

**DISCOURSE ANALYSIS IN KANNADA-ENGLISH  
BILINGUAL INDIVIDUALS WITH TRAUMATIC BRAIN  
INJURY**

**Thesis submitted to the University of Mysore,  
for the award of degree of  
Doctor of Philosophy (Ph. D) in Speech Language Pathology**

*By*

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March, 2013**

## DECLARATION

I declare that the thesis entitled '**Discourse Analysis in Kannada-English Bilingual Individuals with Traumatic Brain Injury**', which is submitted herewith for the award of degree of doctor of Philosophy in Speech-Language Pathology at the University of Mysore, Mysore is the result of work carried out by me at All India Institute of Speech and Hearing, Mysore, under the guidance of Dr. Shyamala K.C., Prof. & Head, Department of Speech-Language Pathology, All India Institute of Speech and Hearing, Mysore- 570006. I further declare that the results of this work have not been previously submitted for any degree.

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## CERTIFICATE

This is to certify that this thesis entitled '**Discourse Analysis in Kannada-English Bilingual Individuals with Traumatic Brain Injury**', submitted by Ms. Hema N. for the degree of doctor of Philosophy in Speech-Language Pathology, to the University of Mysore, Mysore is the result of the work done by her at All India Institute of Speech and Hearing, Mysore, under my guidance. I further declare that the results of this work have not been previously submitted for any degree.

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## **ABSTRACT**

*Introduction:* TBI constitutes a major health problem which has been acknowledged recently by World Health Organization's (WHO's) Task Force on Mild Traumatic Brain Injury. The results of such research are a necessary prerequisite for designing preventive, therapeutical rehabilitative and general health care measures in order to minimize the burden of this condition on the individual and on society. As early as 1984, Milton, Prutting, and Binder stated that survivors of brain injuries "talk better than they communicate", meaning they often speak fluently and without an unusual number of grammatical errors but fail to communicate their intents effectively and efficiently. This can be mainly assessed at discourse level. Besides, there is a need to study discourse in different languages and their combinations as is prevalent in the present urban India with multitude of languages. Since in our country, in spite of good acquired literacy in English, native languages only are preferred at home while English is largely used in the work environment. Considering such bilingualism as another factor that may influence the cognitive-linguistic impairment in these individuals is the need of the hour, in Indian context. For these reasons, it has been a long sought goal of TBI researchers to understand if any speech and language impairments in terms of cognitive-communicative deficits are present or not after head injury.

*Aim:* The aim of the present study was to investigate discourse abilities in Kannada-English bilingual individuals with non-aphasic traumatic brain injury as compared to neuro-typical adults.

*Method:* The study considered 20 neuro-typical adults and 20 individuals with non-aphasic traumatic brain injury. Discourse abilities in conversation, narration and picture description tasks were profiled in them. These discourse genres were analyzed qualitatively and quantitatively using Discourse Analysis Scale (Hema & Shyamala, 2008) and T-unit based analysis (Hunt, 1970) respectively.

*Results & Discussion:* Discourse production and analysis distinguished non-aphasic individuals with traumatic brain injury in clinical group from those of neuro-typical adult participants. There was a differential performance in Kannada and English language only in clinical group. Participants in the clinical group had difficulty in all

the three discourse genres at both propositional and non-propositional aspects of qualitative discourse analysis. And in case of quantitative analysis, the clinical group showed difficulty at thematic level and sentential level.

*Conclusion:* Communication is clearly a manifestation of cognition as observed in the present study. The cognitive-communication deficits in bilingual non-aphasic individuals with traumatic brain injury were found reflected in their discourse genres at different levels. The study recognizes the importance of some linguistic variables like syntax, semantics and pragmatics with respect to discourse in different languages which help in differentiation of the non-aphasic individuals with traumatic brain injury from that of neuro-typical adults. The qualitative and the quantitative analysis of discourse genres strengthens the role of speech-language pathologists in the identification, diagnosis, and treatment of cognitive-linguistic deficits as consequences of traumatic brain injury which is well documented in the present study.

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## **CHAPTER 1**

### **INTRODUCTION**

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1.5 Need For The Study



Originally the word 'discourse' comes from Latin '*discursus*' which denoted 'conversation speech'. A complex system of cognitive and linguistic processes underlies the everyday use of language. Language can be viewed and analyzed on many levels. One of them is, "language in use" or discourse. Discourse is the "continuous stretches of language or a series of connected sentences or related linguistic units that convey a message" (Cherney, 1998). Furthermore, "discourse is functional communication" (Cherney, 1998).

### **1.1 Discourse Analysis**

Discourse analysis (DA), as a tool in speech and language assessment research and clinical analysis, is a relatively recent development when compared to other forms of analysis, for example articulatory and syntactic. DA 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). DA may be based on either monologue or conversation. These are further divided into procedural, expository, conversational and narrative. Procedural discourse is describing the procedures involved in performing an activity. Expository discourse is conveying information on a single topic by a single speaker. Conversational discourse is the one which conveys information between a speaker and listener or among speakers and listeners to exchange ideas, thoughts, and feelings. And narrative discourse is a description of events. The use of this analysis remains largely limited to research and within academic settings, mainly as a result of the 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 & Bombard, 1998). It is often not the assessment of choice due to its apparent time-consuming nature and the overwhelming number of options available (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).

## **1.2 Methods of Assessment of Discourse**

There are several ways of analyzing discourse, one is qualitative and the other is quantitative method of analysis. The qualitative method include propositional and non-propositional analysis and quantitative include T-unit based analysis. The propositional analysis 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 task use the ‘Discourse Analysis Scale’ given by Hema and Shyamala (2008), as a qualitative method and T-unit based analysis as a quantitative method. The T-unit based quantitative analysis involves sequential discourse episode counts and proportion of utterances in an individual episode. In the present study only these two types of analysis procedures are used. These measures are described briefly in the method section.

## **1.3 Discourse Genre**

Discourse can be elicited through many ways. As in the present study the discourse genre 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. Conversation 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 this discourse condition is perhaps the most valid means of determining the interpersonal verbal communication abilities of any individuals with or without TBI. 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. But that the percentage of correct information units produced during structured discourse tasks could be used to predict performance under conversational conditions with a high degree of accuracy.

Second, narration involves organizing and expressing a complex series of events. This process is fundamental for human communication, yet we know little about its linguistic basis. The narrative production involves at least two components, a linguistic component and an executive resource component (Mar, 2004). Linguistic functions implicated during narrative production include phonology, morphology, lexical, and grammatical processing, which serve to express the content of an event. The second component is cognition, involves higher level of cognitive processing that play a crucial role in organizing a narrative, such as sustaining a theme through working memory, and maintaining event coherence through top-down planning and organization. These linguistic and cognitive processes must successfully interact to produce a sequence of utterances that relate to each other in expressing a logical and coherent narrative.

Third, picture description is one of the interesting and simplest tasks to elicit a discourse sample that remains as a most commonly used task during diagnostic assessment. Since it is having the added benefit of 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 day-to-day communicative interactions are very highly influenced by a few extraneous variables like world's knowledge and individual's intelligence. Using standard picture stimulus possibly may rule out these extraneous variables and make the task more equivalent among different participants. Thus, it may help in making differential diagnosis among the clinical populations and also establish the normative data in discourse. Thus, analysis of discourse varies with respect to discourse elicitation task. In this present study, two different methods of assessment/analysis of these discourse genres are done.

#### **1.4 Factors Influencing Discourse Production**

There are several factors which influence discourse production. They include, age, education, profession, cognition, proficient usage of more than single language (bilingualism/multilingualism), psychological status of the individual, etc. These factors individually or in combination may influence the spoken language production. A few factors which were considered relevant for the present study are discussed in brief. These factors included bilingualism and individuals with TBI.

##### **1.4.1 Bilingualism.**

One of the greatest challenges when writing about bilingualism is finding a theoretical framework that clearly defines what bilingualism is and who is bilingual. In fact, researchers and theorists diverge on their definitions of who is purely monolingual and who is bilingual. The definitions of bilingualism in the twentieth and twenty-first centuries have evolved from a purely dichotomous approach (monolingual vs. bilingual) towards seeing bilingualism as a complex phenomenon that includes key features. According to current linguistic, psychological, and neurolinguistic approaches, the term "bilingual" refers to all those people who use two or more languages or dialects in their everyday lives (Grosjean 1994). By considering this definition into account, it is found that more than half of the world would be considered as bilinguals (Giussani, Roux, Lubrano, Gaini & Bello, 2007).

***1.4.1.1 Types of bilingualism.***

The degree of proficiency in each language can be considered as a key attribute of bilingualism (Valdés & Figueroa, 1994; Romaine, 1995). Authors argue that bilingualism can be determined by how fluent the speaker is in each language and to what degree the proficiency in both languages can be compared. That is, to them, one can be a balanced bilingual with equal proficiency in both languages, or have a dominant language and be bilingual nonetheless. May, Hill, and Tiakiwai (2005) consider age as an important factor. They draw the distinction between a simultaneous bilingual, a child who acquires two languages simultaneously as a result of family or societal bilingualism, and a sequential or consecutive bilingual, is a person who acquires a second language after the first language, almost always in puberty or adulthood and often as the result of education. May, Hill, and Tiakiwai (2005) also maintain that the social status of the two languages and the personal circumstances of the bilingual individuals will have an impact on how they see themselves with reference to the two languages, and whether they will consider themselves bilingual or not. Consequently, they argue the importance of distinguishing between the elective or elite bilingual and the circumstantial bilingual. García (1997) and May (2002a, 2002b) point out that a person becomes an elite bilingual when the acquisition of the second language (L2) is actively promoted and supported, and it is clearly seen as a social and cultural asset. This individual usually becomes bilingual by means of the acquisition of an elite language in an educational setting. In this case, the learners/users of the second language (L2) are elective bilinguals, for they decide of their own free will to acquire the second language at school or in a study abroad context. Their native language (L1) and culture are not endangered by the acquisition of the L2. On the other hand, circumstantial bilinguals are those individuals who have to learn/acquire an L2 in order to survive in a given society without having a choice. This is the case of societal language usage indigenous to learn the language of their new work or of their society in order to find a place in the mainstream society at the risk of losing or balancing with their native language. In the present study this definition is relatively considered.

#### ***1.4.1.2 Bilingualism and language organization.***

Investigations into the neural manifestations of bilingualism have included functional comparisons of a variety of linguistic and non-linguistic domains and studies of cortical anatomy. The earliest studies of the cortical correlates of bilingualism used behavioral approaches to examine hemispheric dominance differences between monolinguals and bilinguals, early- and late-acquired bilinguals, and high- and low-proficiency bilinguals. Hull and Vaid's (2007) meta-analyses of the data reveal that early bilinguals were the only group that showed consistent bilateral dominance for language. Late bilinguals and monolinguals showed left-hemisphere dominance. Second-language proficiency was found to be less relevant than age of acquisition in influencing language lateralization. Thus, it is proposed that a period of early monolingual development establishes left-hemispheric dominance that is then preserved irrespective of future bilingual experience. Interestingly, this decreased hemispheric dominance in early bilinguals also is observed for non-linguistic tasks. For example, Hausamann, Durmusoglu, Yazgan and Gunturkun (2004) used visual hemi field presentation to investigate face discrimination, a right-hemisphere-dominant task. Turkish-German bilinguals were more bilaterally dominant than both Turkish and German monolinguals.

However, according to Hernandez, Martinez and Kohnert (2000) and Kim, Relkin, Lee and Hirsch (1997), neuroimaging studies have failed to find consistent laterality differences between monolingual and bilingual speakers. But when neural activations for single words are meta-analyzed on the basis of the lexical processes involving semantic access, phonological code retrieval, or articulation, bilinguals and monolinguals activate similar neural regions for individual lexical processes (Indefrey & Levelt, 2004; Indefrey, 2006). What is different, though, is that specific perisylvian regions may differentially activate for individual languages of the bilingual speaker. The left inferior frontal gyrus (LIFG) has been shown to respond differentially to L1 and L2, either with different foci for L1 versus L2 or with greater volume of activation for L2 (Kim, Relkin, Lee & Hirsch, 1997). This differential activation is found only for late bilinguals and for specific linguistic tasks.

Marian, Shildkrot, Blumenfeld, Kaushanskaya, Faroqi-Shah and Hirsch (2007), for example, found that the foci of LIFG activations differed across L1 and L2 for lexical and phonological processing, but not for orthographic processing. But for syntactic processing, Saur et al (2009) found differential activation at LIFG for L1 and L2. Thus, LIFG appears to make distinctions between L1 and L2 for linguistic processes for which it serves a unique role and further research is needed to elucidate these patterns. Moreover, bilingualism may have ramifications on cortical morphology. Using high-resolution magnetic resonance imaging scans and an analysis procedure called voxel-based morphometry which checks the covariance of the cortical structures, Mechelli and colleagues (2004) found that individuals with higher proficiency in and/or earlier age of second-language acquisition had a higher gray matter density in the left inferior parietal cortex.

The scarcity of direct comparisons of bilingual versus monolingual brains during language processing tasks and the need for tasks involving more complete levels of language competence, for example at morphological and syntactic levels leaves unanswered questions about the similarities and differences between monolingual and bilingual brains. First, it is still equivocal as to whether bilinguals recruit the same classic language areas in the same manner, for the same functions of language processing, and with the same location and extent as monolinguals including the superior temporal gyrus (STG; Brodmann's area 42/22), which is known to be important in phonological processing (Zatorre & Belin, 2001; Petitto, Zatorre, Gauna, Nikelski, Dostie, & Evans, 2000), and the left inferior frontal cortex (LIFC), this is a large left inferior frontal area that has been typically observed to participate in all aspects of language processing, including morphosyntax, semantics, and phonology. It incorporates pars triangularis and pars opercularis including the classic Broca's area (Price, 2000; Foundas, Eure, Luevano, & Weinberger, 1998) and spans Brodmann's areas 47, 45, 44, and 6 (Hagoort, 2005). Second, the anatomical studies noted above suggest that there are structural changes in a person's brain as a result of extensive bilingual exposure, including enlargement of brain areas such as the inferior parietal cortex (Mechelli et al., 2004). To summarize, bilateral processing of language (and other nonverbal tasks) is most likely to occur only in early bilinguals. Monolinguals and bilinguals use similar neural regions for language processing. However, late bilinguals are likely to activate the LIFG differentially for processes in which the

LIFG plays a crucial role, such as phonological and syntactic processing. Finally, bilinguals have greater gray matter density than monolinguals in certain left hemisphere regions. When speaking to each other, bilingual people can quickly switch between two languages, usually choosing the word or phrase from the language that best expresses their thoughts. But bilinguals rarely slip into a second language when speaking to people who only speak one language. Being bilingual has certain cognitive benefits and boosts the performance of the brain, especially one of the most important areas known as the executive control system. Speaking more than one language keeps the brain in shape and speeds up the mental function (Jha, 2011). In agreement with these studies on neuro-typical adult bilinguals, the same language areas (locations) for language processing can be considered and can predict a correlation with traumatically brain injured individuals.

#### **1.4.2 Traumatic brain injury (TBI).**

Traumatic brain injury (TBI) has been defined as “an insult to the brain, not of the degenerative or congenital nature, but caused by an external force, that may produce a diminished or altered state of consciousness” (National Head Injury Foundation, 1985). According to this definition, TBI is caused by an external force and thereby excludes brain insult resulting from other neurological conditions. Road traffic accidents, falls, sports, industrial accidents and assaults are the most frequent causes of TBI. TBI is also known as acquired brain injury, head injury, or brain injury, causes substantial disability and mortality. It occurs when a sudden trauma damages the brain and disrupts normal brain function. TBI may have profound physical, psychological, cognitive, emotional, and social effects. The diagnosis of mild TBI appears to be vastly under diagnosed in the setting of systemic trauma and even in trauma centers.

The relationship between head injury and loss of speech has been known for thousands of years as seen in the reports of the Egyptian surgeons between 3000-2500 BC (Breasted, 1930). Descriptions of such cases have, however, been few until the time of the first and second world wars. During these periods a great amount of literature on post-traumatic aphasia secondary to penetrating wounds was published. In contrast with this abundant literature, the paucity of works on post-traumatic



aphasia in peace time is striking, and this is especially true in cases of aphasia secondary to closed head injuries.

It is found in the literature that traumatic brain injury is one of the most common neurological insults that affect individuals discourse ability. The discourse abilities of adults who have suffered TBI have revealed that although these individuals display “normal” or “near normal” language on traditional aphasia tests, they demonstrate varying levels of impairment in the coherence, cohesion, and informational content of their extended verbal production (Hagen, 1984; Ylsivaker & Szekeres, 1989, 1994; Hartley & Jensen, 1991; Coelho, Liles, & Duffy, 1994). These individuals are found to be lacking in many areas of conversational discourse (Allen & Brown, 1976; Milton, 1984; Mentis & Prutting, 1991). One of these is interactional aspects or non-propositional aspects. This deals with the behaviors that reflect as the reciprocal nature of conversation and the joint co-operation required for the participant (Mc Tear, 1985). Here they experience difficulty when called upon to function as a discourse partner. Another area is propositional aspects of conversation. This deals with how discourse is organized with respect to overall plan, theme or topic and how individual utterances are conceptually linked to maintain unity (Hartley, 1995). Here they exhibit inability to focus on, filter relevant versus irrelevant stimuli, organize, retain and retrieve the stimuli in a conversation, whether in conversation or referential communication.

One of the oldest forms of discourse analysis proposed by Grice (1975), in his model of conversational practice was within a pragmatic framework to measure the success of conversation. According to him there are four levels, first the quantity where the speakers will say no more than/less than what is required. Second the quality where the speaker will say only what he/she believes to be true and has evidence for. Third the relevance where the speaker will say only what is relevant. Last the manner, here the speaker will impart information in manner, which is clear and unambiguous. All these different forms of discourse fall under the label generative discourse. This discourse which is the combination of cognitive and linguistic processes should be more sensitive to characterize the types of communication deficits that various clinical populations may exhibit in the context of daily living.

The communication of people with acquired brain injury (ABI) differs from that of people without neurological injuries. As early as 1984, Milton, Prutting, and Binder stated that survivors of brain injuries “talk better than they communicate”, meaning they often speak fluently and without an unusual number of grammatical errors but fail to communicate their intents effectively and efficiently. Professionals label this type of language disorders as cognitive-communication impairment and define it as a decreased ability to perform language-based activities because of a deficit in one or more cognitive functions underlying communication (eg. Attention, executive functioning, memory etc) (ASHA, 1991; Coelho, 2007).

Research has identified measures that successfully differentiated the discourse of individuals with brain injury from that of healthy participants on productivity, t-units, cohesion and story grammar (Cherney, Shadden & Coelho, 1998). Rousseaux, Ve´rigneaux, and Kozlowski (2010) attempted to correlate these measures with performance in aspects of cognition thought to underlie discourse performance (e.g., memory, attention, executive function). In their results they have established a link between the aspects of discourse (cohesion) and cognition (executive function and working memory) at a moderate level with inconsistent correlations. Thus, it is one of the critical challenge remained for the future research.

A study by Bara, Cutical and Tirassa (2001), compared TBI and neurologically intact individuals in their ability to interpret video vignettes in which actors depicted simple and complex standard communicative acts (i.e., direct and indirect requests, deceit, irony) and failures of communication using only nonverbal cues such as pointing gestures (e.g., pointing toward the person to whom the speaker refers). The results showed that the two groups did not differ in their interpretations of simple and complex communicative acts, but that individuals with TBI performed significantly worse in interpreting deceit, irony, and failures than their neurologically intact counterparts did. These findings suggest that individuals with TBI show impaired ability to draw inferences from nonverbal cues in interpreting particular communicative acts. There is widespread consensus that TBI, and acquired brain injury more broadly, can result in cognitive-communication deficits and that these deficits interfere with academic, vocational, and interpersonal pursuits (Coelho, 2007).

***1.4.2.1 Relationship between cognition and communication.***

Cognition is a general term that refers to both stored knowledge and the processes for making and manipulating knowledge. The linguistic representations for objects are part of long-term lexical memory and must be retrieved and brought to consciousness. If the simple act of naming access to long term memory, association, recognition, decision making, motor planning and self monitoring, it can be imagined how much the cognitive skills are required for the act of communication. According to Fodor (1975) the brain appears to have a language of its own and the output of this language is translated to human natural language. To ensure what a person intend to say, he has to monitor the utterances and make judgment about them. Thus, the production of linguistic information uses semantic memory, lexical memory, working memory, motor procedural memory and the central executive system. Linguistic comprehension ultimately involves deriving the right concepts and propositions. It is the product of sequential and parallel processes that involves many parts of the nervous system. Hence the production and comprehension of language cannot be separated from cognition. Rather, communication is a manifestation of cognition. Individuals with TBI have difficulty in processing linguistic information because they have trouble in thinking and planning and organizing ideas. This is because the information-processing abilities at sentence level are disturbed due to diffuse injury. Thus, discourse relies on the interaction of both linguistic in terms of comprehension and expression and non-linguistic knowledge, especially the non-linguistic systems of executive control and working memory (Cannizzaro & Coelho, 2002). But, a study by Melissa, Duff, Bilge, Lindsey and Turkstra (2012) review the basic principles of distributed cognition and the implications for applying this approach to the study of discourse in TBI individuals with cognitive-communication disorders. A core theoretical principle of distributed cognition is that cognition, learning, and knowledge are not confined to an individual but rather are distributed across individuals and the environment. From this perspective, the unit of analysis is not an utterance, an individual, or a specific domain of cognition with the individual. But it is a framework for understanding interaction among communication partners, interaction of communication and cognition, and interaction with the environments and contexts of everyday language use. In support to this Hutchins (2011) distributes three ways of cognitive processes when observing human activity. Firstly, cognitive

processes may be distributed across the members of social groups. Second, cognitive processes may involve coordination between internal and external (material or environmental) structure. Third, cognitive processes may be distributed through time in such a way that the products of earlier events can transform the nature of later events.

### **1.5 Need For The Study**

A study by Gururaj (2011) on traumatic brain injuries revealed that the road accidents in India are increased by 1.4% during 2009-10. In total, 4,15,855 road accidents were reported, that resulted in death of 1,26,896 persons with an accident severity index of 30%. The annual mortality rate was 10.9/1,00,000 population. In Bangalore 5,705 were injured and 742 were killed, in Karnataka 61,697 were injured and 8,714 were killed and in India 4,66,649 were injured and 1,26,896 were killed. Thus, TBI constitutes a major health problem which has been acknowledged recently by some authorities. For example, The World Health Organization's (WHO's) Task Force on Mild Traumatic Brain Injury had arrived at a conclusion, that "there is evidence that mild traumatic brain injury is an important public health problem" and that "we need more high quality research in this area" (Cassidy et al., 2004). The results of such research are also a necessary prerequisite for designing preventive, therapeutical rehabilitative and general health care measures in order to minimize the burden of this condition on the individual and on society. For these reasons, it has been a long sought goal of TBI researchers to understand if any speech and language impairments in terms of cognitive-communicative deficits are present or not after head injury. If present, the researchers' goal can be to diagnose the condition and help develop treatment strategies that may assist these patients with cognitive-linguistic recovery.

It is well documented that individuals with TBI do not always produce proficient conversational discourse because they have difficulty in maintaining appropriate pragmatic and social skills. They may also have a difficulty producing proficient discourse due to impaired attention, planning, organization and self-regulation processes (Bond-Chapman, Levin, Matejka, Harward, & Kufera, 1995; Cherney, Shadden, & Coelho, 1998). Previous research on conversational discourse of individuals with TBI has depicted their incompetence and communication difficulties.

It is important to evaluate communication rather than linguistic knowledge in TBI because linguistic knowledge is maintained but the ability to communicate/ or use that knowledge to share information is affected in these individuals. Conversation and “social chat” have been recognized as the affected communication genres for individuals with TBI (Davidson, Worrall, & Hickson, 2003; Larkins, Worrall, & Hickson, 2004). Conversation with individuals with TBI has been described as more effortful and less enjoyable because their partners are required to use “additional” prompting to maintain the topic and flow of conversation (Coelho, Youse, & Le, 2002). Conversational interaction between friends, parents and siblings of individuals with TBI has been occasionally included in clinical studies, and it is difficult to identify if discourse performance of individuals with TBI may be improved in the presence of people who share meaningful (social) relationships with them. But this may cause bias in choosing discourse partners and does not provide an accurate judgment of TBI individuals’ discourse ability. So, discourse studies in the TBI literature have focused on “conventional” genres such as monologues, narratives, procedural texts and structured conversations to make the task more controlled from a research point of view. To check the interactional communication of everyday, conversational discourse genre has to be used. Previous investigations have demonstrated that individuals with TBI experience difficulty with communicative effectiveness across a number of discourse production genres.

The studies on bilingual children suggest that they may produce different narratives in each of their two languages (Minaya-Portella, 1980; Dart, 1992; Bayley & Pease-Alvarez, 1997; Guiterrez-Clellen, 2002; Silliman, Huntley Bahr, Brea, Hnath-Chisolm, & Mahecha, 2002). The left inferior frontal gyrus (LIFG) has been shown to respond differentially to L1 and L2 (Kim, Relkin, Lee & Hirsch, 1997). As of now, research in this area is inconclusive as to whether these differences are a matter of variation related to bilingual language proficiency, linguistic structural differences, and/or cultural differences related to the acquisition of each of the two languages and neuro-pathological conditions due to trauma. As a clinical implication it demonstrates the importance of considering the language of testing when eliciting discourse from any bilingual population and the type of the discourse genre for eliciting a productive and complex discourse. Thus, the differences can be teased apart, by determining differences existing in the different languages of different

discourse genres of bilingual adult with relatively equal proficiency in both languages. In the present study an effort has been made to study the discourse ability of individuals with TBI in their L1 (Kannada) and L2 (English) using three different discourse genres like conversation, narration and picture description. Thus, an attempt has been made to study the similarities or differences between L1 and L2 of all the participants' discourse genres.

## CHAPTER 2

### REVIEW OF LITERATURE

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Traumatic brain injury (TBI) is the leading cause of death and disability in individuals less than 45 years of age in industrialized countries (Bruns & Hauser, 2003). Each year an estimated 1.4 million Americans experience a TBI and 80,000 to 90,000 suffer long-term substantial loss of function (Rutland-Brown, Langlois, Thomas, & Xi, 2006). Clinical studies have shown that 10–15% of individuals with mild TBI have persistent cognitive and behavioural complaints. Outcomes from moderate TBI are much less favourable with some estimates suggesting that 50% of these individuals endure long term injury-related disabilities (Kraus & McArthur, 2005). This places an enormous economic burden on the U.S. healthcare system with an estimated cost of \$9–10 billion in acute care and rehabilitation annually. This cost is in addition to lost earnings, social services, and the cost to family members who must care for TBI survivors. TBI also represents a global healthcare crisis with an estimated 2% of the world's population suffering from chronic symptoms of brain trauma, equating to more than 120 million individuals (National Institute of Health-NIH, 1998; Ragnarsson, 2002).

Data for the years 2008 – 2010 collected under the Bangalore road safety and injury prevention program conclusively point that as per National Crime Records Bureau (NCRB) data for India, Road Traffic Injuries (RTI) accounted for 27%. Even though injuries occur in all age groups and both sexes, young people in the age group of 15 to 44 years are affected most. It is most unfortunate that the productive and resourceful sections of Indian society are succumbing to injuries, as this age is characterized by hope, drive and ambition. This particular section of the society is not only the most crucial age for individuals and families, but also for building the nation. The gender distribution of injuries varies as per cause, but the male predominance is glaring and visible. Nearly 3–4 men are killed and injured for every female death in road crashes. Globally, RTIs alone result in economic losses to the tune of \$ 518 billion every year & a \$ 65 billion in low and middle income countries (WHO, 2004b). Much of this impact is seen in low and/or middle-income countries (LMIC) like India with a economic loss of 20-30 thousand at the time of accident. (Gururaj, 2011). For these reasons it has been a long sought goal of TBI researchers to understand the cognitive-linguistic deficits after TBI to help develop treatment strategies that may assist these patients with cognitive recovery.



## **2.1 Traumatic Brain Injury (TBI)**

Traumatic brain injury is one of the most common neurological insults that affect individuals discourse ability. TBI has been defined as “an insult to the brain, not of the degenerative or congenital nature, but caused by an external force, that may produce a diminished or altered state of consciousness” (National Head Injury Foundation, 1985). According to this definition, TBI is the result of an external mechanical force applied to the cranium and the intracranial contents, leading to temporary or permanent impairments, functional disability, or psychosocial maladjustment. TBI can manifest clinically from concussion to coma and death. Road traffic accidents, falls, sports, industrial accidents and assaults are the most frequent causes of TBI.

### **2.1.1 Classification of traumatic brain injury.**

Brain injury arising from head trauma is generally classified on the external observation and the clinical performance as non penetrating (closed) injuries and penetrating (open) brain injuries. Closed head injuries tend to be associated with diffuse brain pathology and in contrast, penetrating head trauma tends to lead to more focal brain pathology, although diffuse effects also can be observed. The closed head injury patients show more evident speech and language communication disorders and are usually referred to speech language pathologists. There is diverse and complex typical cognitive communication long-term impairments reported to follow closed head injury (CHI) yet there are no proper assessment tools. Recently research has been shifting towards nonstandardized assessment of higher cognitive functioning including discourse, pragmatics, and measures of executive function (Ylvisaker & Szekeres, 1994).

The most common classification system for TBI severity is based on the Glasgow Coma Scale (GCS) score determined at the time of injury (Appendix- A). The GCS is a 3 to 15 point scale used to assess a patient's level of consciousness and level of neurologic functioning. It consists of 3 sections, each of which is scored as best motor response, best verbal response, and eye opening. The total of the motor, verbal, and eye-opening scores range from 3-15 and indicates the severity of a TBI. A total score of 3-8 for the 3 sections indicates severe TBI, a score of 9-12 indicates

moderate TBI, and a score of 13-15 indicates mild TBI and a score of <3 indicates very severe as modified from Jennet and Teasdale (1981) (Table-1). The duration of coma or loss of consciousness (LOC) is another measure of the severity of a TBI (Greenwald, Burnett & Miller, 2003). The mild to moderate stage is more sensitive for the discourse measurement.

Table 1.

*Classification of TBI.*

<b>Severity</b>	<b>GCS Score</b>	<b>Duration of coma</b>	<b>Features</b>	<b>Discourse</b>
Mild	13-15	< 30 min	Unconsciousness and clouding of consciousness with subsequent complete recovery.	Usually intact & can attend to single sentence questions.
Moderate	9-12	30min to 6 hrs	Unconsciousness and clouding for up to 24 hours	Require prompting to begin conversation. Poor planning and organization.
Severe	3-8	>6 hrs	>24 hours without signs of brainstem dysfunction	May respond to verbal utterance restricted to close ended questions only.
Very severe	<3	Upto 1 week	Signs of brainstem dysfunction	Complete nil in their verbal utterance.

A study by Choi (1992) focused on the recovery of cognitive function in patients with head injuries and used the Mini Mental State Examination (MMSE) score and its correlation with demographic (GCS score) and social data. Data on 77 patients with minor head injuries were analyzed. The MMSE scores one month after injury and at discharge were significantly lower in patients with head injuries that included skull fractures than in patients without skull fractures, suggesting lower cognitive function in patients with skull fractures. The MMSE score one month after the injury (at discharge) was highly correlated with the duration of unconsciousness (low GCS score). Thus, MMSE score one month after injury and at discharge were highly correlated with the GCS scores at admission, three days after admission, and one week after admission. Since both GCS and MMSE belongs to neuropsychological

assessment. In the present study, both GCS score and MMSE score are considered as main selection criteria to choose the participants for the study.

Another injury classification based on clinical and neuroradiological evaluation has been proposed. In this classification, TBI would be described as focal or diffuse. Focal injuries include scalp injury, skull fracture, and surface contusions and are generally caused by contact. Diffuse injuries include diffuse axonal injury (DAI), hypoxic-ischemic damage, meningitis, and vascular injury. These are usually caused by acceleration-deceleration forces. These 2 forms of injury are commonly found together. Diffuse axonal injury (DAI) is one of the most common and important pathologic features of TBI. It constitutes mostly microscopic damage, and it is often not visible on imaging studies. The main mechanical force that causes DAI is rotational acceleration of the brain, resulting in unrestricted head movement. Rotational acceleration produces shearing and tensile forces, and axons can be pulled apart at the microscopic level. Microscopic evaluation of the brain tissue often shows numerous swollen and disconnected axons. Rapid stretching of axons is thought to damage the axonal cytoskeleton and, therefore, disrupt normal neuron function. Contusions are distinct areas of swollen brain tissue. They are typically found on the poles of the frontal lobes, the inferior aspects of the frontal lobes, the cortex above and below the operculum of the sylvian fissures, and the lateral and inferior aspects of the temporal lobes. These changes due to head trauma can be observed in brain using many imaging studies. By studying the neuro-pathophysiological changes of brain, TBI can be diagnosed.

### **2.1.2 Neuropathophysiology of TBI.**

Brain injury arising from head trauma is of two broad types: non penetrating (closed) injuries and penetrating (open) brain injuries. The pathologies associated with closed head injury are categorized into two types: Primary injury and Secondary injury. The two main mechanisms that cause primary injury are contact (example- an object striking the head or the brain striking the inside of the skull) and acceleration-deceleration. Primary injury due to contact may result in injury to the scalp, fracture to the skull, and surface contusions. Primary injury due to acceleration-deceleration results from unrestricted movement of the head and leads to shear, tensile, and

compressive strains. These forces can cause intracranial hematoma which is the most common cause of death and clinical deterioration after TBI. Hematomas are categorized as epidural hematomas, these are usually caused by fracture of the temporal bone and rupture of the middle meningeal artery. With epidural hematomas, clotted blood collects between the bone and the dura. Because the source of bleeding is arterial, this type of hematoma can grow quickly and create pressure against the brain tissue. Subdural hematomas, such hematomas are usually caused by rupture of the bridging veins in the subdural space. They can grow large enough to act as mass lesions, and they are associated with high morbidity and mortality rates. Subarachnoid hematomas result from damage to blood vessels in the posterior fossa stalk. Primary injury also includes injury to cranial nerves and the pituitary stalk. Other major types of primary brain injury are contusions, lacerations, basal ganglia haematoma and diffuse axonal injury. To explain each in detail a contusion consists of multifocal capillary haemorrhages, vascular engorgement and edema in an area of brain tissue. The injury can be at the site of the blow or impact of brain tissues to the skull (coup contusions) or at the opposite point to the trauma (contra-coup). When a brain contusion is sufficiently severe, it causes a visible breach in the continuity of the brain causing lacerations. Lacerations are more associated with penetrating head injuries than with closed head injuries. Basal ganglia haematoma occurs in approximately 3% of severe closed head injuries. Although it can occur in isolation or in association with other intracerebral haematomas and contusions, it is mostly found in subjects who have severe diffuse white matter injury (Coloquboun & Rawlinson, 1999). Diffuse axonal injury is usually caused by rotational acceleration in which there is rotation of head around its own center of gravity, which results in permanent stretching or rupturing of neuronal fibers causing diffuse axonal injury (Pang, 1985; Bigler, 1990). It leads to damage of the axons in the white matter of brain produced at the moment of impact and is widely considered to be the primary cause for closed head injury. The degree of diffuse axonal injury is directly related to duration and severity of coma and the clinical outcome.

Secondary injuries may occur immediately after trauma and produces effects that may continue for a long time. Injury may result from impairment or local declines in cerebral blood flow (CBF) after a TBI. Decreases in CBF are the result of cerebral

edema, intra cranial hemorrhage, ischemic brain damage, increased intra cranial pressure, cerebral atrophy and ventricular enlargement. As a result of inadequate perfusion, cellular ion pumps may fail, causing a cascade involving intracellular calcium and sodium. Resultant calcium and sodium overload may contribute to cellular destruction. Excessive release of excitatory amino acids, such as glutamate and aspartate, exacerbates failure of the ion pumps. As the cascade continues, cells die, causing free radical formation, proteolysis, and lipid per oxidation. These factors can ultimately cause neuronal death. This neurological defect leads to communication disorders. These are due to complex biomechanical forces associated with head injury. The biomechanical forces involved in closed head injury include, compression, acceleration, deceleration and rotational acceleration which result in brain tissue being compressed, torn apart by the effects of tension and sheared by rotational forces (Murdoch, 1990).

### **2.1.3 Pathological hallmark and deficits in TBI.**

In TBI, frontal and temporal lobe injuries are most commonly reported, as these are the areas which are more vulnerable for the impacts. While temporal lobe pathology following TBI is associated with disorders of memory and new learning, frontal lobe damage and diffuse axonal injuries have been associated with loss of regulatory control over cognitive processes and affective and social behaviours. Alternately other individuals with TBI may demonstrate impoverished communication because of their inability to formulate and initiate goal-directed behaviour and reduced desire to express emotion or engage in social interaction (Auberach, 1986). Owing to the presence of these difficulties, individuals with TBI display impaired social perception, self image and self analysis. The common discourse impairments include verbosity, disorganization, tangentiality, concreteness, and an inability to interpret or utilize conversational inference. However, overall, little exploration of these deficits has occurred to date.

Other discourse difficulties which have been described following TBI include poor topic maintenance, difficulty meeting the informational needs of the listener, difficulty making contributions which sustain and extend an interaction, poor cohesion, and reduced communicative efficiency (Hagen 1984; Mentis & Prutting

1991; McDonald, 1993; Coelho, 1995; Hartley, 1995; Snow, Douglas, & Pansford, 1995, 1997). Because TBI is typically associated with diffuse axonal injury, together with focal injury to the frontal and temporal regions, Pansford (1995) reports that these discourse changes are generally considered to reflect neurobehavioural impairment, rather than aphasia. That is, TBI is thought to be associated predominantly with a disturbance of language use, rather than language form.

A number of workers have also emphasized the relationship between discourse impairment and underlying cognitive dys-function (Hagen 1981; McDonald & van Sommers, 1993; Hartley 1995; McDonald & Pearce 1995; Coelho, Liles & Duffy, 1994; 1996). Deficits in areas such as attention/concentration, mental flexibility, planning/organization, and self-regulation, have been implicated as being substantially, if not entirely, responsible for difficulties using discourse appropriately in everyday settings. Observations of non-aphasic patients with focal central nervous system damage implicate frontal cortex in the higher-level processes contributing to narrative skills. For example, patients with executive dysfunction due to prefrontal damage following traumatic brain injury fail to construct cohesive, temporally sequenced speech samples (Ferstl, Guthke, & von Cramon, 1999; Ferstl & von Cramon, 2002). This dysfunction can appear after damage to left or right prefrontal cortex.

## **2.2 Cognitive-Linguistic Deficits After TBI**

It is observed that there are neuroanatomical and neurophysiological changes in brain due to traumatic brain injury. These changes with traumatic brain injury can alter neurocognitive and neurolinguistic skills in any individuals. These skills include cognition and language. Coelho (1995) noted that, because discourse may break down at a number of different levels, samples should be analysed at multiple levels of performance, for example cohesion, productivity, and content. There is evidence that different discourse genres place different cognitive and/or linguistic demands on a speaker, regardless of the presence of brain damage (Coelho, Liles, & Duffy, 1991a; Hartley & Jensen, 1991; Shadden, Burnette, Eikenberry & DiBrezza, 1991). Non-brain-damaged controls have been found to produce longer monologues (both temporally and in terms of the number of utterances) when producing narratives than

when producing procedural discourse. Also, speakers tend to use more complex sentences when producing narratives. Hartley and Jensen (1991) reported that control subjects displayed greater difficulties with clarity of reference when producing procedural discourse, than when producing narratives. Specific observations can be made with respect to discourse deficits in individuals with traumatic brain injury for conversation, narration and picture description task. The discourse can be profiled under different parameters in a specific manner as mention in the following sections.

### **2.2.1 Discourse level.**

The linguistic skills at the level of discourse can be assessed by considering different discourse genre. In the present study conversation, narration and picture description tasks were considered. Sherratt (2007) studied the applicability and utility of using a multi-level discourse-processing model to examine the interaction between levels of discourse produced by individuals without brain damage. A total of 14 narrative and procedural discourse samples were elicited from 32 non-brain-damaged males of different ages and socioeconomic status groups, yielding a total of 394 samples. These samples were analysed in terms of seven broad features like relevance, discourse grammar, clarity disruptors, productivity and syntactic complexity, clausal structures, cohesion and fluency relating to the levels of the multi-level discourse model. Greater relevance was related to more appropriate discourse grammar as well as greater cohesion and syntactic complexity. Longer samples were correlated with an increased proportion of cohesive ties, cohesive errors, and syntactic complexity. An increase in non-specific elements was related to reduced syntactic complexity and cohesion. A higher occurrence of left-branching clauses was associated with increased dysfluency. These correlations are explained in terms of the multi-level discourse model. Thus, it is concluded that using a multi-level discourse processing model one can offer a more realistic perspective of discourse than the analysis of individual aspects. The differential diagnosis of relatively similar discourse impairments (example- following head injury, dementia, right brain damage) may ultimately rely on a comparison of the relative deficits at different levels. Certain discourse features that can be assessed more objectively (example- the number and type of conjunctions) can signal a breakdown at a more conceptual discourse level (example- the linking of propositions to each other at a semantic level). Finally these correlations can provide explanatory

information regarding more subjective concepts that are difficult to define and measure (example- the perception of “relevance” relates to more structured discourse at the macro and micro level). Although this approach to discourse is challenging, it can provide a starting point for more productive investigations of discourse. Thus in the present study, an effort is made to analyze discourse at multiple levels.

### ***2.2.1.1 Studies on T-unit based analysis.***

The discourse analyses procedure begins with the elicitation of a spoken discourse, ideally five sentences or more in length. A variety of elicitation tasks has been described in the previous section and is related to different discourse types. The elicited samples are typically audiotaped and transcribed verbatim. Once transcribed the discourse samples are distributed into more basic units for analysis such as T-units. A T-unit, as described by Hunt (1970), is more reliably identified than sentences and is defined as an independent clause plus any dependent clauses associated with it. Depending on the elicitation task and the focus of the analysis, the actual discourse analysis may take place at a variety of levels, including within sentences, across sentences, and in the case of narration across the entire narration. Each of these levels of analysis will be described in more detail below.

#### ***2.2.1.1.1 Sentence level analyses.***

There are numerous measures that can be generated at the sentence level once the transcribed discourse has been distributed into a basic unit such as T-units. Total number of T-units per discourse might be used as a measure of a participant’s verbal output or productivity for a given task. The total number of subordinate clauses might be tallied for each discourse sample as a measure of the complexity of sentence-level grammar. Various measures may also be combined to generate additional measures like, number of clauses (NC) and number of words per clauses (NWPC). For example, the number of subordinate clauses in each discourse or number of words in each clause divided by the total number of clauses in each T-units gives the number of clause. Such a ratio could be obtained in order to establish sentence level grammatical competence and permit comparisons across discourse samples that vary in length. Liles et al. (1989) reported that their CHI and normal subjects produced longer narratives (more T-units) in story retelling than generation. However, in story



generation both groups used more complex sentences (more clauses per T-unit) than in story retelling. The authors interpreted these results to mean that the subjects intended to retell literally what had been viewed in the film-strip with an effort to reproduce the story in its entirety.

*2.2.1.1.2 Across sentence analyses- Thematic level.*

The measures included in this section are Number of T-unit (NTU) and number of words per T-unit (NWPTU). This mainly include intersentential cohesion, cohesion is defined as structural coherence among the parts of a text (Halliday & Hasan, 1976). Sentences are conjoined by various kinds of meaning relations described as cohesive ties. These cohesive ties can be objectively measured as one T-unit. These ties vary, depending on cognitive-linguistic ability of the speaker. Each of the different types of discourse (e.g. picture description, narration, conversational) is distinct and therefore, requires a different pattern of cohesive use to instantiate the underlying rules of structure appropriate to the creation of coherent discourse. Analysis of intersentential cohesion may involve the sequential occurrence of coherent discourse involving initiating event, describing in a sequence and final description in a word/gist of information. The creation of episodes is evidence of picture description and narrative grammar knowledge, and because this unit is cognitive in nature, it is reasonable to believe that it may be disrupted by brain damage in TBI participants. This level of analysis may, therefore, be sensitive to a level of cognitive disruption not typically investigated in TBI participants. The research by Wyckoff (1984), on the CHI subjects were noted to use significantly fewer cohesive ties per communication unit (roughly equivalent to a T-unit) than the normal controls in both the narrative and procedural discourse tasks. This finding was felt to provide evidence that their discourse lacked continuity. Mentis and Prutting (1987) also noted that their CHI subjects used fewer cohesive ties than the normal subjects in the narrative tasks. However, Liles et al. (1989) reported that the number of cohesive ties (per T-unit) produced by their CHI subjects was the same as the normal subjects for both story generation and story retelling. Thus, in the present study an attempt is made to investigate discourse deficits of bilingual individuals with TBI using the same T-unit analysis.

### **2.2.1.2 Qualitative discourse analysis.**

#### *2.2.1.2.1 Conversation task.*

Conversational discourse samples can be studied and analysed in terms of two broad areas comprising nine different individual measures (Hema & Shyamala, 2008). Due to the complexity and more quantity of data obtained from the individual subjects, the results from all the discourse samples can be profiled under individual measures. These reflect the propositional and non-propositional aspects of conversation. Propositional aspects of conversation include the notion of relevancy, clarity of reference and coherence. It deals with how discourse is organized with respect to overall plan, theme or topic and how individual utterances are conceptually linked to maintain unity (Hartley, 1995). This includes the following sub parameters.

*Discourse structure* evaluates whether the discourse is confusing or not even if it is organized with respect to overall plan, theme or topic and how individual utterances are conceptually linked to maintain unity. Thus, one can comment about the discourse forethought ability and organizational planning of any discourse.

*Communication intent* evaluates whether an individual uses greeting others by themselves or in response to other's greeting, introducing self, starting the conversation, asking for information, asking for assistance in understanding conversation, criticizing the conversation by agreeing or disagreeing to a part in the conversation, imagining events correctly and understanding advancers and blockers in the conversation only in required circumstances or in the entire context of conversation.

*Coherence* assesses for the presence or absence of good relationship between the meaning and context of verbalization with respect to the general topic of conversation or with that of the immediately preceding utterance produced either by interviewer or participants. The literature suggests that, compared to non-brain-injured (NBI) controls, TBI survivors evidence impairment in macrolinguistic abilities, producing discourse that contains less output (Coelho, 2002) and contains deficits in coherence and cohesion (Mentis & Prutting, 1987; Glosser & Deser, 1990; Cannizzaro & Coelho, 2002). Their discourse also contains fewer implied meanings and is more concrete (Tucker & Hanlon, 1998), with more pragmatic errors (Snow,

Douglas, & Ponsford, 1999) than NBI controls. In terms of microlinguistic abilities, their discourse also contains a greater number of syntactic and lexical errors (Glosser & Deser, 1990) than NBI controls. Overall, TBI survivors demonstrate both macrolinguistic and microlinguistic deficits in discourse production.

*Topic management* checks for the presence or absence of irrelevantly introducing topics, rapid topic shift, non coherent topic changes/inappropriate topic changes, perseveration in the topics, responses which expand topics, minimal responses, minimal elaboration and extra elaboration of topics. Sohlberg and Mateer (1989) have noted that pragmatic deficits might be the most pervasive communication problems in adults with TBI. Performance on pragmatic rating scales and analysis of response appropriateness and topic management revealed that TBI individuals experienced difficulty when called upon to function as a discourse partner, whether in conversation or referential communication (i.e. structural exchange on a specific topic requiring extensive listeners' feedback).

*Other discourse parameter* includes *information adequacy* in terms of individual's answer to all the questions during conversation at word level/single sentence level/multiple sentence level. *Information content* is the meaningful and adequate information to all the questions in terms of initiating and/or sustaining conversation or if the individuals know what the person is talking about, even if the information does not appear to be available. *Message accuracy* checks whether an attempted communication involves correct answers to the question without any confabulation or any inaccurate information within the same question frame.

Speech related parameters include *use of nonspecific vocabulary* in terms of overuse of generic terms such as "thing" and "stuff" when more specific information is required. *Linguistic non-fluency* is the presence or absence of repetition, unusual pauses and hesitations in any discourse. *Inappropriate speech style* is the presence or absence of dialectal structural forms, code switching and style-shifting. *Inappropriate intonation* is the presence of abnormal rising, falling and flat intonation with respect to a particular context of conversation. *Gaze efficiency* is the presence of consistent use of appropriate or severe restricted eye gaze with another person during any conversational context. *Delay before responding* is the time taken to respond to any questions during the conversation which is measured in terms of seconds.

The non-propositional aspects of conversation are one of the important categories of social communication behaviour. These behaviours reflect the reciprocal nature of conversation and the joint co-operation required of the participants. *Turn taking* behaviour checks for the presence or absence of turn initiation, taking time to start a turn, use of non-contingent turn in terms of not fulfilling 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. Other behaviours includes unable to take prosodic cues, rapid shift from verbal and non verbal mode and persistent in listeners or speakers mode with reference to the entire context of conversation. It also includes use of *revision behavior* in terms of false start and self interruptions in the entire context of conversation. And use of *conversation repair* in terms of self repair through repetition, revisions through clarification and use of other initiate repair. A variety of cognitive deficits like attention, memory, visual-spatial perception, reasoning, executive controls like organization, affect etc, which are seen after TBI leads to this type of communication impairment. Attention impairment causes inability to focus on, filter relevant versus irrelevant stimuli, organize, retain and retrieve the stimuli in a conversation, thus resulting in impaired comprehension of discourse or social interaction (Hagen & Malkmus, 1979). Memory problems impair comprehension and retention, reflecting inability to retain what was said at the beginning of a conversation or remembering the topic or remembering who said what and in which order. Slow processing of information causes difficulty in shifting between speaking and listening roles.

#### 2.2.1.2.2 Narration task.

Narrative discourse involves recounting the sequence of events representing previous experience (McCabe, 1995). Narrative plays an important role in education, pragmatic and theoretical reasons. One reason narrative is so central is that it plays a critical role in skills underlying successful academic achievement, including reading and writing (Feagans, 1982; Graesser, Golding & Long, 1991; Snow & Dickinson, 1990; Watson, 1989). Instructors traditionally use narrative as a tool of instruction for both practical and theoretical reasons. On the practical side, most of the individuals will have competence at understanding and producing narrative, whereas knowledge of other

genres of discourse often requires formal training. Furthermore, information conveyed via narrative is both comprehended and recalled more readily than information conveyed in other genres, like explanation or description (Graesser, Golding & Long, 1991). On the theoretical side, narrative is built upon a foundation of event knowledge, and cognitive development in any individuals is critically dependent upon event knowledge (French, 1986; Nelson, 1986). Furthermore, listening to or producing narratives fosters cognitive skills, as these require individuals to temporarily remove themselves from the here-and-now, that is, to decontextualize their thinking. Narration is a cornerstone of school instruction according to Graesser, Golding and Long (1991) study on children. It is like narration “a). Rely on mental representations instead of the immediate environment when they speak, b). De-center from the present time, c). Formulate hypothetical and optional possibilities for events, and d). Abstract general features of events”. It requires the ability to comprehend and produce larger units of text that are organized in terms of the perception of the listener, maintenance of the topic, and integration of meaning throughout discourse (Ewing- Cobbs, Brookshire, Scott, & Fletcher, 1998). Individual words, sentences, and their interrelationships at the local level constitute the microstructure of discourse. Macrostructure refers to a more abstract representation of discourse that captures the meaning of the propositions or idea units and their interconnections (Kintsch & van Dijk, 1978; van Dijk & Kintsch, 1983). Extracting the macrostructure of discourse depends on the ability to make inferences based on prior context, world knowledge, and the content of the sentences that the discourse contains (van Dijk & Kintsch, 1983).

Adults with RHD have difficulty comprehending the main theme of narratives. Even though they may be able to understand and convey the literal meaning of information presented in individual sentences, they miss the thrust of a narrative because of their inability to infer meaning across sentences (Hough, 1990; Joannette, Goulet, Ska, & Nespoulous, 1986; Wapner, Hamby, & Gardner, 1981). Problems experienced by adults with RHD in producing narrative structure include forming coherent texts (Delis, Wapner, Gardner, & Moses, 1983; Schneiderman, Murasugi, & Saddy, 1992), revising sentence meaning (Brownwell, Potter, Bihrlé, & Gardner, 1986), identifying words as meaningful based on inferences (Beeman, 1993), and

generating a thematic organization for a story (Hough, 1990). Compared to controls, the narrative productions of adults with RHD also contain fewer story propositions, or omit the propositions that are essential to telling a story (Joanette, Goulet, Ska, & Nespoulous, 1986). In explaining illustrations (Myers & Brookshire, 1996) and pictorially presented stories, adults with RHD tend to miss the main theme with a corresponding increase in the amount of tangential details, confabulations, and embellishments (Wapner, Hamby, & Gardner, 1981).

Recent studies of microlinguistic impairments in the narrative discourse of adults with traumatic brain injury (TBI) have applied syntactic analyses, with some noting no deficits and others specific problems with sentence formulation. An alternative approach to examining the microlinguistic dysfunction in the discourse of individuals with TBI is through the use of propositional analysis. The advantage of propositional analysis is that it enables one to assess semantic complexity of utterances apart from sentence structure and grammaticality. The study by Coelho, Grela, Corso, Gamble and Feinn (2005) was conducted on applied propositional analysis to the story narratives of participants with TBI and participants with no brain injury (NBI). Specifically, the mean number of propositions within a sentence was tallied, in other words the participants' ability to insert multiple ideas into single surface sentences. It was hypothesized that the participants with TBI would produce fewer propositions per sentence because of organizational problems than the participants with NBI, regardless of level of education. Two story narratives (retelling and generation) previously elicited from the two participant groups TBI and NBI were analysed. For each language sample, the number of propositions was tallied and divided by the number of T-units. The resulting number, the propositional complexity index (PCI), was the average number of predicates per sentence. Results indicated that the group with TBI produced significantly fewer propositions per T-unit compared to NBI. These findings are in harmony with the notion that the participants with TBI studied presented with impairments of both micro- and macrolinguistic processes involved with the organization of semantic information in discourse.

Peach and Schaude (1986) examined the clausal structure in the descriptive narratives of 20 individuals with TBI. Results indicated that, although the syntactic complexity was comparable for the groups with TBI and NBI, the group with TBI

produced more syntactic errors including word order transpositions, verb tense and agreement errors and complex alterations. McDonald (1993) tallied unspecified propositions in explanations of a board game by two individuals with TBI and found that one individual provided less detail than the non-brain-injured controls.

According to Peterson (1994) the narrative skills which seem important for efficient discourse are as follows: *Responsive to narrative prompts* is important for children to be responsive to teacher prompts for narrative production (Feagans, 1982). Of most difficulty to teachers is the reaction termed the “unteachable response” (Blank, Rose, & Berlin, 1978) in which a child produces such as minimal response to a teacher’s probe that the teacher is unsure even if the child understood. Nor should the child require constant prompting to provide each additional piece of information the teacher requests. Children with good narrative skills readily narrate in response to teacher requests to do so. In agreement with this, the present study consist various parameters to assess narrative discourse ability of any individuals. The parameters are *communication intent* where the individuals initiates narration, asks for assistance during narration and imagines events correctly in the required circumstances.

*Informative-* Narratives should be dense with information units (Fivush, 1991). Such information includes a description of people, locations, objects, activities and attributes that played a role in the events being narrated about. Good narratives paint a detailed linguistic picture of the events they are describing. In the present study along with this parameter the same information adequacy and message accuracy of conversation task is also considered for narrative discourse analysis.

*Decontextualized-* A discourse should be able to stand alone, without support from its here-and-now context (Cazden, 1985; Snow & Dickinson, 1990). Specifically, a narrative about personal experience should make sense to listeners not present at the described experience. One criterion of a decontextualized narrative is that it is embedded in an explicitly described spatial-temporal context (Graesser, Golding & Long, 1991). In agreement with this, the present study consist various parameters to assess narrative discourse ability of any individuals. The parameter considered is the *topic management*, which is similar and discussed in the conversational task.

*Linguistically explicit temporal and causal relationships-* Events in a narrative are related both temporally and causally, they are not randomly ordered. To provide a coherent narrative account of these relationships, an individual should explicitly relate the events linguistically (Fivush, 1991). Temporal terms include then, and then, first, next, before, and after. Causal terms include because, so, when, if, while, and until. The same parameter is assessed in the present study under the heading of other discourse parameter.

*Chronologically organized-* A narrative is fundamentally a description of a series of events. Such series should be chronologically and logically organized with events occurring earlier in time being described before events occurring later, and causative events preceding their consequences (Labov, 1972; Peterson & McCabe, 1983). Misorder chronology often makes narratives confusing to listeners. This particular feature is assessed under the heading of discourse structure.

*Structurally well-patterned-* Two major types of narrative patterning have dominated investigations of narrative structure. Labov (1972) describes well-organized narratives as incorporating chronological description of events leading up to an evaluative high point, a crisis, which is subsequently resolved. Thus, the narrative story as a whole is interesting and reportable. This assesses the narrative discourse structure and describes coherent patterning of a narrative at local and global level.

Other is the *non-propositional aspects*, these includes use of revision behaviours and repair strategy. In revision behaviour one should check for the presence or absence of continuous use of false starts and self-interruptions in the entire context of narration. And repair strategy checks whether the individual use self correction, repair through repetition/revision, other initiated correction, request for clarification in all the required circumstances or in the entire context of narration. The foregoing list is by no means exhaustive, it includes, however several key ingredients of competent narration by any individuals. The question directing the current research is how traumatic brain injury affects these narrative skills. Since such skills seem to be important predictor of cognitive-communication ability and personal experience narratives are the first type of narrative to develop and in fact begin to appear in



rudimentary form in children as young as two years of age (Eisenberg, 1985; Peterson, 1990). They are also easier for children to produce than fictional stories or other forms of narrative (Hudson & Shapiro, 1991). In agreement with this, an attempt is made to study and profile the discourse abilities in the similar manner in bilingual individuals with traumatic brain injury.

#### 2.2.1.2.3 *Picture description task.*

Discourse samples of picture description task can be studied and analysed in terms of two broad areas comprising eight different individual measures (Hema & Shyamala, 2008). This particular task has the added benefit of predictable content that yields relatively brief language samples within short duration and later it requires little time to transcribe, assess and infer the abstract information and efficiency of coherence among concrete items in the stimuli. Thus, the results from all this samples can be profiled under individual measures. These reflect the propositional and non-propositional aspects of picture description.

Propositional aspects of picture description include 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. This includes the following sub parameters. *Discourse structure* evaluates whether the discourse is confusing or organized with respect to overall plan, theme or topic and how individual utterances are conceptually linked to maintain unity. Thus, one can comment about the discourse forethought ability and organizational planning of any discourse. *Communication intent* evaluates whether an individual initiates picture description, asks assistance in understanding picture, criticizes the picture by agreeing or disagreeing to a part in the picture only in required circumstances or in the entire context of picture description and imagines events correctly. *Coherence* assesses for the presence or absence of good relationship between the meaning and context of verbalization with respect to general topic of picture description is the global coherence. And when the same relationship is with that of immediately preceding utterance produced by the participants is the local coherence. *Topic management* checks for the presence or absence of irrelevantly introducing topics, rapid topic shift, non coherent topic

changes/inappropriate topic changes, perseveration in the topics, minimal elaboration, and minimal/extra elaboration of topic. *Other discourse parameter* includes *information adequacy* in terms of adequate picture description at word level/single sentence level/multiple sentence level in presence of few or several prompts. *Information content* is the 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 does not appear to be available or more than half of the picture described. *Message accuracy* checks whether an attempted picture description involves correct descriptions of picture without any confabulation or any inaccurate information within the same context of picture description.

Speech related parameters include *use of nonspecific vocabulary* in terms of overuse of generic terms such as "thing" and "stuff" when more specific information is required. *Linguistic non-fluency* is the presence or absence of repetition, unusual pauses and hesitations in any discourse. *Inappropriate speech style* is the presence or absence of dialectal structural forms, code switching and style-shifting. *Inappropriate intonation* is the presence of abnormal rising, falling and flat intonation with respect to a particular context of picture description. *Delay before responding* is the time taken to start the picture description and is measured in terms of seconds. *Gist of information* is the presence of correct depiction of the theme (picnic spot) with good local and global coherence.

The non-propositional aspects of picture description are one of the important categories of social communication behaviour. These behaviours reflect the reciprocal nature of conversation and the joint co-operation required of the participants. In picture description it is only from participant's point of view. The following are the subcategories considered for analysis. *Revision behaviour* is the presence/absence of false start and self interruptions in the entire context of picture description. The other is the use of *repair strategies* in terms of self correction, here the participants find a word or sentence after giving a small pause and continue the topic of picture description. Other strategies are repeating themselves and correcting the discourse without the investigators help. This is termed as use of repair through repetition/revision. If the participant is not able to find the right word and when the

investigator fills it with the correct word to continue the topic of picture description is termed as use of other initiated correction. The last is the use of request for clarification. Here the participant requests the investigator to modify the discourse and use the corrected version of discourse to continue the topic of picture description. Since the literature specific to picture description task is not available, the same parameters from the conversation task are employed and specific required modifications are made according to picture description task. Thus, the present study attempts to profile the discourse abilities of bilingual individuals with traumatic brain injury in conversation, narration and picture description tasks.

Evaluation of discourse is recognised as an important component in the diagnosis and management of adult acquired communication disorders. Picture description is a common and practical data elicitation procedure that has provided insights into the discourse of many adult groups. Such data may be analysed from several linguistic and pragmatic perspectives and, as is commonly the case with discourse measures, the usefulness of such data is limited by a paucity of relevant normative information. Mackenzie, Brady, Norrie and Poedjianto (2007) determined the influences of age, education, and gender on the concepts and topic coherence of the picture description of 225 non-brain-damaged adults. These adults described the “cookie theft” picture (Goodglass, Kaplan, & Barresi, 2001). Responses were analysed for presence and completeness of concepts (Nicholas & Brookshire, 1995) and topic coherence (Mentis & Prutting, 1991). The concept and topic coherence, confirmed education level as a highly important variable affecting the performance of non-brain-damaged adults. The number of concepts used accurately and completely, and the amount of topic subdivision, increased with amount of education (both with and without adjustment for age and gender). Clear influences of age or gender were not demonstrated, although some trends in favour of women and younger age were noted. Recognition of the impact of education is essential in the assessment and diagnosis of communication difficulty. Thus, in the present study education is considered as an important variable for TBI and NTA groups.

### **2.3 Bilingualism.**

As the education systems have improved, there are more and more educated people in the social spectrum. This has resulted in creating awareness regarding certain issues. For example traumatic brain injury resulting due to road traffic accident and their recovery in communication abilities depends on their educational background or the world knowledge. Pragmatic-linguistic deficits are the most pervasive communication problems in TBI and more so among bilinguals. Thus, there is a need for cognitive-linguistic analysis at the level of discourse in bilinguals.

An attempt can be made to study specifically and analyze various discourse samples by Kannada-English bilingual adults. Comparing Kannada and English, as a matter of fact, offers an interesting research for cross-linguistic analysis, because they are such distinctly different languages. To begin with, Kannada is one of the major Dravidian languages of India and is spoken predominantly in the state of Karnataka. Numbering roughly 38 million population makes it the 27<sup>th</sup> most spoken language in the world. Kannada having its own script is a highly inflected language with three genders (masculine, feminine, neutral or common) and two numbers (singular, plural). It is inflected for gender, number and tense, among other things (Prakash & Joshi, 1995). In case of Indian English, it comprises several dialects and is evolved during and after the colonial rule of Britain in India. English is one of the official languages of India with about ninety million speakers according to the 1991 Census of India. Clauses in English language have a subject and a verb. There are three main types of dependent clauses like noun clauses, adjective clauses, and adverb clauses, so-called for their syntactic and semantic resemblance to nouns, adjectives, and adverbs, respectively. Here, a noun is the head of the phrase. These differences make comparison of English and Kannada of great potential interest for those who research cross-linguistic ability.

People not only use single language but also may have an addition of one or two languages to their mother tongue. This is the result of globalization and increased stimulation through various modes such as television, newspaper etc. Thus, bilingualism or multilingualism exposes several issues for practical consideration. Humans possess a capacity to learn aspects of more than one language (Branson,

2003). A desire to communicate is what drives people to learn more languages and make it useful. Bilingualism is a widely prevalent phenomena and is related to a variety of factors like proficiency, social interaction etc. Thus, it is really difficult to give a precise definition of bilingualism covering all these aspects. Bilingualism can be defined as the ability to use two or more languages in proficient conversation with native speakers of each language. Not only are bilingual speakers able to use linguistic structures of their two languages, they also master pragmatic and sociolinguistic norms of the culture surrounding each languages (Bialystok, 2001). India has been a multilingual country right from earliest times. And English is one language which has become an integral part within bilingualism. Hence it is necessary to study the first language along with the proficient second language in the clinical population too. Literature in the Indian context regarding aspects of discourse processing that are preserved in individuals with TBI and those that are impaired is limited.

Language organization in these neuro-typical bilingual adults is studied based on neuroimaging studies. Studies in this regard by Chee, Soon, Lee and Pallier (2004), Perani et al and Wartenburger, Heekeren, Abutalebi, Cappa, Villringer, & Perani in 2003, have focused on the level of language proficiency in each of a bilingual's two languages as windows into bilingual brain organization and processing. Language proficiency, in both early and late bilinguals, has also been found to impact bilingual language organization in the brain. For instance, using semantic and phonological language processing tasks, Chee et al (2004) has shown neural differences in bilingual brains depending on whether they had high or low language proficiency in each language, independent of the age of acquisition. To reconcile the question of whether it is the age of exposure or proficiency that has more impact, Wartenburger et al. (2003) conducted a study which revealed that both age and proficiency influence neural organization of two languages in one brain. Also, a structural imaging study of gray matter density in high- and low-proficiency bilinguals versus monolinguals revealed a fascinating finding that bilinguals have an increase in gray matter volume in the left inferior parietal lobe as compared to monolinguals (Mechelli et al., 2004). The greatest increase in gray matter volume was in early high-proficiency bilinguals, and the lowest was in late low-proficiency

bilinguals. Most of these investigations are indirect comparisons of neural activation in bilingual versus monolingual brains during language switching/differentiation tasks (Rodriguez-Fornells, Rotte, Heinze, Noesselt, & Munte, 2002; Rodriguez-Fornells, van der Lugt, Rotte, Britti, Heinze, & Munte, 2005; Quaresima, Ferrari, van der Sluijs, Menssen, & Colier, 2002; Hernandez, Martinez and Kohnert, 2000; Price, Green and Studnitz, 1999). These imaging studies have yielded an important finding that specific brain areas are involved in bilingual switching they are dorsolateral prefrontal cortex, inferior frontal cortex, anterior cingulate and supramarginal gyrus. In agreement with this, on comparison with neuro-typical adult bilinguals there is a need for cognitive-linguistic analysis at the level of discourse in bilingual individuals with traumatic brain injury.

#### **2.4 Indian Studies on TBI**

Arvind and Karanth (2000) have found the degree of spontaneous recovery of speech and language deficits in ten subjects with traumatic brain injury using the Western Aphasia Battery (WAB) (Kertesz & Poole, 1974). They concluded that the overall spontaneous recovery among their open head injured subjects were poorer than the closed head injured subjects. Age had a significant effect on the spontaneous recovery depending upon the Glasgow Coma Scale (GCS) scores. The younger TBI subjects showed greater recovery than the older subjects. The patients with low GCS scores showed less recovery than the patients with high GCS scores, irrespective of age.

An Indian study by Tanuja and Manjula (2004) has found that TBI individuals have impairment in discourse when compared to normal participants because of cerebral insults. Also variations in the discourse pattern were evident for subgroups of TBI. TBI with RHD participants showed a verbose pattern with extra elaboration and inability to maintain topics of conversation whereas TBI group with LHD showed less conversational output with minimal response and reduced informativeness. Even though a difference in the conversation traits were seen in various subgroups, the data was not sufficient to generalize the obtained findings.

Hema and Shyamala (2008) examined quantitatively conversational discourse in moderately Traumatic Brain Injured (TBI) with left hemisphere damage, right hemisphere damage and normal adults in Kannada using qualitative measures. All the participants underwent standardized neuropsychological tests with conversation task and narrative task for picture description. The authors used a scale to quantify the discourse called- "Discourse Analysis Scale". From this, samples were analyzed under different discourse components. The results indicated that TBI participants had impairment in discourse when compared to normal speakers because of cerebral injury. Comparison across TBI participants with left hemisphere damage (LHD) and right hemisphere damage (RHD) group showed a significant difference only in communication intent like greeting others by himself/herself and introducing self which is a propositional aspect and turn taking in terms of initiating turns and conversational repair by using too much of other initiated repairs which is a non-propositional aspect of conversational task. On picture description task difference was seen again in communication intent in terms of fabricating/imagining events and delayed response under the propositional aspects. It was concluded that LHD group performed better compared to RHD group in all the aspects of discourse. Both the groups had better performance on propositional aspects of discourse compared to non-propositional aspects of discourse.

Narrative skills on bilinguals were studied by Hema and Shyamala (2011). According to the linguistic relativity hypothesis bilinguals may actually have different thought patterns when speaking different languages, this study, which examines the narration told by individuals in two different languages, sheds further light on the validity of the hypothesis. This study particularly explored how, when telling narratives, bilingual individuals express verbal notions through the use of the tense, aspect, and voice forms available in each of their two languages. Particularly the past tense was often used in oral narratives, specifying the typical series of events taking place in a particular sequence such as going on a trip or journey to a place. This was the target task considered for the present study. Here 20 normal bilingual adults were the participants and had to narrate in Kannada and English languages separately. These discourse samples were video recorded using digital handycam DCR-DVD 908. The objective was to compare and see the differences in Kannada and English

language narrative discourse. The narrative discourse of these participants were subjected for T-unit analysis; the parameters included were number of clauses, number of T-units, number of words per clauses and number of words per T-unit. Thus the participant's Kannada and English narrative discourse were quantified separately. The statistical results showed significant differences for the parameter number of clauses, number of T-units and number of words per T-unit of Kannada narrative discourse when compared to English narrative discourse.



## CHAPTER 3

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3.8 Procedure

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*3.8.2.1.2 Narration.*

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*3.8.3.2 Qualitative analysis of discourse sample.*

*3.8.3.2.1 Trial rating phase.*

*3.8.3.3 Quantitative analysis of conversation, narration and picture description discourse.*

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

### **3.1 Aim:**

The present study aimed to investigate discourse abilities in Kannada-English bilingual individuals with non-aphasic traumatic brain injury as compared to neuro-typical adults.

### **3.2 Objectives Of The Study:**

The objectives of the study were,

1. To investigate and compare discourse parameters of non-aphasic individuals with traumatic brain injury and neuro-typical adults on conversation, narration and picture description tasks.
2. To profile discourse parameters seen in non-aphasic individuals with traumatic brain injury in comparison with neuro-typical adults qualitatively and quantitatively.
3. To compare the discourse parameters in Kannada (L1) and English (L2) respectively in non-aphasic individuals with traumatic brain injury.

### **3.3 Hypotheses**

#### ***3.3.1 Null hypotheses.***

1. It is hypothesized that there would be no significant difference in discourse abilities between bilingual individuals with non-aphasic traumatic brain injury and neuro-typical adults.
2. It is hypothesized that there would be no significant difference in discourse abilities between Kannada (L1) and English (L2) in non-aphasic individuals with traumatic brain injury.

### **3.4 Research Design**

A standard group comparison was employed for the present study and it followed 2x2 research design.

### **3.5 Pilot Study**

A pilot study was carried out on 20 typical Kannada-English bilingual individuals to decide the topic of conversation and narration. Thus, the topic “Our country” and “Journey to a place” was selected for conversation and narration respectively. It was decided on an observation of participants’ response during data collection, counter balancing (discourse in L1 followed by discourse in L2 and vice versa) had to be done to avoid practice (order) effect. Thus, for all the participants in the main study counter balancing was done. Figure 1, in the form of flow chart represents the detail method and procedure carried out in the study.

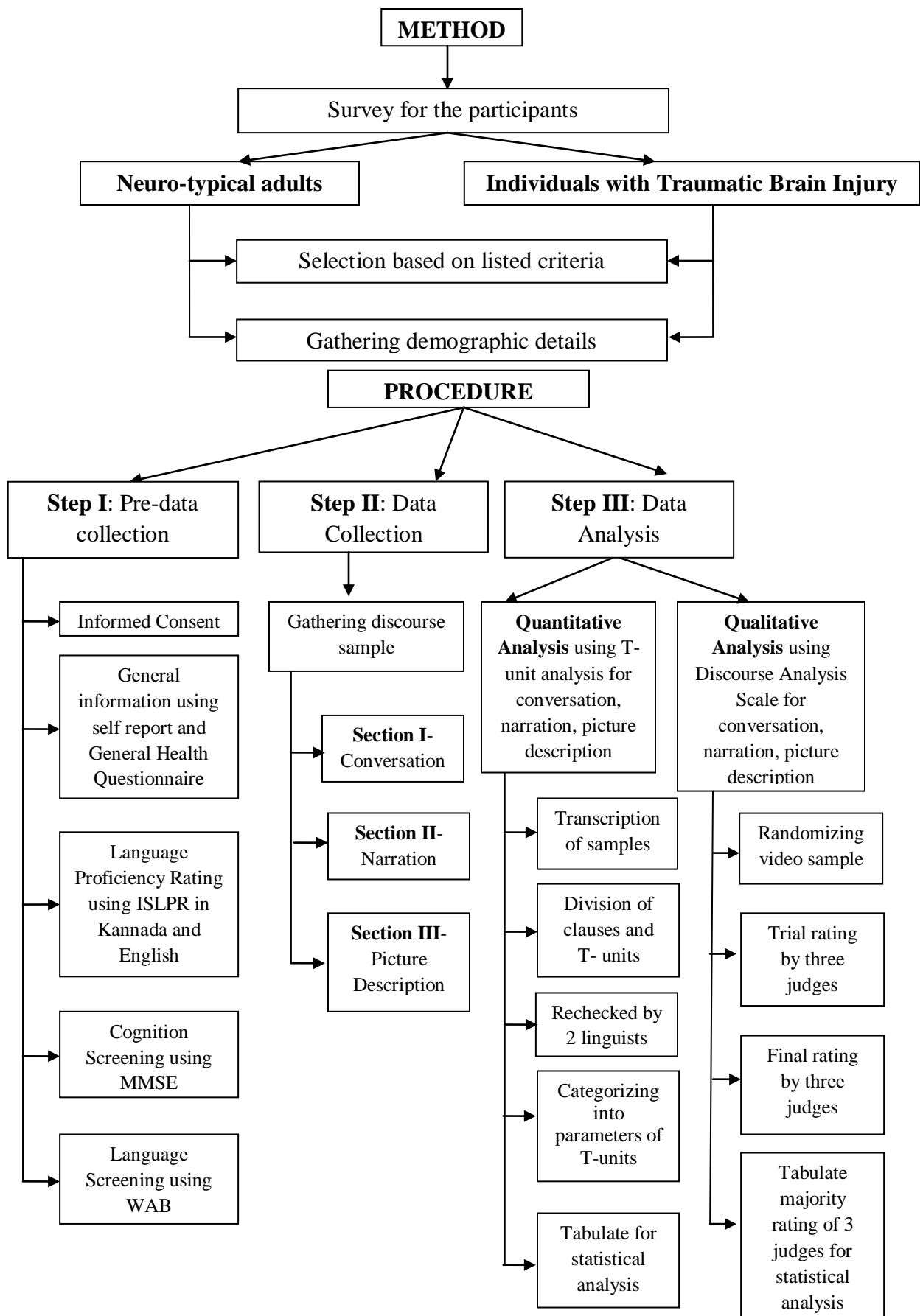


Figure 1- Flow chart represents the detail method and procedure carried out in the study.

### **3.6 Participants**

The participants chosen for the study were 20 persons diagnosed as non-aphasic individuals with traumatic brain injury by a speech-language pathologist (investigator) and 20 neuro-typical adults. A total of 40 people participated in the study and all were Kannada-English speaking bilinguals in the age range of 25-48 years, with Kannada as their mother tongue, and had learnt English for the first time as a second language at around the age of five years in their school. The non-aphasic individuals with traumatic brain injury constituted the clinical group and the neuro-typical adults constituted the non-clinical/normal/neuro-typical adult group.

#### **3.6.1 Location of the participants.**

All the participants from the clinical group were chosen from the Apollo BGS Hospital, Mysore, Karnataka, India. The participants from the normal group were drawn from the work/residential place in and around Mysore, Karnataka, India.

#### **3.6.2 Criteria for selection of participants.**

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

##### ***3.6.2.1 Common criteria for both normal and clinical group.***

All the participants had to be in the age range of 25 - 48 years. They should have had a minimum of 10 years of formal education. All of them should have had Kannada (Kannada is one of the major Dravidian languages predominantly spoken in the state of Karnataka, South India, Kamath, 2002) as their first language (L1) and English as their second language (L2). They should also have had vision and hearing acuity within normal limits and the handedness was right according to their self report. They should have had obtained a score of “three” and above on the International Second Language Proficiency Rating Scales (ISLPR) (Wylie & Ingram, 2006), suggesting that the candidate would have basic vocational proficiency in that particular language. The

scale was administered both in Kannada as well as English. All these participants belonged to a middle/high socioeconomic status as per the rating on re-adapted version of National Institute of Mental Health (NIMH) Socioeconomic Status Scale, (Venkatesan, 2011) (Appendix A1). They should not have had complaints of memory or any other cognitive difficulties which would influence their communicative abilities. Thus, they had to obtain a score of 25 or above on mini mental status examination (MMSE; Folstein, Folstein, and McHugh, 1975).

***3.6.2.2 Criteria for the group with non-aphasic individuals with traumatic brain injury.***

During the hospitalization period the clinical population had to be identified/diagnosed by neurologists or neurosurgeon. The clinical group had a diagnosis of TBI type as closed head injury by a neuro-surgeon. Later the severity of TBI was assessed based on the administration of Glasgow Coma Scale (GCS) (Jennet & Teasdale, 1981) (Appendix A). The clinical group had undergone medical screening. This screening included Computerized Tomography (CT) scanning of the head. All the participants in the clinical group had a score ranging from 12-15 and only those participants were considered for the study since they were all verbal. Thus, this score corresponded to a severity of mild to moderate TBI. An individual with TBI having any other associated speech motor problems was not considered as a participant of the study. At the time of the study all these TBI participants had to have a post traumatic brain injury period of 3-4 months. Appendix B shows the neuroimaging results and GCS score of all the participants of clinical group (individuals with traumatic brain injury) at the time of recording. These participants received a confirmation from a speech language pathologist regarding the absence of aphasia component using Western Aphasia Battery (Shyamala and Ravikumar, 2008). Finally the main selection criterion was they had to obtain a score of 25 or above on mini mental status examination (MMSE; Folstein, Folstein, and McHugh, 1975). Thus, they should not have had complaints of memory or any other cognitive difficulties which would influence their communicative abilities. Only these TBI individuals with a score of 25 or above were considered as the participants of the study.



### 3.6.2.3 Criteria for the group with neuro-typical adults.

The neuro-typical adult participants had to be free from any neurological (such as stroke, dysarthria, etc) or psychological illness (such as, dementia, schizophrenia etc) which would have been likely to impair their performance, as determined by the general health questionnaire (Golderberg and Williams, 1988).

### 3.6.3 Demographic details of the participants.

The demographic and diagnostic details of the participants in the clinical group are shown in Table 2. Table 3 shows the mean age of clinical and normal group and the mean of post traumatic brain injury period of clinical group. The normal group was matched with the clinical group for age and education level.

Table 2

*Demographic details of clinical participants.*

Sl no.	Age/sex	Language known	Education level	Diagnosis of TBI
1.	25/M	K, E	G	RTA with concussive head injury
2.	25/M	K, E	PG	RTA with concussive head injury
3.	25/M	K, E	PG	RTA with head injury
4.	48/M	K, E	G	RTA with concussive head injury
5.	30/M	K, E	G	RTA with severe head injury
6.	32/M	K, E	G	RTA with concussive head injury
7.	25/M	K, E	G	RTA with concussive head injury
8.	33/M	K, E	G	RTA with concussive head injury
9.	26/M	K, E	G	RTA with concussive head injury
10.	43/M	K, E	G	RTA with concussive head injury
11.	43/M	K, E	G	RTA with mild concussive head injury
12.	32/M	K, E	G	RTA with concussive head injury
13.	30/M	K, E	PG	RTA with mild head injury
14.	28/M	K, E	PG	RTA with concussive head injury
15.	25/M	K, E	PG	RTA with severe head injury
16.	29/M	K, E	PG	RTA with concussive head injury
17.	42/M	K, E	G	RTA with concussive head injury
18.	28/M	K, E	G	RTA with concussive head injury
19.	28/M	K, E	PG	RTA with mild concussive head injury
20.	26/F	K, E	G	RTA with mild head injury

*Note:* GCS- Glasgow Coma Scale score, M- Male, F- Female, K- Kannada, E- English, RTA- Road Traffic Accident, G- Graduation, PG- Post Graduation.

Table 3

*Mean and SD of all the participants in clinical group and normal group and post traumatic brain injury period for clinical group.*

<b>Groups</b>	<b><i>n</i></b>	<b><i>M</i></b>	<b><i>SD</i></b>
Age (clinical and normal group)	40	31.15 (years)	7.13
Post traumatic brain injury period (clinical group)	20	3.10 (months)	0.96

*Note: n* -Number of participants, *M* -Mean, *SD*- Standard Deviation.

### **3.7 Assessment Protocol**

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

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

There were a list of forms and test protocols employed for the present study during the data collection process.

##### **3.7.1.1 Informed consent form.**

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

**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 anytime during the data collection/study. Emphasize is 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 all the participants in the group with neuro-typical adults and individuals with traumatic brain injury.

### ***3.7.1.2 General information sheet.***

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

### ***3.7.1.3 Mini Mental Status Examination (MMSE).***

The mini-mental state examination (MMSE) or Folstein's test is a brief 30-point questionnaire test that is used to screen for cognitive impairment. It was introduced by Folstein, Folstein, and McHugh (1975) in 1975 (Appendix F). It is commonly used to screen for cognitive impairment. It is also used to estimate the severity of cognitive impairment at a given point in time and to follow the course of cognitive changes in an individual over time. It is an effective way to document an individual's response to treatment. In a time span of about 10 minutes, MMSE samples various functions including arithmetic. The MMSE test includes simple questions and problems in several areas: the time and place of the test, repeating lists of words, arithmetic such as the serial sevens, language use and comprehension, and basic motor skills. For example, a question is asked to copy a drawing of two pentagons. Any score greater than, or equal to 25 points (out of 30) is effectively normal (intact). Below this, scores can show severity like severe ( $\leq 9$  points), moderate (10-20 points) or mild (21-24 points). Low to very low scores correlate closely with the presence of cognitive impairment, although other mental disorders can also lead to abnormal findings on MMSE testing.

#### ***3.7.1.4 International Second Language Proficiency Rating Scales (ISLPR).***

The ISLPR was first developed in 1978 by Wylie and Ingram, and was called the Australian Second Language Proficiency Ratings until being renamed the ISLPR in 1997 to reflect its increasing international status as well as the increasingly international context of its use. For the present study the final version by Wylie and Ingram (2006) was used (Appendix G). The scale is designed to measure general proficiency or practical language skills in real-life language contexts for learners of a second or foreign language. The scale checks four parameters that included, speaking, listening, reading, and writing. Scoring in the scale ranged from zero to five (0-proficiency, 0+ Formulaic proficiency, 1 Minimum 'creative' proficiency, 1 Basic transactional proficiency, 1+ Transactional Proficiency, 2 Basic social proficiency, 2+ Social proficiency, 3 Basic vocational proficiency, 3+ Basic vocational proficiency, 4 Vocational proficiency, 4+ Advanced vocational proficiency, and 5 native like proficiency). The outcome of the ISLPR was a profile, rather than a result, as each major skill was separately specified.

#### ***3.7.1.5 Western Aphasia Battery (WAB).***

This is a standard test initially given by Kertesz and Poole (1974, 1979, and 1982) to assess the language ability and classify the participants into different types of aphasia. The test consists of different tasks to check spontaneous speech, auditory verbal comprehension, repetition and naming abilities. In the present study the Kannada version of WAB developed by Shyamala and Ravikumar (2008) (Appendix H) was used to rule out the presence/absence of aphasia component in the individuals with traumatic brain injury. Only the participants with an absence of aphasia component were considered for the study.

### **3.7.2 Part II: Materials used during data collection to obtain discourse sample.**

Three types of discourse samples were collected from the participants in Kannada and English languages separately. They included conversation, narration and picture description genre.

**3.7.2.1 Section I:** *Obtaining discourse sample of conversation using a topic ('My country- India').*

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."*

**3.7.2.2 Section II:** *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 same in past or future tense."*

**3.7.2.3 Section III:** *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- Appendix I). All the participants were instructed to tell the gist of information from the picture first 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 instructed to tell the gist of information from the picture first and then describe the events happening in the picture, they were asked to name all the contents in the picture and describe the same. Samples of the recording from the participants of NTA group for the three discourse genres are given in Appendix J.

**3.7.3 Part III: Material used while analyzing discourse samples.**

Video recorded discourse samples of conversation, narration and picture description were transcribed using IPA symbols (Schiffman, 1979) (Appendix K). Discourse involving

both the speaker (participants) and listener (investigator) was transcribed. The discourse samples were analyzed qualitatively and quantitatively for the conversation, narration and picture description tasks. Qualitative rating of discourse using Discourse Analysis Scale and quantitative T-unit based analysis were employed for the same.

### ***3.7.3.1 Qualitative analysis using Discourse Analysis Scale.***

Discourse Analysis Scale analyzes 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. For the present study, Discourse Analysis Scale (Hema & Shyamala, 2008) was used. The scale has separate ratings for conversation, narration and picture description (Appendix L1, L2, L3). 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. The same DAS was administrated for both the groups in both the languages and thus, the scores were obtained for conversation, narration and picture description tasks.

### **3.7.3.2 Quantitative analysis using T-unit based analysis.**

For the T-unit based analysis the video recorded data were transcribed verbatim, with verification for accuracy. To prepare the transcribed data for T-unit based analysis, repetitions, false starts and irrelevant speech were deleted. The basic unit for segmenting the data was the T-unit, which is defined as one independent clause plus the dependent modifiers of that clause (Hunt, 1970). A clause is a part of a sentence. There are two main types of clauses viz independent (main clauses) and dependent (subordinate clauses). An independent clause is a complete sentence. It contains a subject and verb and expresses a complete thought in both context and meaning (e. g., The police said). Independent clauses can be joined by a coordinating conjunction to form complex or compound sentences. A dependent (subordinate) clause is part of a sentence. It contains a subject and verb but does not express a complete thought. They can make sense on their own, but, they are dependent on the rest of the sentence for context and meaning (e. g., I will give this gold to the one that can do it). The discourse tasks in the study were analyzed in terms of discourse grammar. The variables and analyses pertaining to this consisted of number of T-units (NTU), number of words per T-unit (NWPTU), number of clauses (NC) and number of words per clause (NWPC).

### **3.7.4 Equipments.**

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

### **3.7.5 Software used in the present study.**

#### **3.7.5.1 Statistical Package for Social Sciences (SPSS).**

SPSS is a comprehensive and flexible statistical analysis and data management solution. For the present study SPSS version 18.0 was employed.

## 3.8 Procedure

### 3.8.1 Part I: Pre-data collection.

#### 3.8.1.1 *Informed consent.*

Researcher as well as participants signed in the consent form. The contact details of participants were noted in the consent form.

#### 3.8.1.2 *History.*

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

#### 3.8.1.3 *Assessing language proficiency using ISLPR.*

ISLPR was administered both in Kannada and English for all the bilingual participants. The rules of ISLPR were followed and the four domains viz, speaking, reading, writing and listening were checked. The scores obtained were tabulated for all the bilinguals. Table 4 shows the scores obtained on ISLPR for all the bilingual participants for Kannada and English.



Table 4

*Ratings obtained for ISLPR in Kannada and English language for the NTA and TBI participants.*

Participants  parameters	Speaking		Listening		Reading		Writing	
	K	E	K	E	K	E	K	E
Bilingual NTA (range) (n- 20)	4+ to 5	4 to 5	4 to 5	4 to 4+	4 to 5	4 to 4+	4 to 4+	4 to 4+
Bilingual TBI								
1	4+	5	4+	4	4+	4+	4	4
2	5	4+	4+	4	4+	4+	4+	4
3	5	5	4+	4	4+	4	4	4+
4	5	4+	4+	4	4+	4+	4+	4
5	5	4+	4+	4	5	4+	4+	4
6	5	4	4+	4	4+	4	4	4+
7	4+	4	4+	4	4+	4	4+	4
8	4+	4+	4+	4	4+	4+	4	4
9	4+	4+	4+	4	4	4	4+	4+
10	4+	4	4+	4	4+	4	4	4
11	5	4+	5	4+	4+	4	4	4
12	4+	4+	4+	4	4+	4	4	4
13	5	4+	4+	4	4+	4	4	4
14	4+	4+	4+	4+	4	4	4+	4
15	5	4+	4+	4+	4+	4	4	4+
16	4+	4+	4	4	4+	4+	4+	4+
17	5	5	4+	4	4+	4+	4+	4
18	4+	4	4+	4	4+	4	4	4
19	4+	4+	4	4	4+	4+	4	4
20	4+	4	4+	4	4	4	4	4

*Notes.* NTA = neuro-typical adults, K = Kannada, E = English, 4 = vocational proficiency, 4+ = advanced vocational proficiency, 5 = native like proficiency.

### ***3.8.1.4 Mini Mental Status Examination.***

MMSE was administered in Kannada to the participants in both clinical and non-clinical groups. Table 5 shows the scores obtained on MMSE for all the bilingual TBI participants. The participants score >25 indicate no cognitive impairment.

Table 5

*Scores obtained on MMSE for all the TBI participants.*

Participants  parameters of MMSE	Orientation (10)	Registration (3)	Attention & Calculation (5)	Recall (3)	Language & Praxis (9)	Total
Bilingual TBI (n = 20)	10	3	5	3	9	30
1	9	3	5	3	9	29
2	8	3	5	3	8	27
3	8	3	4	2	9	26
4	9	3	5	3	8	28
5	9	3	5	3	8	28
6	10	3	5	2	9	29
7	10	3	5	3	9	30
8	9	3	4	2	8	26
9	9	3	5	2	9	28
10	8	3	4	3	8	26
11	9	3	5	3	9	29
12	10	3	5	3	9	30
13	9	3	4	3	9	28
14	10	3	5	3	9	30
15	10	3	5	3	8	29
16	10	3	4	2	9	28
17	9	3	5	3	9	29
18	10	3	5	3	9	30
19	9	3	5	3	9	29
20	9	3	4	3	8	27

*Note.* n- Number of participants.

### **3.8.1.5 Western Aphasia Battery (WAB).**

WAB was administered in Kannada and English to the participants in both clinical and non-clinical groups. Table 6 shows the scores obtained on WAB for all the bilingual participants.

Table 6

*Scores obtained on WAB for all the TBI participants.*

Participants/ Parameters in WAB	Spontaneous speech (20) Fluency (10=AQ)	Auditory Verbal Comprehension (200/20=AQ)	Repetition (100/10= AQ)	Naming (100/10= AQ)	Presence/ Absence of Aphasia component
Bilingual TBI ( <i>n</i> - 20)					
1	10	10	10	9.8	Non- Aphasic
2	10	10	10	10	Non- Aphasic
3	10	9.75	9.8	9.6	Non- Aphasic
4	10	10	10	9.7	Non- Aphasic
5	10	10	10	10	Non- Aphasic
6	10	10	10	10	Non- Aphasic
7	10	10	10	10	Non- Aphasic
8	10	10	9.8	9.6	Non- Aphasic
9	10	9.8	10	10	Non- Aphasic
10	10	10	10	10	Non- Aphasic
11	9	10	10	10	Non- Aphasic
12	10	10	10	10	Non- Aphasic
13	10	10	10	10	Non- Aphasic
14	9	9.75	9.6	9.5	Non- Aphasic
15	10	10	10	10	Non- Aphasic
16	10	10	10	10	Non- Aphasic
17	10	10	10	9.8	Non- Aphasic
18	10	10	10	10	Non- Aphasic
19	10	10	10	10	Non- Aphasic
20	10	10	10	10	Non- Aphasic

*Note.* *n*- Number of participants.

### 3.8.2 Part II: Data collection.

#### 3.8.2.1 Obtaining discourse sample.

All the participants were provided prior notice that the discourse samples will be video recorded and the recording will be started when they will be ready for the same. 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 and this session was aimed to improve interaction between the investigator and the participants to build rapport. In Phase- II, to

obtain discourse samples of all the participants the recordings were done in two separate sessions. 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 15 days, same participants had to repeat the same tasks using only L2 (for example- English language). An important point here was, because the same participants had to converse, narrate and describe the picture in both Kannada and English languages, counter-balancing was achieved by having one half of the participants performing the tasks in English language first and then in Kannada language (sub-group I) and the other half performing the discourse tasks in Kannada language first and then in English language (sub-group II). This counter-balancing was used to help cancel any effect of order of presentation. The participants were aware that their speech was being recorded. 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. They were also informed that they were free to ask any questions related to the topic to the examiner during the conversation. Each session was video recorded with a handy cam (Sony digital recorder H302233). All the three tasks would last between 15-20 minutes allowing as much time as required to collect at least 500-700 words (arbitrarily determined for the study) of conversation, narration and picture description from each participant.

#### *3.8.2.1.1 Conversation.*

For the conversation task, topic selected was ‘My country’. Instructions provided to the participants were as follows.

*Topic: My country.*

*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.*

A total of two sessions of conversation each lasting for 10 to 15 minutes were carried out between the investigator and the participants in a quiet room with no distraction in between the recordings. First session was intended to improve interaction and build rapport. Before recording, the participants were instructed to talk in a way similar to two friends talking to each other and also informed that, they are free to ask any questions to the investigator during the conversation. Succeeding sessions was video recorded with a Handycam (Sony digital recorder H302233). They were asked to converse using L1 (Kannada) and L2 (English) for the same topic. A gap of 2 weeks was provided between these language conditions. Counter balancing was done to avoid practice affect. Responses were not corrected by the interviewer and no stimulus or interruption was provided, unless the participants were clearly distressed with their inability to respond. Not more than specific number of questions was used as prompting to initiate conversation which was decided after pilot study. Interviews lasted between 15-20 minutes allowing as much as time was required to collect at least 700 words (arbitrarily determined for the study) of conversation from each participant.

#### *3.8.2.1.2 Narration.*

Participants were given a topic “Journey to a place” to narrate in detail. After the instruction, particular duration of 3-5 minutes was provided to the participants to plan and sequence the contents to express. Later narration in L1 and L2 was video recorded. A gap of 2 weeks was provided between L1 and L2 conditions. Thus counter balancing was done to avoid practice affect.

*Topic: “Journey to a place”*

*Instruction: “Imagine a past journey to a place and narrate the same in past tense or future tense.”*

#### *3.8.2.1.3 Picture Description.*

Picnic spot picture of Western Aphasia Battery, Kannada version, was used for obtaining discourse sample on picture description. The same picture was placed in front of the participants for 2-3 minutes of duration. The participants had to tell the gist of

information from the picture first and later they were requested to describe the picture in detail using their L1 and L2. A gap of 2 weeks was provided between L1 and L2 conditions. Thus, counter balancing was done to avoid practice affect. The picture can be found in Appendix D. Instruction was provided to the participants which is as follows.

*Instruction: "I will show you a picture. I would want you to tell the gist of information in the picture and later describe and explain what is happening in the picture. I would want you to explain in sentences."*

### **3.8.3 Part III: Analyzing discourse samples.**

The score obtained from T-unit analysis were tabulated. Analysis of the samples related to conversation, narration and picture description were done as follows to arrive at quantitative data.

#### ***3.8.3.1 Transcription of discourse samples.***

Video recorded discourse samples (of conversation, narration and picture description) were transcribed before subjecting them for analysis. Interviews were transcribed using IPA symbols (Schiffman, 1979). Discourse samples of the participants and the investigator both were transcribed. Initially all words were transcribed exactly as they had been spoken, including repetitions, incomplete words, interjections, and paraphasias. Subsequently, the discourses were rephrased deleting repetition, incomplete words and interjections which were therefore not counted for analysis. Stereotypical set phrases such as, "amele" (later) "matte" (and) were excluded, because such expressions were not acceptable as proper word or clause or full sentences. Numbers were transcribed as words. Multiple attempts at the same word were only recorded once.

#### ***3.8.3.2 Qualitative analysis of discourse samples.***

Discourse Analysis Scale analyzes 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. For the present study, Discourse Analysis Scale (Hema & Shyamala, 2008) was used. This is a perceptual rating scale developed on the basis of the standardized Clinical Discourse

Analysis, Damico (1985) and Cooperative Principles for conversation, Grice (1975). 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 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. The same DAS was administrated for both the groups in both the languages and thus the scores were obtained for conversation, narration and picture description tasks. Three judges including the experimenter rated the samples. All the judges were post graduates in Speech-language pathology.

#### *3.8.3.2.1 Trial rating phase.*

Before the actual rating, the judges employed for rating the performances of persons with TBI were first familiarized with the terms|parameters used in the scale and the behaviors observed in the discourse samples in the trial rating phase. For this purpose, three discourse samples were used and simultaneous rating was carried out by all the three judges. Each discourse sample was rated in a separate scoring sheet. The judges were seated in front of a HP computer (INA103SGVX) with HP headphones in a considerably quiet room. The conversation, narration and picture description was rated separately. After the completion of the rating, the score sheets were gathered and the ratings were entered and tabulated. The scores obtained from quantitative and qualitative analyses of

discourse were subjected to appropriate statistical analyses using SPSS 18.0 (Statistical package for social sciences, version 18) as described in the following results section.

### ***3.8.3.3 Quantitative analysis of conversation, narration and picture description discourse.***

The basic unit for segmenting all the three discourse data was the T- unit. This division relies mostly on the prosodic features to determine where an utterance is complete or not. Further division of T-units were calculated according to Hunt (1970) under different parameters such as number of T-units (NTU), number of words per T-unit (NWPTU), number of clauses (NC), and number of words per clause (NWPC) for analyzing the informativeness in the discourse. It is defined as discourse consisting of a main clause (independent) plus all subordinate clauses (dependent) and non-clausal structures that are attached to or embedded in it. A clause is a meaningful unit of a sentence in the present study. It can vary from two words to five words. An independent clause is a complete sentence. It contains a subject and verb and expresses a complete thought in both context and meaning (e.g., The police said). Independent clauses can be joined by a coordinating conjunction to form complex or compound sentences. A dependent (subordinate) clause is part of a sentence. It contains a subject and verb but does not express a complete thought. They can make sense on their own, but, they are dependent on the rest of the sentence for context and meaning (e. g., I will give this gold to the one that can do it). The discourse tasks in the study were analyzed in terms of discourse grammar. The variables and analyses pertaining to this consisted of number of T-units (NTU), number of words per T-unit (NWPTU), number of clauses (NC) and number of words per clause (NWPC). Thus, data was analyzed and grouped for length, complexity and quality. Length was indicated by the total number of words and clauses (i.e., all words excluding fillers, repetitions and reformulations). Complexity was indicated by the thematic coding of the discourse sample provided during production. The quality was indicated using 'Discourse Analysis Scale' with perceptual rating scale in the form of multidimensional scoring system. This was employed to analyze the complex discourse task on multiple



domains. An example of division of clauses and T-units is as follows. 100% of the data was checked for inter-judge reliability rating.

*3.8.3.3.1 Example: Division of clauses and T-units for a part of discourse.*

Discourse sample: I like the movie/ we saw about Ramesh, the terrorist/. The police said/ if you can kill the terrorist, Ramesh,/ I will give this gold to the one/ that can do it/They tried and tried/They almost caught the terrorist/

T-unit analysis of discourse: Number of clauses=8, Number of words/clauses= 5.2, Number of T-unit= 1, Number of words/T unit=41

## **CHAPTER 4**

### **RESULTS**

#### **Contents**

Aim of the study

4.1 Inter-judge Reliability Measures Using Cronbach's Alpha Co-efficient

4.2 Brief Description of Section A

4.3 Brief Description of Section B

The aim of the present study was to investigate discourse abilities in Kannada-English bilingual individuals with non-aphasic traumatic brain injury as compared to neuro-typical adults.

#### **4.1 Inter Judge Reliability Measures Using Cronbach's Alpha Co-Efficient For Qualitative And Quantitative Data**

There were three judges including the researcher who participated for the qualitative rating of the discourse samples. These judges were speech language pathologists. All the three judges rated 100% of the samples. The qualitative ratings obtained from the three judges were subjected to inter judge reliability tests using Cronbach's Alpha Reliability tests were performed separately for individuals with TBI group and neuro-typical group for Kannada and English language. Under quantitative analysis, initially the complete discourse samples were transcribed and later the T-unit based division was performed by the researcher and 10% of the data was re-checked for correct transcription and re-divided for T-unit based analysis by two linguists. The judgments on the division of number of T-unit (NTU), number of words per T-unit (NWPTU), number of clauses (NC) and number of words per clauses (NWPC) were performed by three judges (researcher and two speech language pathologists) and the entire data was subjected to inter-judge reliability measures using Cronbach's alpha coefficient. Thus, the reliability measures were carried out using Cronbach's alpha co-efficient for the qualitative and quantitative analysis of the discourse samples. The results of Cronbach's Alpha co-efficient for parameters related to qualitative analysis using 'Discourse Analysis Scale' for conversation, narration and picture description are represented in the following Table 7, 8 and 9. All the parameters showed >0.7 scores on these reliability measures. This suggested that, the data was reliable for the qualitative analysis. Hence for qualitative the *majority rating* by the three judges was subjected to further statistical analyses. Similarly, the results of Cronbach's Alpha co-efficient for parameters related to T-unit based analysis of conversation, narration and picture description tasks are represented in Table 10, 11 and 12. Here all the parameters showed >0.7 scores on these reliability measures suggesting that the data was reliable for the quantitative analysis. Hence for quantitative analysis the *average* of the judges was considered for further statistical analysis.

Table 7

*Cronbach's Alpha co-efficient for parameters related to qualitative analysis of conversation in Group I (TBI) and Group II (NTA).*

Parameters	Groups	Kannada	English
<b>Propositional aspects</b>			
<b>Discourse structure</b>			
Discourse forethought	TBI	0.974	0.963
	NTA	0.972	0.985
Organizational planning	TBI	0.951	0.969
	NTA	0.833	0.852
<b>Communication Intent</b>			
Greet others by themselves	TBI	0.983	0.985
	NTA	0.984	0.996
Greet others in response to others greeting	TBI	0.863	0.826
	NTA	0.962	0.937
Start conversation	TBI	0.883	0.874
	NTA	0.894	0.964
Ask information	TBI	0.796	0.802
	NTA	0.897	0.901
Ask assistance in understanding conversation	TBI	0.793	0.836
	NTA	0.876	0.895
Criticize conversation by agreeing or disagreeing	TBI	0.829	0.842
	NTA	0.868	0.941
Imagine events	TBI	0.857	0.875
	NTA	0.978	0.983
Understands advancers and blockers in conversation	TBI	0.875	0.897
	NTA	0.976	0.965
<b>Coherence</b>			
Global coherence	TBI	0.876	0.864
	NTA	0.884	0.977
Local coherence	TBI	0.852	0.861
	NTA	0.967	0.959
<b>Topic Management</b>			
Introducing topic	TBI	0.725	0.785
	NTA	0.893	0.882
Topic shift	TBI	0.823	0.817
	NTA	0.844	0.836
Topic change	TBI	0.862	0.848
	NTA	0.891	0.908
Perseveration in topic	TBI	0.880	0.877
	NTA	0.837	0.876
Minimal response	TBI	0.816	0.827
	NTA	0.887	0.873
Minimal elaboration	TBI	0.834	0.822
	NTA	0.935	0.944
Elaboration of topic	TBI	0.877	0.868
	NTA	0.946	0.850

Table 7 (continued)

Parameters	Groups	Kannada	English
<b>Other Discourse parameters</b>			
Information adequacy	TBI	0.787	0.766
	NTA	0.899	0.818
Information content	TBI	0.895	0.883
	NTA	0.929	0.914
Message accuracy	TBI	0.812	0.828
	NTA	0.984	0.965
<b>Speech related parameters</b>			
Vocabulary specificity	TBI	0.829	0.837
	NTA	0.997	0.987
Linguistic fluency	TBI	0.874	0.832
	NTA	-	-
Speech style	TBI	-	-
	NTA	-	-
Intonation	TBI	-	-
	NTA	-	-
Gaze efficiency	TBI	0.864	0.874
	NTA	0.971	0.992
Response time	TBI	0.817	0.827
	NTA	0.895	0.906
<b>Non-propositional aspects</b>			
<b>Turn taking</b>			
Initiation of turn	TBI	0.898	0.918
	NTA	0.976	0.998
Time to start turn	TBI	0.899	0.885
	NTA	0.929	0.947
Contingency of turn	TBI	0.895	0.904
	NTA	0.914	0.923
Unable to take prosodic cues	TBI	0.987	0.897
	NTA	0.963	0.985
Mode of conversation	TBI	0.762	0.759
	NTA	0.953	0.966
Listeners or speakers mode	TBI	0.740	0.726
	NTA	0.797	0.818
<b>Revision Behaviours</b>			
Revision behaviour	TBI	0.897	0.903
	NTA	0.913	0.921
<b>Conversation Repair</b>			
Use of self repair through repetition	TBI	0.837	0.829
	NTA	0.996	0.956
Use of revision through clarification	TBI	0.764	0.726
	NTA	0.975	0.944
Use of other initiated repair	TBI	0.789	0.800
	NTA	0.967	0.998

Note. TBI- Traumatic Brain Injury, NTA- Neuro-typical adults.

Table 8

*Cronbach's Alpha co-efficient for parameters related to qualitative analysis of narration in Group I (TBI) and Group II (NTA).*

Parameters	Groups	Kannada	English
<b>Propositional aspects</b>			
<b>Discourse Structure</b>			
Discourse forethought	TBI	0.895	0.961
	NTA	0.991	0.962
Organizational planning	TBI	0.897	0.883
	NTA	0.989	0.994
<b>Communication Intent</b>			
Initiation of narration	TBI	0.962	0.986
	NTA	0.921	0.935
Ask assistance during narration	TBI	0.989	0.976
	NTA	0.967	0.970
Imagines event correctly	TBI	0.894	0.887
	NTA	0.946	0.978
<b>Coherence</b>			
Global coherence	TBI	0.993	0.985
	NTA	0.983	0.921
Local Coherence	TBI	0.946	0.956
	NTA	0.872	0.868
<b>Topic Management</b>			
Introducing topic	TBI	0.963	0.979
	NTA	0.989	0.970
Topic shift	TBI	0.977	0.861
	NTA	0.980	0.948
Topic change	TBI	0.899	0.893
	NTA	0.951	0.945
Perseveration in topic	TBI	0.936	0.921
	NTA	0.951	0.971
Minimal elaboration	TBI	0.898	0.868
	NTA	0.955	0.948
Elaboration of topic	TBI	0.891	0.886
	NTA	0.996	0.958
<b>Other Discourse parameters</b>			
Information adequacy	TBI	0.895	0.879
	NTA	0.868	0.878
Information content	TBI	0.861	0.846
	NTA	0.985	0.976
Message accuracy	TBI	0.891	0.887
	NTA	0.951	0.961
Temporal and causal relation	TBI	0.886	0.858
	NTA	0.952	0.966

Table 8 (continued)

Parameters	Groups	Kannada	English
<b>Speech related parameters</b>			
Vocabulary specificity	TBI	0.847	0.858
	NTA	0.946	0.965
Linguistic fluency	TBI	0.877	0.897
	NTA	0.981	0.970
Speech style	TBI	0.871	0.869
	NTA	0.894	0.959
Intonation	TBI	0.837	0.849
	NTA	0.936	0.925
<b>Non-propositional aspects</b>			
<b>Revision behaviour</b>			
Revision behaviour	TBI	0.798	0.795
	NHT	0.938	0.955
<b>Repair Strategy</b>			
Use of self correction	TBI	0.880	0.869
	NTA	0.956	0.987
Use of repair through repetition or revision	TBI	0.878	0.855
	NTA	0.932	0.942
Use of other initiated correction	TBI	0.846	0.834
	NTA	0.939	0.925
Use of request for clarification	TBI	0.798	0.789
	NTA	0.930	0.965

Note. TBI- Traumatic brain injury, NTA- Neuro-typical adults.

Table 9

*Cronbach's Alpha co-efficient for parameters related to qualitative analysis of picture description in Group I (TBI) and Group II (NTA).*

Parameters	Groups	Kannada	English
<b>Propositional aspects</b>			
<b>Discourse Structure</b>			
Discourse forethought	TBI	0.875	0.861
	NTA	0.921	0.932
Organizational planning	TBI	0.877	0.883
	NTA	0.979	0.984
<b>Communication Intent</b>			
Initiate picture description	TBI	0.942	0.996
	NTA	0.923	0.937
Ask assistance in understanding the picture	TBI	0.929	0.876
	NTA	0.987	0.980
Criticize picture by agreeing or disagreeing	TBI	0.883	0.893
	NTA	0.985	0.956
Imagines event correctly	TBI	0.804	0.817
	NTA	0.906	0.918

Table 9 (continued)			
Parameters	Groups	Kannada	English
<b>Coherence</b>			
Global coherence	TBI	0.899	0.885
	NTA	0.913	0.921
Local Coherence	TBI	0.846	0.856
	NTA	0.982	0.968
<b>Topic Management</b>			
Introducing topic	TBI	0.863	0.879
	NTA	0.969	0.940
Topic shift	TBI	0.897	0.865
	NTA	0.981	0.948
Topic change	TBI	0.869	0.843
	NTA	0.955	0.944
Perseveration in topic	TBI	0.836	0.821
	NTA	0.957	0.972
Minimal elaboration	TBI	0.878	0.858
	NTA	0.959	0.946
Elaboration of topic	TBI	0.871	0.846
	NTA	0.992	0.948
<b>Other Discourse parameters</b>			
Information adequacy	TBI	0.795	0.809
	NTA	0.858	0.848
Information content	TBI	0.863	0.849
	NTA	0.989	0.979
Message accuracy	TBI	0.889	0.857
	NTA	0.952	0.968
<b>Speech related parameters</b>			
Vocabulary specificity	TBI	0.845	0.859
	NTA	0.947	0.969
Linguistic fluency	TBI	0.867	0.837
	NTA	0.980	0.940
Speech style	TBI	0.771	0.769
	NTA	0.892	0.909
Intonation	TBI	0.839	0.848
	NTA	0.937	0.920
Response time	TBI	0.840	0.823
	NTA	0.958	0.947
Gist of information	TBI	0.866	0.858
	NTA	0.936	0.986
<b>Non-propositional aspects</b>			
<b>Revision behaviour</b>			
Revision behaviour	TBI	0.786	0.796
	NHT	0.939	0.957



Table 9 (continued)

Parameters	Groups	Kannada	English
<b>Repair Strategy</b>			
Use of self correction	TBI	0.889	0.863
	NTA	0.957	0.980
Use of repair through repetition	TBI	0.876	0.852
	NTA	0.934	0.943
Use of other initiated correction	TBI	0.840	0.835
	NTA	0.939	0.926
Use of request for clarification	TBI	0.797	0.784
	NTA	0.931	0.969

Note. TBI- Traumatic Brain Injury, NTA- Neuro-typical adults.

Table 10

Results of Cronbach's Alpha co-efficient for parameters related to T-unit based analysis for conversation in Group I (TBI) and Group II (NTA).

Parameters of T-units	Groups	Kannada	English
NWPTU	TBI	0.87	0.82
	NTA	0.96	0.93
NC	TBI	0.81	0.79
	NTA	0.82	0.86
NWPC	TBI	0.91	0.83
	NTA	0.89	0.92

Note. NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, TBI- Traumatic Brain Injury, NTA- Neuro-typical adults.

Table 11

Results of Cronbach's Alpha co-efficient for parameters related to T-unit based analysis for narration in Group I (TBI) and Group II (NTA).

Parameters of T-units	Groups	Kannada	English
NTU	TBI	0.94	0.92
	NTA	0.95	0.92
NWPTU	TBI	0.91	0.87
	NTA	0.92	0.89
NC	TBI	0.85	0.83
	NTA	0.89	0.91
NWPC	TBI	0.91	0.89
	NTA	0.89	0.87

Note. NTU- number of T-unit, NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, TBI- Traumatic Brain Injury, NTA- Neuro-typical adults.

Table 12

*Results of Cronbach's Alpha co-efficient for parameters related to T-unit based analysis for picture description in Group I (TBI) and Group II (NTA).*

<b>Parameters of T-units</b>	<b>Groups</b>	<b>Kannada</b>	<b>English</b>
<b>NWPTU</b>	TBI	0.94	0.92
	NTA	0.97	0.95
<b>NC</b>	TBI	0.87	0.88
	NTA	0.89	0.91
<b>NWPC</b>	TBI	0.87	0.84
	NTA	0.91	0.89

Note. NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, TBI- Traumatic Brain Injury, NTA- Neuro-typical adults.

The major findings and the objectives of the study are explained under two sections, section A- Qualitative ratings and section B- Quantitative ratings. The sub-sections of section A and B are the qualitative and quantitative measures with respect to conversation, narration and picture description task.

#### **4.2 Section A- Qualitative Rating Of The Discourse Samples Using Discourse Analysis Scale**

**4.2.1 Sub-section I:** The performance of neuro-typical adults and individuals with traumatic brain injury (TBI) on qualitative measures of conversation using Discourse Analysis Scale (DAS) for conversation task.

**4.2.2 Sub-section II:** The performance of neuro-typical adults and individuals with traumatic brain injury (TBI) on qualitative measures of narration using DAS for narration task.

**4.2.3 Sub-section III:** The performance of neuro-typical adults and individuals with traumatic brain injury (TBI) on qualitative measures of picture description using DAS for picture description task.

### **4.3 Section B- Quantitative Rating Of The Discourse Samples Using T-Unit Analysis**

**4.3.1 Sub-section I:** The performance of neuro-typical adults and individuals with traumatic brain injury (TBI) on quantitative measures of conversation using T-unit based analysis.

**4.3.2 Sub-section II:** The performance of neuro-typical adults and individuals with traumatic brain injury (TBI) on quantitative measures of narration using T-unit based analysis.

**4.3.3 Sub-section III:** The performance of neuro-typical adults and individuals with traumatic brain injury (TBI) on quantitative measures of picture description using T-unit based analysis.

The statistical analysis was carried out using SPSS (PASW) Version 18. The mean, median, standard deviation of propositional and non-propositional parameters of individuals with TBI group and neuro-typical adult group on conversation, narration and picture description task in both the languages were calculated. This qualitative analysis data had further statistical analysis in three different steps. Initially in step 1, Mann-Whitney Test was done for the comparison between the individuals with TBI group and neuro-typical adult group. Later in step II, Wilcoxon's Signed Rank Test was done within each group for comparison between Kannada and English language discourse samples. Finally in step III, the propositional and non-propositional total scores of both the groups on the conversation, narration and picture description task were subjected to parametric tests. This includes mixed ANOVA (stage I), to study the main and interaction effects of group and languages followed by MANOVA (stage II), to study the effect of groups within each language and later paired t-test (stage III), to study the effect of languages within Group I and Group II separately. For quantitative data analysis the same three stages of step III of qualitative analysis data were used for the statistical analysis. The same is represented as a flow chart in the Figure 3 and Figure 6 for section A and section B respectively.

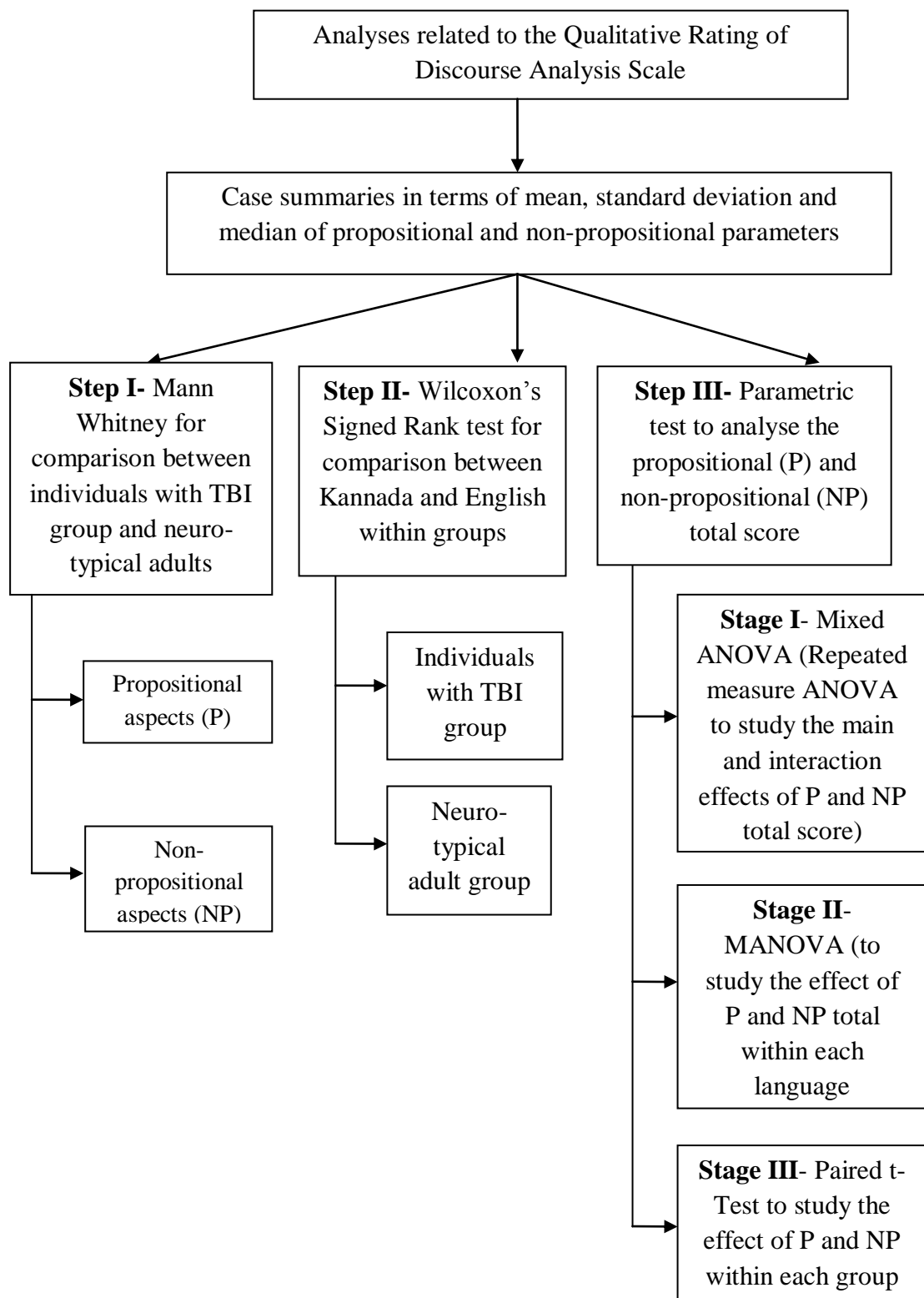
Thus, under section A (qualitative rating) the results for each sub sections are presented in the following steps:

1. *Mean, median and standard deviation of propositional and non-propositional parameters of discourse of individuals with traumatic brain injury group and neuro-typical adult group.*
2. *Step I- Comparison between the bilingual individuals with TBI and neuro-typical groups for propositional and non-propositional aspects.*
3. *Step II- Comparison of discourse between Kannada and English language within the individual groups (individuals with traumatic brain injury group and neuro-typical adult group).*
4. *Step III- Analysis for the total scores.*

And under section B (quantitative rating) the results for each sub sections are presented in the following stages:

1. *Mean, median and standard deviation of propositional and non-propositional parameters of discourse of individuals with traumatic brain injury group and neuro-typical adult group.*
2. *Stage I- Mixed ANOVA*
3. *Stage II- MANOVA*
4. *Stage III- Paired t-test*

**Section A: The performance of persons with traumatic brain injury (TBI) and neuro-typical adult on qualitative measures using Discourse Analysis Scale (DAS) for conversation, narration and picture description task.**



*Figure 2.* The statistical methods employed for the qualitative rating of the conversation, narration and picture description discourse genres.

## Contents

### 4.2 Section A: Qualitative Rating Of The Discourse Samples

4.2.1 Sub-section I: The performance of neuro-typical adults and individuals with traumatic brain injury (TBI) on qualitative measures of conversation using Discourse Analysis Scale (DAS) for conversation task.

*4.2.1.1 Mean, median and standard deviation of propositional and non-propositional parameters of discourse of individuals with traumatic brain injury group and neuro-typical adults group.*

*4.2.1.2 Step I- Comparison between the bilingual individuals with TBI and NTA groups.*

*4.2.1.2.1 Propositional aspects.*

*4.2.1.2.2 Non-propositional aspects.*

*4.2.1.3 Step II- Comparison of discourse in Kannada and English languages within the groups.*

*4.2.1.3.1 Individuals with Traumatic Brain Injury group (TBI).*

*4.2.1.3.2 Neuro-typical adult group.*

*4.2.1.4 Step III- Analysis for the total scores.*

*4.2.1.4.1 Descriptive statistics for the total scores.*

*4.2.1.4.2 Stage I.*

*4.2.1.4.3 Stage II.*

*4.2.1.4.4 Stage III.*

## **4.2 Section A- Qualitative Rating Of The Discourse Samples Using Discourse Analysis Scale**

**4.2.1 Sub-section I: Performance of individuals with traumatic brain injury (TBI) and neuro-typical adults (NTA) on qualitative measures of conversation using DAS for conversation task.**

*4.2.1.1 Mean, median and standard deviation of propositional and non-propositional parameters of discourse of individuals with traumatic brain injury group and neuro-typical adults group.*

The statistical analysis was carried out using SPSS (PASW) Version 18. The mean, median, standard deviation of propositional and non-propositional parameters of individuals with TBI group and neuro-typical adult group on conversation task in both the languages were calculated as shown in Table 13. Since ratings were considered, median was also given. This suggested lower mean and median for individuals with TBI group compared to NTA group.

Table 13- Mean, Median, Standard Deviation for the propositional and non-propositional parameters of conversation task for neuro-typical adult (NTA) group and individuals with traumatic brain injury (TBI) group in Kannada and English language.

Parameters	Groups															
	NTA								TBI							
	Kannada				English				Kannada				English			
	n	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD
<b>PROPOSITIONAL ASPECTS</b>																
<b>Discourse Structure</b>																
DF	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.10	1.00	0.64	20	1.40	1.00	0.59
OP	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.05	1.00	0.39	20	1.10	1.00	0.44
<b>Communication intent</b>																
GOBT	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.00	1.00	1.02	20	1.70	2.00	0.73
GOIRTOG	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00
SC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.75	2.00	0.44	20	1.85	2.00	0.48
AI	20	1.95	2.00	0.22	20	2.00	2.00	0.00	20	1.25	1.00	0.78	20	1.75	2.00	0.44
AAIUC	20	1.95	2.00	0.22	20	2.00	2.00	0.00	20	1.20	1.00	0.69	20	1.70	2.00	0.57
CCBAOD	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.50	2.00	0.68	20	1.80	2.00	0.52
IEC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.75	2.00	0.55	20	1.80	2.00	0.52
UAABIC	20	1.95	2.00	0.22	20	2.00	2.00	0.00	20	1.25	1.00	0.78	20	1.65	2.00	0.48
<b>Coherence</b>																
GC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	0.95	1.00	0.60	20	1.25	1.00	0.55
LC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.60	2.00	0.50	20	1.45	1.00	0.51
<b>Topic management</b>																
IT	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.90	2.00	0.30	20	1.90	2.00	0.30
TS	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.50	2.00	0.60	20	1.60	2.00	0.59
TC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.45	2.00	0.75	20	1.85	2.00	0.36
PIT	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.90	2.00	0.30	20	2.00	2.00	0.00
MR	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.85	2.00	0.36	20	1.65	2.00	0.48
ME	20	1.95	2.00	0.22	20	1.95	2.00	0.22	20	1.45	2.00	0.82	20	1.00	1.00	0.56
EOT	20	1.75	2.00	0.44	20	1.90	2.00	0.30	20	1.65	2.00	0.48	20	1.85	2.00	0.36

Note: DF- Discourse forethought, OP- Organizational planning, GOBT- Greet others by themselves, GOIRTOG- Greet others in response to others greeting, SC- Start conversation, AI- Ask information, AAIUC- Ask assistance in understanding conversation, CCBAOD- Criticise conversation by agreeing or disagreeing, IEC- Imagines events correctly, UAABIC- Understands advancers and blockers in conversation, GC- Global coherence, LC- Local coherence, IT- Introducing topic, TS-Topic shift, TC- Topic change, PIT- Perseveration in topic, MR- Minimal response, ME- Minimal elaboration, EOT- Elaboration of topic.



Table 13 (continued)																
Parameters	Groups															
	NTA								TBI							
	Kannada				English				Kannada				English			
	n	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD
<b>Other Discourse parameters</b>																
IA	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.95	2.00	0.22	20	1.95	2.00	0.22
IC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.65	2.00	0.48	20	1.45	1.00	0.51
MA	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.55	2.00	0.60	20	1.80	2.00	0.52
<b>Speech related parameters</b>																
VS	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.85	2.00	0.36	20	1.95	2.00	0.22
LF	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.90	2.00	0.30	20	2.00	2.00	0.00
SS	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00
I	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.95	2.00	0.22	20	1.95	2.00	0.22
GE	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.95	2.00	0.22	20	2.00	2.00	0.00
RT	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.60	2.00	0.50	20	1.65	2.00	0.48
<b>NON-PROPOSITIONAL ASPECTS</b>																
<b>Turn Taking</b>																
IOT	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.90	2.00	0.44	20	1.90	2.00	0.44
TTTST	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.65	2.00	0.67	20	1.75	2.00	0.63
CT	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.75	2.00	0.55	20	1.50	2.00	0.60
UTTPC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.90	2.00	0.30	20	1.95	2.00	0.22
MOC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00
LOSM	20	1.90	2.00	0.30	20	1.95	2.00	0.22	20	1.55	2.00	0.60	20	1.85	2.00	0.36
<b>Revision Behavior</b>																
RB	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00
<b>Conversation Repair</b>																
UOSRTR	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.75	2.00	0.44	20	2.00	2.00	0.00
UORTC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.50	2.00	0.82	20	1.90	2.00	0.30
UOOIR	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.95	2.00	0.22

Note: IA- Information adequacy, IC- Information content, MA- Message accuracy, VS- Vocabulary specificity, LF- Linguistic fluency, SS- Speech style, I- Intonation, GE- Gaze efficiency, RT-Response time, IOT- Initiation of turn, TTTST- Taking time to start a turn, CT- Contingency of turn, UTTPC- Unable to take prosodic cues, MOC- Mode of conversation, LOSM- Listener or speaker mode, RB- Revision behaviour, UOSRTR- Use of self repair through repetition, UORTC- Use of revision through clarification, UOOIR- Use of other initiated repair.

#### 4.2.1.2 Step I- Comparison between the bilingual individuals with TBI and NTA groups.

The results are explained with respect to propositional and non-propositional aspects of conversational discourse.

##### 4.2.1.2.1 Propositional Aspects.

Mann-Whitney U test was administered to examine the difference in conversational discourse sample between the individuals with TBI group and NTA group. The results of propositional aspects of conversational discourse are represented in Table 14.

Table 14

*Results of Mann-Whitney Test for the propositional aspects of DAS of conversation task in Kannada and English language.*

Parameters	Kannada		English	
	/Z/	p value	/Z/	p value
<b>Discourse structure</b>				
Discourse forethought	4.75	0.000**	3.83	0.000**
Organizational planning	5.59	0.000**	5.32	0.000**
<b>Communication intent</b>				
Greets others and introduces self by themselves	3.60	0.000**	1.77	0.075
Greets others and introduces self in response to other's greeting	0.00	1.000	0.00	1.000
Starts conversation	2.36	0.018*	1.43	0.152
Asks information	3.42	0.001*	2.36	0.018*
Asks assistance in understanding conversation	3.91	0.000**	2.35	0.018*
Criticizes conversation by agreeing or disagreeing	3.10	0.002*	1.77	0.076
Imagines events correctly	2.08	0.038*	1.77	0.076
Understands advancers and blockers in conversation	3.42	0.001*	2.87	0.004*
<b>Coherence</b>				
Global coherence	5.22	0.000**	4.55	0.000**
Local coherence	3.12	0.002*	3.84	0.000**
<b>Topic management</b>				
Introducing topic	1.43	0.152	1.43	0.152
Topic shift	3.35	0.001*	2.87	0.004*
Topic changes	3.10	0.002*	1.77	0.075
Perseveration in topics	1.43	0.152	0.00	1.000
Minimal response	1.77	0.075	2.87	0.004*
Minimal elaboration	2.40	0.016*	4.94	0.000**
Elaboration of topics	0.68	0.496	0.47	0.637

Note. \*  $p < .05$ , \*\*  $p < .001$ .

Table 14 (continued)

Parameters	Kannada		English	
	/Z/	p value	/Z/	p value
<b>Other discourse parameters</b>				
Information adequacy	1.00	0.317	1.00	0.317
Information content	2.87	0.004*	3.84	0.000**
Message accuracy	3.11	0.002*	1.77	0.076
<b>Speech related parameters</b>				
Vocabulary specificity	1.77	0.075	1.00	0.317
Linguistic fluency	1.43	0.152	0.00	1.000
Intonation	1.00	0.317	1.00	0.317
Speech Style	0.00	1.000	0.00	1.000
Gaze efficiency	1.00	0.317	0.00	1.000
Response time	3.12	0.002*	2.87	0.004*

Note. \*  $p < .05$ , \*\*  $p < .001$ .

#### 4.2.1.2.2 Non- Propositional aspects.

There was a high significant difference between the groups for the sub parameters 'time to start a turn', 'contingency of the turn' and 'listener or speakers mode' of turn taking in Kannada language and 'contingency of the turn' in English language as shown in Table 15.

Table 15

Results of Mann-Whitney Test for the non-propositional aspects of DAS of conversation task in Kannada and English language.

Parameters	Kannada		English	
	/Z/	p value	/Z/	p value
<b>Turn taking</b>				
Initiation of turn	1.00	0.317	1.00	0.317
Time to start a turn	2.35	0.019*	1.77	0.076
Contingency of the turn	2.08	0.038*	3.35	0.001*
Unable to take prosodic cues	1.43	0.152	1.00	0.317
Mode of conversation	0.00	1.000	0.00	1.000
Listeners or speakers mode	2.19	0.028*	1.04	0.298
<b>Revision behaviours</b>				
Revision behaviours	0.00	1.000	0.00	1.000
<b>Conversation repair</b>				
Use of self repair through repetition	2.36	0.018*	0.00	1.000
Use of revisions through clarification	2.61	0.009*	1.43	0.152
Use of other initiated repair	0.00	1.000	1.00	0.317

Note. \*  $p < .05$ .

**4.2.1.3 Step II- Comparison of discourse in Kannada and English languages within the groups.**

**4.2.1.3.1 Individuals with Traumatic Brain Injury group (TBI).**

Wilcoxon's Signed Rank test was administered to examine the difference between Kannada and English language in the discourse samples. The performances of the TBI group on the propositional and non-propositional aspects of DAS are represented in following Table 16 and Table 17.

In Table 16, sub parameter 'greet other and introduces self by themselves or in response to others greeting' of communication intent, 'introducing topic' of topic management, 'information adequacy', 'speech style', 'intonation' of other discourse parameters seemed to be equal in the two languages. There was a high significant difference between the two languages for the sub parameters 'greet others and introduces self by themselves', 'asks information', 'asks assistance in understanding conversation' of communication intent and also the sub parameters 'global coherence' of coherence, 'topic changes', 'minimal response' and 'minimal elaboration' of topic management and 'information content' of other discourse parameter of the propositional aspects.

In Table 17, under non-propositional aspects the sub parameter 'initiation of turn', 'mode of conversation' of turn taking and revision behaviours seemed to be equal in both the languages. There was a high significant difference between the two languages for the sub parameter 'listeners or speakers mode' of turn taking and the sub parameter 'use of self repair through repetition' of conversation repair.

Table 16

*Results of Wilcoxon's Signed Rank test for propositional aspects of DAS of conversation task within the TBI group.*

<b>Parameters</b>	<b>/Z/</b>	<b>p value</b>
<b>Discourse structure</b>		
Discourse forethought	1.89	0.058
Organizational planning	1.00	0.317
<b>Communication intent</b>		
Greets others and introduces self by themselves	2.33	0.020*
Greets others and introduces self in response to others greeting	0.00	1.000
Starts conversation	1.00	0.317
Asks information	2.33	0.020*
Asks assistance in understanding conversation	2.67	0.008*
Criticizes conversation by agreeing or disagreeing	1.89	0.058
Imagines events correctly	1.00	0.317
Understand advances and blockers in conversation	1.90	0.057
<b>Coherence</b>		
Global coherence	2.44	0.014*
Local coherence	1.73	0.083
<b>Topic management</b>		
Introducing topic	0.00	1.000
Topic shift	1.00	0.317
Topic changes	1.99	0.046*
Perseveration in topic	1.41	0.157
Minimal response	2.00	0.046*
Minimal elaboration	2.32	0.020*
Elaboration of topics	1.41	0.157
<b>Other discourse parameters</b>		
Information adequacy	0.00	1.000
Information content	2.00	0.046*
Message accuracy	1.89	0.059
<b>Speech related parameters</b>		
Vocabulary specificity	1.41	0.157
Linguistic fluency	1.41	0.157
Speech style	0.00	1.000
Intonation	0.00	1.000
Gaze efficiency	1.00	0.317
Response time	0.37	0.705

*Note.* \*  $p < .05$ .

Table 17

*Results of Wilcoxon's Signed Rank test for non-propositional aspects of DAS of conversation task within the TBI group.*

<b>Parameters</b>	<b> Z </b>	<b>p value</b>
<b>Turn taking</b>		
Initiation of turn	0.00	1.000
Time to start a turn	1.41	0.157
Contingency of the turn	1.50	0.132
Unable to take prosodic cues	1.00	0.317
Mode of conversation	0.00	1.000
Listeners or speakers mode	2.12	0.034*
<b>Revision behaviour</b>		
Revision behaviour	0.00	1.000
<b>Conversation repair</b>		
Use of self repair through repetition	2.23	0.025*
Use of revision through clarification	1.86	0.062
Use of other initiated repair	1.00	0.317

*Note.* \*  $p < .05$ .

#### 4.2.1.3.2 Neuro-typical adult group (NTA).

Wilcoxon's Signed Rank test results showed no significant difference between the two languages for all the parameters of propositional and non-propositional aspects of conversational discourse analysis scale. In Table 18, except the sub parameter 'asks information', 'asks assistance in understanding conversation' and 'understand advancers and blockers in conversation' of communication intent and 'elaboration of topic' of topic management, all other sub parameters of the propositional aspects seemed to be equal in the two languages. In Table 19, for non-propositional aspects, except the sub parameter 'listeners or speakers mode' of turn taking all other sub parameters of revision behaviour and conversation repair seemed to be equal in the two languages.

Table 18

*Results of Wilcoxon's Signed Rank test for propositional aspects of DAS of conversation task within the NTA group.*

<b>Parameters</b>	<b>/Z/</b>	<b>p value</b>
<b>Discourse structure</b>		
Discourse forethought	0.00	1.000
Organizational planning	0.00	1.000
<b>Communication intent</b>		
Greets others and introduces self by themselves	0.00	1.000
Greets others and introduces self in response to others greeting	0.00	1.000
Starts conversation	0.00	1.000
Asks information	1.00	0.317
Asks assistance in understanding conversation	1.00	0.317
Criticizes conversation by agreeing or disagreeing	0.00	1.000
Imagines events correctly	0.00	1.000
Understand advancers and blockers in conversation	1.00	0.317
<b>Coherence</b>		
Global coherence	0.00	1.000
Local coherence	0.00	1.000
<b>Topic management</b>		
Introducing a topic	0.00	1.000
Topic shift	0.00	1.000
Topic changes	0.00	1.000
Perseveration in topic	0.00	1.000
Minimal response	0.00	1.000
Minimal elaboration	0.00	1.000
Elaboration of topics	1.73	0.083
<b>Other discourse parameters</b>		
Information adequacy	0.00	1.000
Information content	0.00	1.000
Message accuracy	0.00	1.000
<b>Speech related parameters</b>		
Vocabulary specificity	0.00	1.000
Linguistic fluency	0.00	1.000
Speech style	0.00	1.000
Intonation	0.00	1.000
Gaze efficiency	0.00	1.000
Response time	0.00	1.000

Table 19

*Results of Wilcoxon's Signed Rank test for non-propositional aspects of DAS of conversation task within the NTA group.*

<b>Parameters</b>	<b> Z </b>	<b>p value</b>
<b>Turn Taking</b>		
Initiation of turn	0.00	1.000
Time to start a turn	0.00	1.000
Contingency of the turn	0.00	1.000
Unable to take prosodic cues	0.00	1.000
Mode of conversation	0.00	1.000
Listeners or speakers mode	1.00	0.317
<b>Revision behaviour</b>		
Revision behaviour	0.00	1.000
<b>Conversation repair</b>		
Use of self repair through repetition	0.00	1.000
Use or revisions through clarification	0.00	1.000
Use of other initiated repair	0.00	1.000

#### ***4.2.1.5 Step III- Analysis for the total scores.***

The three point perceptual rating scale was used for scoring. This total score of the Discourse Analysis Scale (DAS) for conversation was 78. This total score of Discourse Analysis Scale had been further divided into two sub levels, the propositional and non-propositional total. For conversation task, the propositional and non-propositional total was equal to 58 and 20 respectively. On administration of DAS for both the groups in both the languages, the scores were obtained using the three point perceptual rating scale. The obtained scores out of the total scores at two sub levels, the propositional and non-propositional total were subjected to parametric tests like mixed ANOVA, MANOVA and paired t-test. This analysis is similar to the statistical analysis of quantitative data under three separate stages. The results and details of the statistical analyses are explained in detail for conversation task under two sub levels (propositional total and non-propositional total) of Discourse Analysis Scale.



#### 4.2.1.4.1 Propositional and Non-propositional total.

The results of descriptive statistics of propositional and non-propositional aspects total with respect to groups in Kannada and English languages show lower mean value for individuals with traumatic brain injury group compared to neuro-typical adult group in both the languages. Among the comparison of languages (Kannada and English) between the TBI and NTA groups, both the groups showed higher mean value for English language compared to Kannada language. The same is depicted in Figure 3 and Table 20 shows the mean values.

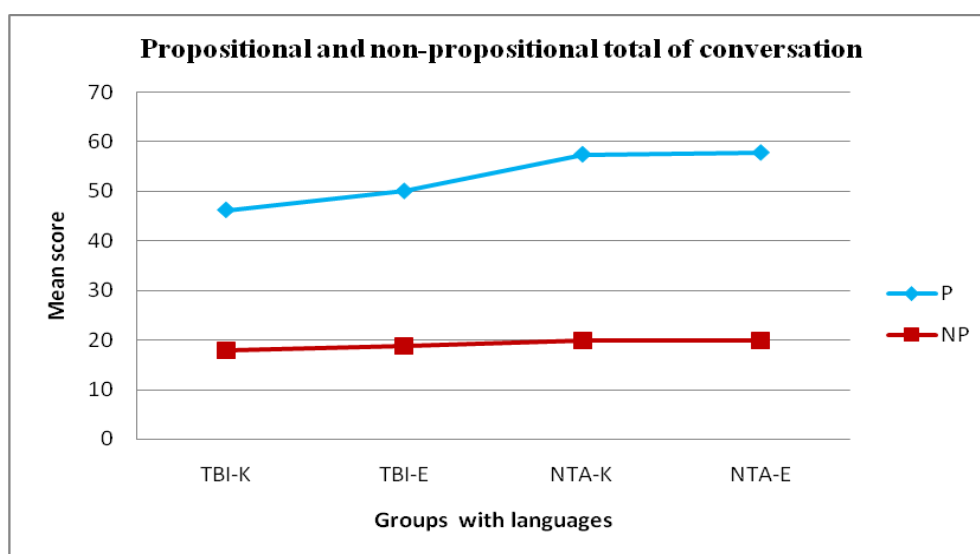


Figure 3. Mean scores of the propositional (P) and non-propositional (NP) total of conversation task between the groups and languages. TBI-Traumatic brain injury, NTA-Neuro-typical adult, K-Kannada, E-English.

Table 20

Mean and Standard Deviation for the propositional and non-propositional total of conversational discourse of TBI and NTA group in Kannada and English language.

Sub levels of DAS	Groups	N	Languages			
			Kannada		English	
			Mean	Standard Deviation	Mean	Standard Deviation
<b>Propositional aspects</b>	TBI	20	46.20	7.28	50.05	6.71
	NTA	20	57.50	1.14	57.85	0.36
<b>Non-Propositional aspects</b>	TBI	20	17.85	2.27	18.80	1.88
	NTA	20	19.90	0.30	19.95	0.22

Note. TBI- Traumatic brain injury, NTA- Neuro-typical adults, DAS- Discourse Analysis Scale, N- Number of participants.

#### 4.2.1.4.2 Stage I.

Following the descriptive statistics, mixed ANOVA was administered to check the main and interaction effects of groups (TBI vs NTA) and languages (Kannada vs English) and groups over the language on the sub levels of Discourse Analysis Scale (propositional total and non-propositional total) using qualitative ratings. Table 21, shows the results of mixed ANOVA.

Table 21

*Results of Mixed ANOVA to study the main and interaction effects of groups and languages for the qualitative scale based measures of conversation.*

Source	Sub levels of DAS	F (1,38)	p value
<b>Groups</b>	Propositional aspects	40.10	0.000**
	Non-Propositional aspects	16.00	0.000**
<b>Languages</b>	Propositional aspects	20.24	0.001*
	Non-Propositional aspects	4.04	0.051
<b>Groups*Languages</b>	Propositional aspects	14.05	0.001*
	Non-Propositional aspects	3.27	0.078

*Note.* DAS- Discourse Analysis Scale, \*-  $p < .05$ , \*\* -  $p < .001$ .

Initially for between group comparisons the results of the statistical analysis showed a significant main effect of groups for both the sub levels (propositional and non-propositional aspects) of DAS. Later, on comparison between Kannada and English languages there was a significant main effect of languages which was only at one sub level, the propositional aspects of DAS.

#### 4.2.1.4.3 Stage II.

MANOVA was conducted to cross check the results of mixed ANOVA. This examined the difference between the groups (TBI and NTA) over the dependent variables (propositional and non-propositional aspects of DAS) within Kannada and English languages. The results for both within Kannada and English language showed a main effect for both the sub level propositional and non-propositional aspects of DAS as shown in Table 22. The TBI group performed poorer than NTA group.

Table 22

*Results of MANOVA to study the effect of group within each language (Kannada and English) for the propositional and non-propositional aspects of DAS of conversation.*

<b>Languages</b>	<b>Sub levels of DAS</b>	<b>F (1,38)</b>	<b>p value</b>
<b>Kannada</b>	Propositional aspects	46.91	0.000**
	Non-Propositional aspects	15.91	0.001*
<b>English</b>	Propositional aspects	26.89	0.000**
	Non-Propositional aspects	7.37	0.010*

*Note.* DAS- Discourse Analysis Scale, \*-  $p < .05$ , \*\* -  $p < .001$ .

#### 4.2.1.4.4 Stage III.

Paired t-test was administered to study the effect of Kannada and English language over the dependent variable (propositional and non-propositional aspects) of DAS within individual group (TBI followed by NTA). In Group I (TBI), there was a significant difference only for the sub level propositional aspects of DAS. But in case of Group II (NTA) there was no significant difference for the two sub levels (propositional and non-propositional aspects) of DAS as shown in Table 23.

Table 23

*Results of Paired t-test to study the effect of languages within each group for the propositional and non-propositional aspects of DAS of conversation.*

<b>Groups</b>	<b>Sub levels of DAS</b>	<b>t (19)</b>	<b>p value</b>
<b>TBI</b>	Propositional aspects	4.28	0.000**
	Non-Propositional aspects	1.92	0.070
<b>NTA</b>	Propositional aspects	1.37	0.185
	Non-Propositional aspects	1.00	0.330

*Note.* TBI- Traumatic brain injury, NTA- Neuro-typical adults, DAS- Discourse Analysis Scale, \*\* -  $p < .001$ .

## Contents

4.2.2 Sub-section II: The performance of neuro-typical adults and individuals with traumatic brain injury (TBI) on qualitative measures of narration using Discourse Analysis Scale (DAS) for narration task.

4.2.2.1 *Mean, median and standard deviation of propositional and non-propositional parameters of discourse of individuals with traumatic brain injury group and neuro-typical adults group.*

4.2.2.2 *Step I- Comparison between the bilingual individuals with TBI and NTA groups.*

4.2.2.2.1 *Propositional aspects.*

4.2.2.2.2 *Non-propositional aspects.*

4.2.2.3 *Step II- Comparison of discourse in Kannada and English languages within the groups.*

4.2.2.3.1 *Individuals with Traumatic Brain Injury group (TBI).*

4.2.2.3.2 *Neuro-typical adult group.*

4.2.2.4 *Step III- Analysis for the total scores.*

4.2.2.4.1 *Descriptive statistics for the total scores.*

4.2.2.4.2 *Stage I.*

4.2.2.4.3 *Stage II.*

4.2.2.4.4 *Stage III.*

**4.2.2 Sub-section II: Performance of individuals with traumatic brain injury (TBI) and neuro-typical adults (NTA) on qualitative measures of narration using DAS for narration task.**

***4.2.2.1 Mean, median and standard deviation of propositional and non-propositional parameters of discourse of individuals with traumatic brain injury group and neuro-typical adults group.***

The statistical analysis was carried out using SPSS (PASW) Version 18. The mean, median, standard deviation of propositional and non-propositional parameters of individuals with TBI group and neuro-typical adult group on narration task in both the languages were calculated as shown in Table 24. Since ratings were considered, median was also given. This suggested lower mean and median for individuals with TBI group compared to NTA group.

Table 24 - Mean, Median, Standard Deviation of the propositional and non-propositional parameters of narrative discourse of neuro-typical adult (NTA) group and individuals with traumatic brain injury (TBI) group in Kannada and English language.

Parameters	Groups															
	NTA								TBI							
	Kannada				English				Kannada				English			
	N	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD
<b>PROPOSITIONAL ASPECTS</b>																
<b>Discourse Structure</b>																
DF	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.75	2.00	0.35	20	1.75	2.00	0.25
OP	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.65	2.00	0.37	20	1.65	2.00	0.37
<b>Communication Intent</b>																
IN	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.95	2.00	0.22
AADN	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.95	2.00	0.48	20	1.90	2.00	0.30
IEC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.85	2.00	0.58	20	1.95	1.75	0.24
<b>Coherence</b>																
GC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.40	2.00	0.44	20	1.60	2.00	0.45
LC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.65	2.00	0.54	20	1.75	2.00	0.55
<b>Topic Management</b>																
IT	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.60	2.00	0.55	20	1.75	2.00	0.44
TS	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.90	2.00	0.30	20	1.85	2.00	0.36
TC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.80	2.00	0.21	20	2.00	2.00	0.00
PIT	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00
ME	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.65	2.00	0.45	20	1.60	2.00	0.47
EOT	20	1.95	2.00	0.22	20	2.00	2.00	0.00	20	1.85	2.00	0.21	20	1.95	2.00	0.05

Note: DF- Discourse forethought, OP- Organizational planning, IN- Initiate narration, AADN- Ask assistance during narration, IEC- Imagines events correctly, GC- Global coherence, LC- Local coherence, IT- Introducing topic, TS-Topic shift, TC- Topic change, PIT- Perseveration in topic, ME- Minimal elaboration, EOT-Elaboration of topic.

Table 24 (continued)																
Parameters	Groups															
	NTA								TBI							
	Kannada				English				Kannada				English			
	N	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD
<b>Other Discourse parameters</b>																
IA	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.95	2.00	0.22	20	1.90	2.00	0.30
IC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.45	2.00	0.57	20	1.80	2.00	0.20
MA	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.50	2.00	0.55	20	1.75	2.00	0.38
TCR	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.45	2.00	0.57	20	1.80	2.00	0.20
<b>Speech related parameters</b>																
VS	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.91	2.00	0.29
LF	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00
SS	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00
I	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.85	2.00	0.21	20	1.85	2.00	0.21
<b>NON-PROPOSITIONAL ASPECTS</b>																
<b>Turn Taking</b>																
RB	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.95	2.00	0.22
<b>Repair Strategy</b>																
UOSC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.85	2.00	0.34	20	1.95	2.00	0.22
UORTROR	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.45	2.00	0.55	20	1.80	2.00	0.29
UOIC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.90	2.00	0.35	20	1.85	2.00	0.20
UORFC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.75	2.00	0.44	20	1.90	2.00	0.22

Note: IA- Information adequacy, IC- Information content, MA- Message accuracy, TCR- Temporal causal relation, VS- Vocabulary specificity, LF- Linguistic fluency, SS- Speech style, I- Intonation, RB- Revision behaviour, UOSC- Use of self correction, UORTROR- Use of repair through repetition or revision, UOIC- Use of other initiated corrections, UORFC- Use of request for clarification

#### 4.2.2.2 Step I- Comparison between the bilingual individuals with TBI and NTA groups.

The results are explained with respect to propositional and non-propositional aspects of narrative discourse.

##### 4.2.2.2.1 Propositional Aspects.

Mann-Whitney U test was administered to examine the difference in narrative discourse sample between the individuals with TBI group and NTA group. The results of propositional aspects of narrative discourse are represented in Table 25. There was a significant difference between the groups for the sub parameter ‘discourse forethought’ and ‘organizational planning’ of discourse structure, ‘global and local coherence’ of coherence, ‘topic shift’ and ‘minimal elaboration’ of topic management, ‘information content’, ‘message accuracy’ and ‘temporal causal relation’ of other discourse parameters in Kannada and English languages.

Table 25

*Results of Mann-Whitney Test for the propositional aspects of DAS of narration task in Kannada and English language.*

Parameters	Kannada		English	
	/Z/	p value	/Z/	p value
<b>Discourse structure</b>				
Discourse forethought	2.360	0.018*	2.623	0.009*
Organizational planning	2.357	0.018*	2.357	0.018*
<b>Communication intent</b>				
Initiation of narration	0.000	1.000	1.433	0.152
Asks assistance during narration	1.433	0.152	1.778	0.075
Imagines events correctly	1.000	0.317	1.778	0.075
<b>Coherence</b>				
Global coherence	2.082	0.037*	2.623	0.009*
Local coherence	2.360	0.018*	2.360	0.018*
<b>Topic management</b>				
Introducing topic	0.000	1.000	0.000	1.000
Topic shift	2.082	0.037*	2.082	0.037*
Topic changes	1.778	0.075	1.433	0.152
Perseveration in topics	0.000	1.000	0.000	1.000
Minimal elaboration	2.082	0.037*	2.360	0.018*
Elaboration of topic	1.416	0.157	1.778	0.075

Note. \*  $p < .05$ .



Table 25 (continued)

Parameters	Kannada		English	
	/Z/	p value	/Z/	p value
<b>Other discourse parameters</b>				
Information adequacy	1.000	0.317	1.433	0.152
Information content	2.616	0.009*	2.623	0.009*
Message accuracy	2.082	0.037*	2.082	0.037*
Temporal and causal relation	2.623	0.009*	2.876	0.004*
<b>Speech related parameters</b>				
Vocabulary specificity	0.000	1.000	1.433	0.152
Linguistic fluency	0.000	1.000	0.000	1.000
Speech style	0.000	1.000	0.000	1.000
Intonation	1.000	0.317	1.000	0.317

Note. \*  $p < .05$ .

#### 4.2.2.2.2 Non- Propositional aspects.

There was a high significant difference between the groups for the sub parameters 'use of self correction', 'use of repair through repetition or revision' and 'use of other initiated correction' of repair strategy in Kannada language and 'use of other initiated correction' in English language as shown in the following Table 26.

Table 26

Results of Mann-Whitney Test for the non-propositional aspects of DAS of narration task in Kannada and English language.

Parameters	Kannada		English	
	/Z/	p value	/Z/	p value
<b>Revision behaviours</b>				
Revision behaviours	0.000	1.000	1.000	0.317
<b>Repair strategy</b>				
Use of self correction	1.000	0.317	2.360	0.018*
Use of repair through repetition or revision	1.433	0.152	2.615	0.009*
Use of other initiated correction	2.360	0.018*	2.360	0.018*
Use of request for clarification	1.777	0.076	1.433	0.152

Note. \*  $p < .05$ .

#### 4.2.2.3 Step II- Comparison of discourse in Kannada and English languages within the groups.

##### 4.2.2.3.1 Individuals with Traumatic Brain Injury group (TBI).

Wilcoxon's Signed Rank test was administered to examine the difference between Kannada and English language in the discourse samples. The performances of the TBI group on the propositional and non-propositional aspects of DAS are represented in Table 27. The sub parameter 'organizational planning' of discourse structure, 'local coherence' of coherence, 'introducing topic', 'topic shift', 'perseveration in topic' of topic management, 'message accuracy' of other discourse parameters and 'linguistic fluency', 'speech style', 'intonation' of speech related parameters seemed to be equal in the two languages. Thus, with respect to propositional aspects of discourse there was no significant difference between the languages for any of the parameters of discourse.

But according to Table 28, under the non propositional aspects of discourse there was a high significant difference between the two languages for the sub parameters 'use of self correction' of repair strategy. The sub parameter 'use of other initiated correction' of turn taking seemed to be equal in both the languages.

Table 27

*Results of Wilcoxon's Signed Rank test for propositional aspects of DAS of narration task within the TBI group.*

<b>Parameters</b>	<b>/Z/</b>	<b>p value</b>
<b>Propositional parameters</b>		
<b>Discourse structure</b>		
Discourse forethought	1.000	0.317
Organizational planning	0.000	1.000
<b>Communication intent</b>		
Initiation of narration	1.414	0.157
Asks assistance during narration	0.577	0.564
Imagines events correctly	1.414	0.157
<b>Coherence</b>		
Global coherence	1.414	0.157
Local coherence	0.000	1.000

Table 27 (continued)

Parameters	/Z/	p value
<b>Topic management</b>		
Introducing topic	0.000	1.000
Topic shift	0.000	1.000
Topic changes	1.000	0.317
Perseveration in topics	0.000	1.000
Minimal elaboration	0.447	0.655
Elaboration of topics	1.000	0.317
<b>Other discourse parameters</b>		
Information adequacy	1.000	0.317
Information content	1.000	0.317
Message accuracy	0.000	1.000
Temporal and causal relation	1.000	0.317
<b>Speech related parameters</b>		
Vocabulary specificity	1.414	0.157
Linguistic fluency	0.000	1.000
Speech style	0.000	1.000
Intonation	0.000	1.000

Table 28

*Results of Wilcoxon's Signed Rank test for non-propositional aspects of DAS of narration task within the TBI group.*

Parameters	/Z/	p value
<b>Non-Propositional parameters</b>		
<b>Revision behaviour</b>		
Revision behaviours	1.000	0.317
<b>Repair strategy</b>		
Use of self correction	2.000	0.046*
Use of repair through repetition/revision	1.823	0.068
Use of other initiated correction	0.000	1.000
Use of request for clarification	1.414	0.157

*Note.* \*  $p < .05$ .

4.2.2.3.2 *Neuro-typical adult group (NTA).*

Wilcoxon's Signed Rank test results showed no significant difference between the two languages for all the parameters of propositional and non-propositional aspects of discourse analysis scale of narration task. In Table 29, except the sub parameter 'elaboration of topics' of topic management, all other sub parameters of the propositional aspects seemed to be equal in the two languages. In case of non-propositional aspects all the sub parameters of revision behaviour and repair strategy seemed to be equal in the two languages as shown in Table 30.

Table 29

*Results of Wilcoxon's Signed Rank test for propositional aspects of DAS of narration task within the NTA group.*

<b>Parameters</b>	<b>/Z/</b>	<b>p value</b>
<b>Discourse structure</b>		
Discourse forethought	0.000	1.000
Organizational planning	0.000	1.000
<b>Communication intent</b>		
Initiation of narration	0.000	1.000
Asks assistance during narration	0.000	1.000
Imagines events correctly	0.000	1.000
<b>Coherence</b>		
Global coherence	0.000	1.000
Local coherence	0.000	1.000
<b>Topic management</b>		
Introducing topic	0.000	1.000
Topic shift	0.000	1.000
Topic changes	0.000	1.000
Perseveration in topics	0.000	1.000
Minimal elaboration	0.000	1.000
Elaboration of topics	1.000	0.317
<b>Other discourse parameters</b>		
Information adequacy	0.000	1.000
Information content	0.000	1.000
Message accuracy	0.000	1.000
Temporal and causal relation	0.000	1.000

Table 29 (continued)

Parameters	/Z/	p value
<b>Speech related parameters</b>		
Vocabulary specificity	0.000	1.000
Linguistic fluency	0.000	1.000
Speech style	0.000	1.000
Intonation	0.000	1.000

Table 30

*Results of Wilcoxon's Signed Rank test for non-propositional aspects of DAS of narration task within the NTA group.*

Parameters	/Z/	p value
<b>Revision behaviour</b>		
Revision behaviours	0.000	1.000
<b>Repair strategy</b>		
Use of self correction	0.000	1.000
Use of repair through repetition/revision	0.000	1.000
Use of other initiated correction	0.000	1.000
Use of request for clarification	0.000	1.000

#### **4.2.2.4 Step III- Analysis for the total score.**

The obtained scores out of the total scores at two sub levels, the propositional and non-propositional total were subjected to parametric tests like mixed ANOVA, MANOVA and paired t-test. This analysis is similar to the statistical analysis of quantitative data under three separate stages. The results and details of the statistical analyses are explained in detail for narration task under two sub levels (propositional total and non-propositional total) of Discourse Analysis Scale.

##### *4.2.2.4.1 Propositional and Non-propositional total.*

The results of descriptive statistics of propositional and non-propositional aspects total with respect to groups in Kannada and English languages show lower mean value for individuals with traumatic brain injury group compared to neuro-typical adult group in both the languages. Among the comparison of languages (Kannada and

English) between the groups, both the groups showed higher mean value for English language compared to Kannada language. The same is depicted in Figure 4 and Table 31 shows the mean values.

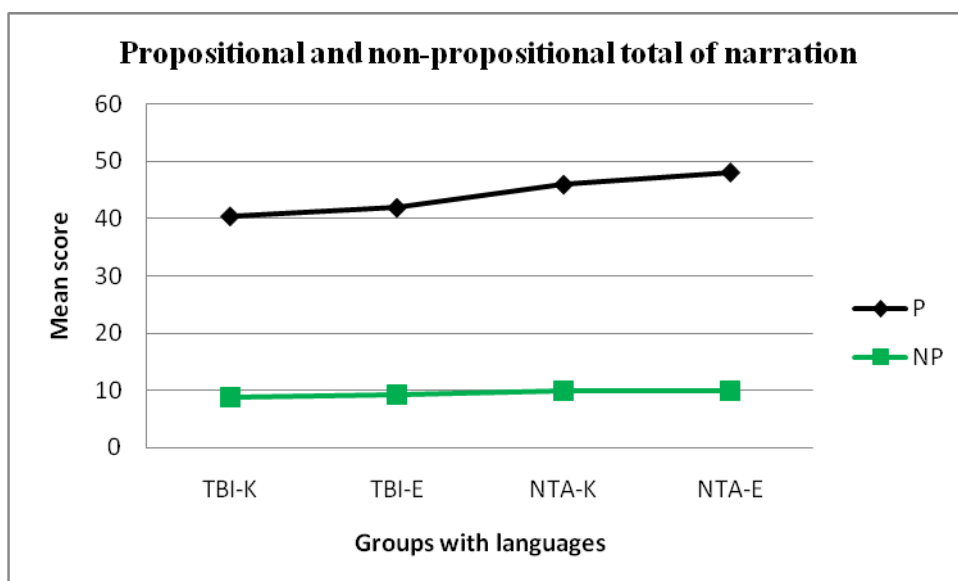


Figure 4. Mean scores of the propositional (P) and non-propositional (NP) total of narration task between the groups and languages. TBI-Traumatic brain injury, NTA-Neuro-typical adult, K-Kannada, E-English.

Table 31

Mean and Standard Deviation of both (TBI and NTA) the groups for Kannada and English propositional and non-propositional total of narration.

Sub levels of DAS	Groups	N	Languages			
			Kannada		English	
			Mean	Standard Deviation	Mean	Standard Deviation
<b>Propositional aspects</b>	TBI	20	40.45	5.96	41.90	4.97
	NTA	20	45.90	0.30	48.00	0.00
<b>Non-Propositional aspects</b>	TBI	20	8.80	1.10	9.35	1.22
	NTA	20	10.00	0.00	10.00	0.00

Note. TBI- Traumatic brain injury, NTA- Neuro-typical adults, DAS- Discourse Analysis Scale, N- Number of participants.

#### 4.2.2.4.2 Stage 1.

Following the descriptive statistics, mixed ANOVA was administered to check the main and interaction effects of groups (TBI vs NTA) and languages (Kannada vs

English) and groups over the language on the sub levels (propositional and non-propositional aspects) of Discourse Analysis Scale using qualitative ratings. Table 32, shows the results of mixed ANOVA.

Table 32

*Results of Mixed ANOVA to study the main and interaction effects of groups and languages for the qualitative scale based measures of narration.*

Source	Sub levels of DAS	F (1,38)	p value
<b>Groups</b>	Propositional aspects	16.65	0.000*
	Non-Propositional aspects	18.43	0.000*
<b>Languages</b>	Propositional aspects	4.29	0.045*
	Non-Propositional aspects	3.48	0.070
<b>Groups*Languages</b>	Propositional aspects	3.25	0.079
	Non-Propositional aspects	3.48	0.070

*Note.* DAS- Discourse Analysis Scale, \*-  $p < .05$ .

Initially for between group comparisons the results of the statistical analysis showed a significant main effect of groups at both the sub levels (propositional and non-propositional aspects) of DAS. Later, on comparison between Kannada and English languages there was a significant main effect of languages at only one sub level, the propositional aspects of DAS. There was no significant interaction between groups and languages for propositional and non-propositional aspects of DAS.

#### 4.2.2.4.3 Stage II.

MANOVA was conducted to cross check the results of mixed ANOVA. This examined the difference between the groups (TBI and NTA) over the dependent variables (propositional and non-propositional aspects of DAS) within Kannada and English languages. The results in Table 33 for both within Kannada and English language showed a significant main effect for languages at both the sub levels, the propositional and non-propositional aspects of DAS. The TBI group performed poorer than NTA group.

Table 33

*Results of MANOVA to study the effect of group within each language (Kannada and English) for the propositional and non-propositional aspects of DAS of narration.*

<b>Languages</b>	<b>Sub levels of DAS</b>	<b>F (1,38)</b>	<b>p value</b>
<b>Kannada</b>	Propositional aspects	16.67	0.000*
	Non-Propositional aspects	23.58	0.000*
<b>English</b>	Propositional aspects	13.59	0.001*
	Non-Propositional aspects	5.62	0.023*

*Note.* DAS- Discourse Analysis Scale, \*-  $p < .05$ .

#### 4.2.2.4.4 Stage III.

Paired t-test was administered to study the effect of Kannada and English languages over the dependent variable (propositional and non-propositional aspects of DAS) within individual group (TBI followed by NTA). In Group I (TBI) and Group II (NTA), there was no significant difference for the sub level propositional and non-propositional aspects of DAS. The same results are shown in Table 34.

Table 34

*Results of Paired t-test to study the effect of languages within each group for the propositional and non-propositional aspects of DAS of narration.*

<b>Groups</b>	<b>Sub levels of DAS</b>	<b>t (19)</b>	<b>p value</b>
<b>TBI</b>	Propositional aspects	1.94	0.067
	Non-Propositional aspects	1.86	0.077
<b>NTA</b>	Propositional aspects	1.45	0.163
	Non-Propositional aspects	1.42	0.151

*Note.* TBI- Traumatic brain injury, NTA- Neuro-typical adults, DAS- Discourse Analysis Scale.



## Contents

4.2.3 Sub-section III: The performance of neuro-typical adults and individuals with traumatic brain injury (TBI) on qualitative measures of picture description using Discourse Analysis Scale (DAS) for picture description task.

*4.2.3.1 Mean, median and standard deviation of propositional and non-propositional parameters of discourse of individuals with traumatic brain injury group and neuro-typical adults group.*

*4.2.3.2 Step I- Comparison between the bilingual individuals with TBI and NTA groups.*

*4.2.3.2.1 Propositional aspects.*

*4.2.3.2.2 Non-propositional aspects.*

*4.2.3.3 Step II- Comparison of discourse in Kannada and English languages within the groups.*

*4.2.3.3.1 Individuals with Traumatic Brain Injury group (TBI).*

*4.2.3.3.2 Neuro-typical adult group.*

*4.2.3.4 Step III- Analysis for the total scores.*

*4.2.3.4.1 Descriptive statistics for the total scores.*

*4.2.3.4.2 Stage I.*

*4.2.3.4.3 Stage II.*

*4.2.3.4.4 Stage III.*

**4.2.3 Sub-section III: Performance of individuals with traumatic brain injury (TBI) and neuro-typical adults (NTA) on qualitative measures of picture description using DAS for picture description task.**

***4.2.3.1 Mean, median and standard deviation of propositional and non-propositional parameters of discourse of individuals with traumatic brain injury group and neuro-typical adults group.***

The statistical analyses were carried out using SPSS (PASW) Version 18. The mean, median, standard deviation of propositional and non-propositional parameters of individuals with TBI group and neuro-typical adult group on picture description task in both the languages were calculated as shown in Table 35. Since ratings were considered, median was also given. This suggested lower mean and median for individuals with TBI group compared to NTA group.

Table 35 - Mean, Median, Standard Deviation for the propositional and non-propositional parameters of picture description task for neuro-typical adult (NTA) group and individuals with traumatic brain injury (TBI) group in Kannada and English language.

Parameters	Groups															
	NTA								TBI							
	Kannada				English				Kannada				English			
	N	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD
<b>PROPOSITIONAL ASPECTS</b>																
<b>Discourse Structure</b>																
DF	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.80	2.00	0.52	20	1.75	2.00	0.55
OP	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.65	2.00	0.67	20	1.70	2.00	0.57
<b>Communication Intent</b>																
IPD	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.95	2.00	0.22
AAIUP	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.85	2.00	0.48	20	1.90	2.00	0.30
CPBAOD	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.95	2.00	0.22	20	1.90	2.00	0.30
IEC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.15	2.00	0.98	20	1.35	1.50	0.74
<b>Coherence</b>																
GC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.40	2.00	0.94	20	1.70	2.00	0.65
LC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.75	2.00	0.44	20	1.75	2.00	0.44
<b>Topic Management</b>																
IT	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.60	2.00	0.75	20	1.75	2.00	0.44
TS	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.90	2.00	0.30	20	1.85	2.00	0.36
TC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.80	2.00	0.61	20	2.00	2.00	0.00
PIT	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00
ME	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.75	2.00	0.55	20	1.70	2.00	0.47
EOT	20	1.95	2.00	0.22	20	2.00	2.00	0.00	20	1.95	2.00	0.22	20	2.00	2.00	0.00

Note: DF- Discourse forethought, OP- Organizational planning, IPD- Initiate picture description, AAIUPN- Ask assistance in understanding picture, CPBAOD- Criticizes picture by agreeing or disagreeing, IEC- Imagines events correctly, GC- Global coherence, LC- Local coherence, IT- Introducing topic, TS-Topic shift, TC- Topic change, PIT- Perseveration in topic, ME- Minimal elaboration, EOT- Elaboration of topic.

Table 35 (continued)																
Parameters	Groups															
	NTA								TBI							
	Kannada				English				Kannada				English			
	N	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD
<b>Other Discourse parameters</b>																
IA	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.95	2.00	0.22	20	1.90	2.00	0.30
IC	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.65	2.00	0.67	20	1.90	2.00	0.30
MA	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.55	2.00	0.75	20	1.85	2.00	0.48
<b>Speech related parameters</b>																
VS	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.90	2.00	0.30
LF	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00
SS	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00
I	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.95	2.00	0.22	20	1.95	2.00	0.22
RT	20	1.95	2.00	0.22	20	2.00	2.00	0.00	20	1.75	2.00	0.44	20	1.70	2.00	0.47
GOI	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.70	2.00	0.47	20	1.90	2.00	0.30
<b>NON-PROPOSITIONAL ASPECTS</b>																
<b>Turn Taking</b>																
RB	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.95	2.00	0.22
<b>Repair Strategy</b>																
uosc	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.75	2.00	0.44	20	1.95	2.00	0.22
uortror	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.55	2.00	0.75	20	1.90	2.00	0.30
uooic	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.90	2.00	0.30	20	1.90	2.00	0.30
uorfç	20	2.00	2.00	0.00	20	2.00	2.00	0.00	20	1.80	2.00	0.52	20	1.90	2.00	0.30

*Note:* IA- Information adequacy, IC- Information content, MA- Message accuracy, VS- Vocabulary specificity, LF- Linguistic fluency, SS- Speech style, I- Intonation, RT- Response time, GOI- Gist of information, RB- Revision behaviour, UOSC- Use of self correction, UORTROR- Use of repair through repetition or revision, UOOIR- Use of other initiated corrections, UORFC- Use of request for clarification.

#### 4.2.3.2 Step I- Comparison between the bilingual individuals with TBI and NTA group.

The results are explained with respect to propositional and non-propositional aspects of discourse in picture description task.

##### 4.2.3.2.1 Propositional Aspects.

Mann-Whitney U test was administered to examine the difference between individuals with TBI group and neuro-typical adult groups', picture description discourse sample. The results of propositional aspects of picture description are shown in the following Table 36.

Table 36

*Results of Mann-Whitney Test for the propositional aspects of DAS of picture description task in Kannada and English language.*

Parameters	Kannada		English	
	/Z/	p value	/Z/	p value
<b>Discourse structure</b>				
Discourse forethought	1.777	0.076	2.080	0.038*
Organizational planning	2.355	0.019*	2.357	0.018*
<b>Communication intent</b>				
Initiation of picture description	0.000	1.000	1.000	0.317
Asks assistance in understanding picture	1.432	0.152	1.433	0.152
Criticizes picture by agreeing or disagreeing	1.000	0.317	1.433	0.152
Imagines events correctly	3.354	0.001*	3.574	0.000**
<b>Coherence</b>				
Global coherence	2.623	0.009*	2.079	0.038*
Local coherence	2.360	0.018*	2.360	0.018*
<b>Topic management</b>				
Introducing topic	2.355	0.019*	2.360	0.018*
Topic shift	1.433	0.152	1.778	0.075
Topic changes	1.433	0.152	0.000	1.000
Perseveration in topics	0.000	1.000	0.000	1.000
Minimal elaboration	2.080	0.038*	2.623	0.009*
Elaboration of topics	0.000	1.000	0.000	1.000

Note. \*  $p < .05$ . \*\*  $p < .001$

Table 36 (continued)

Parameters	Kannada		English	
	/Z/	p value	/Z/	p value
<b>Other discourse parameters</b>				
Information adequacy	1.000	0.317	1.433	0.152
Information content	2.355	0.019*	1.433	0.152
Message accuracy	2.615	0.009*	1.432	0.152
<b>Speech related parameters</b>				
Vocabulary specificity	0.000	1.000	1.433	0.152
Linguistic fluency	0.000	1.000	0.000	1.000
Speech style	0.000	1.000	0.000	1.000
Intonation	1.000	0.317	1.000	0.317
Response time	1.749	0.080	2.623	0.009*
Gist of information	2.623	0.009*	1.433	0.152

Note. \*  $p < .05$ . \*\*  $p < .001$

#### 4.2.3.2.2 Non- Propositional aspects.

The results of the statistical analysis for the parameter revision behaviour seemed to be equal only in Kannada language for both the groups and there was a significant difference between the groups for the sub parameter 'use of self correction' and 'use of repair through repetition or clarification' of repair strategy in Kannada language as shown in the following Table 37.

Table 37

Results of Mann-Whitney Test for the non-propositional aspects of DAS of picture description task in Kannada and English language.

Parameters	Kannada		English	
	/Z/	p value	/Z/	p value
<b>Revision behaviours</b>				
Revision behaviour	0.000	1.000	1.000	0.317
<b>Repair strategy</b>				
Use of self correction	2.360	0.018*	1.000	0.317
Use of repair through repetition or revision	2.615	0.009*	1.433	0.152
Use of other initiated correction	1.433	0.152	1.433	0.152
Use of request for clarification	1.777	0.076	1.433	0.152

Note. \*  $p < .05$ .

**4.2.3.3 Step II- Comparison of discourse for Kannada and English language within the group.**

**4.2.3.3.1 Individuals with TBI group.**

Wilcoxon's Signed Rank test was administered to examine the difference between Kannada and English languages in the discourse samples. There was a high significant difference between the languages for the sub parameter 'information content' and 'message accuracy' of other discourse parameters of propositional aspects. The results of the statistical analysis for the sub parameter 'local coherence' of coherence, 'perseveration in topic' of topic management and 'linguistic non fluency', 'speech style', 'intonation contour' of other discourse parameters seemed to be equal in the two languages as shown in Table 38.

In case of non-propositional aspects the sub parameter 'use of self correction' of repair strategy showed a significant difference between the languages and the sub parameter 'use of other initiated correction' of repair strategy seemed to be equal in the two languages as shown in Table 39.

Table 38

*Results of Wilcoxon's Signed Rank test for propositional aspects of DAS of picture description task within the TBI group.*

<b>Parameters</b>	<b> Z </b>	<b>p value</b>
<b>Discourse structure</b>		
Discourse forethought	1.000	0.317
Organizational planning	0.447	0.655
<b>Communication intent</b>		
Initiation of picture description	1.000	0.317
Asks assistance in understanding picture	0.378	0.705
Criticizes picture by agreeing or disagreeing	0.577	0.564
Imagines events correctly	1.414	0.157
<b>Coherence</b>		
Global coherence	1.622	0.105
Local coherence	0.000	1.000

*Note.* \*  $p < .05$ .

Table 38 (continued)

<b>Parameters</b>	<b> Z </b>	<b>p value</b>
<b>Topic management</b>		
Introducing topic	1.134	0.257
Topic shift	1.000	0.317
Topic changes	1.414	0.157
Perseveration in topics	0.000	1.000
Minimal elaboration	0.378	0.705
Elaboration of topics	1.000	0.317
<b>Other discourse parameters</b>		
Information adequacy	1.000	0.317
Information content	2.236	0.025*
Message accuracy	2.121	0.034*
<b>Speech related parameters</b>		
Vocabulary specificity	1.414	0.157
Linguistic fluency	0.000	1.000
Speech style	0.000	1.000
Intonation	0.000	1.000
Response time	0.447	0.655
Gist of information	2.000	0.046

Note. \*  $p < .05$ .

Table 39

Results of Wilcoxon's Signed Rank test for non-propositional aspects of DAS of picture description task within the TBI group.

<b>Parameters</b>	<b> Z </b>	<b>p value</b>
<b>Revision behaviour</b>		
Revision behaviour	1.000	0.317
<b>Repair strategy</b>		
Use of self correction	2.000	0.046*
Use of repair through repetition/revision	1.823	0.068
Use of other initiated correction	0.000	1.000
Use of request for clarification	1.414	0.157

Note. \*  $p < .05$ .

#### 4.2.3.3.2 Neuro-typical adult group.

Wilcoxon's Signed Rank test results showed no significant difference between languages for all the parameters of propositional and non-propositional aspects of



discourse analysis scale of picture description task. Except the sub parameter ‘extra elaboration of topic’ of topic management and ‘response time’ of other discourse parameter, all the other sub parameters of propositional and non-propositional aspects seemed to be equal in the two languages as shown in following Table 40 and Table 41.

Table 40

*Results of Wilcoxon’s Signed Rank test for propositional aspects of DAS of picture description task within the NTA group.*

<b>Parameters</b>	<b>/Z/</b>	<b>p value</b>
<b>Discourse structure</b>		
Discourse forethought	0.000	1.000
Organizational planning	0.000	1.000
<b>Communication intent</b>		
Initiation of picture description	0.000	1.000
Asks assistance in understanding picture	0.000	1.000
Criticize the picture by agreeing or disagreeing	0.000	1.000
Imagines events correctly	0.000	1.000
<b>Coherence</b>		
Global coherence	0.000	1.000
Local coherence	0.000	1.000
<b>Topic management</b>		
Introducing topic	0.000	1.000
Topic shift	0.000	1.000
Topic changes	0.000	1.000
Perseveration in topics	0.000	1.000
Minimal elaboration	0.000	1.000
Elaboration of topics	1.000	0.317
<b>Other discourse parameters</b>		
Information adequacy	0.000	1.000
Information content	0.000	1.000
Message accuracy	0.000	1.000

Table 40 (*continued*)

Parameters	/Z/	p value
<b>Speech related parameters</b>		
Vocabulary specificity	0.000	1.000
Linguistic fluency	0.000	1.000
Speech style	0.000	1.000
Intonation	0.000	1.000
Response time	1.000	0.317
Gist of information	0.000	1.000

Table 41

*Results of Wilcoxon's Signed Rank test for non-propositional aspects of DAS of picture description task within the NTA group.*

Parameters	/Z/	p value
<b>Revision behaviour</b>		
Revision behaviour	0.000	1.000
<b>Repair strategy</b>		
Use of self correction	0.000	1.000
Use of repair through repetition/revision	0.000	1.000
Use of other initiated correction	0.000	1.000
Use of request for clarification	0.000	1.000

#### **4.2.3.4 Step III- Analysis for the total score.**

The three point perceptual rating scale was used for scoring. This total score of the Discourse Analysis Scale (DAS) for picture description task is 56. This total score of DAS has been further divided into two sub levels, the propositional and non-propositional total. For picture description task, the propositional and non-propositional total is equal to 46 and 10 respectively. On administration of DAS for both the groups in both the languages, the scores were obtained using the three point perceptual rating scale. These obtained scores out of the above mentioned total scores at two sub levels were subjected to parametric tests like mixed ANOVA, MANOVA and paired t-test. This analysis is similar to the statistical analysis of quantitative data under three separate stages. The results and details of the statistical analysis are explained in detail for picture description task under two separate sub levels (propositional total and non-propositional total) of Discourse Analysis Scale.

#### 4.2.3.4.1 Propositional and Non-propositional total.

The results of descriptive statistics of propositional and non-propositional aspects total with respect to groups in Kannada and English languages show lower mean value for individuals with traumatic brain injury group compared to neuro-typical adult group in both the languages. On comparison of languages (Kannada and English) between these groups, both the groups show higher mean value for English language compared to Kannada language. The same is depicted in Figure 5 and Table 42 shows the mean values.

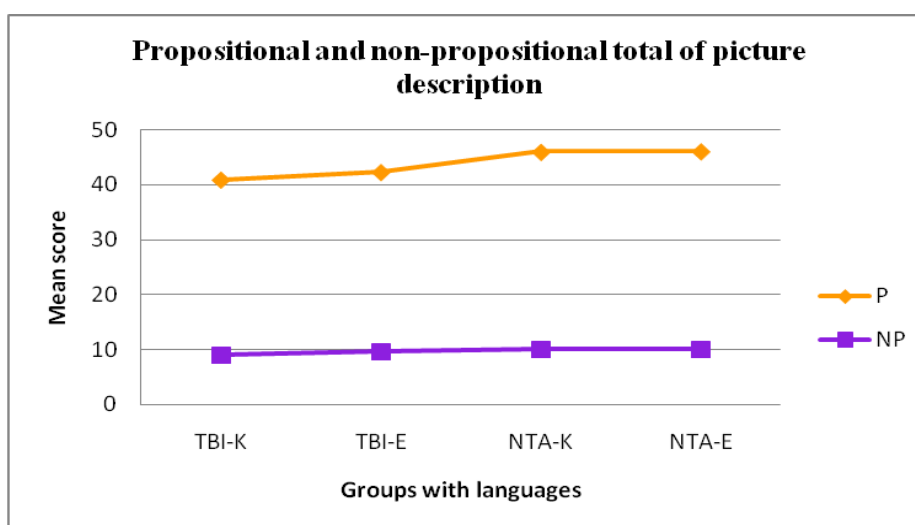


Figure 5. Mean scores of the propositional (P) and non-propositional (NP) total of picture description task between the groups and languages. TBI-Traumatic brain injury, NTA-Neuro-typical adult, K-Kannada, E-English.

Table 42

Mean and Standard Deviation of both (TBI and NTA) groups for Kannada and English propositional and non-propositional total of picture description.

Sub levels of DAS	Groups	N	Languages			
			Kannada		English	
			Mean	Standard Deviation	Mean	Standard Deviation
<b>Propositional aspects</b>	TBI	20	40.80	6.15	42.20	5.06
	NTA	20	45.90	0.30	46.00	0.00
<b>Non-Propositional aspects</b>	TBI	20	9.00	1.25	9.60	1.18
	NTA	20	10.00	0.00	10.00	0.00

Note. TBI- Traumatic brain injury, NTA- Neuro-typical adults, DAS- Discourse Analysis Scale, N- Number of participants.

#### 4.2.3.4.2 Stage I.

Following the descriptive statistics, mixed ANOVA was administered to check the main and interaction effects of groups (TBI vs NTA) and languages (Kannada vs English) and groups over the language on the sub levels of Discourse Analysis Scale (propositional total and non-propositional total) using qualitative ratings. Table 43, shows the results of mixed ANOVA.

Table 43

*Results of Mixed ANOVA to study the main and interaction effects of groups and languages for the qualitative scale of based measures of picture description.*

Source	Sub levels of DAS	F (1,38)	p value
<b>Groups</b>	Propositional aspects	14.19	0.001*
	Non-Propositional aspects	9.21	0.004*
<b>Languages</b>	Propositional aspects	2.88	0.098
	Non-Propositional aspects	4.17	0.048*
<b>Groups*Languages</b>	Propositional aspects	2.16	0.149
	Non-Propositional aspects	4.17	0.048*

*Note.* DAS- Discourse Analysis Scale, \*-  $p < .05$ .

Initially for between group comparisons the results of the statistical analysis showed a significant main effect of groups at both the sub levels (propositional and non-propositional aspects) of DAS. Later for comparison between Kannada and English languages there was a significant main effect of languages at only one sub level, the non-propositional aspects of DAS. Finally there was a significant interaction between languages and groups for the same sub level non-propositional aspects of DAS.

#### 4.2.3.4.3 Stage II.

MANOVA was conducted to cross check the results of mixed ANOVA. This examined the difference between the groups (TBI and NTA) over the dependent variables (propositional and non-propositional aspects of DAS) within Kannada and English languages. The results for within Kannada language showed a significant main effect at both the sub level, the propositional and non-propositional aspects of DAS. But in case of within English language, results showed a significant main effect only for the sub level, the propositional aspects of DAS. The same is shown in Table 44.

Table 44

*Results of MANOVA to study the effect of group within each language (Kannada and English) for the propositional and non-propositional aspects of DAS of picture description.*

<b>Languages</b>	<b>Sub levels of DAS</b>	<b>F (1,38)</b>	<b>p value</b>
<b>Kannada</b>	Propositional aspects	13.70	0.001*
	Non-Propositional aspects	12.66	0.001*
<b>English</b>	Propositional aspects	11.26	0.002*
	Non-Propositional aspects	2.26	0.140

*Note.* DAS- Discourse Analysis Scale, \*-  $p < .05$ .

#### 4.2.3.4.4 Stage III.

Paired t-test was administered to study the effect of Kannada and English languages over the dependent variable (propositional and non-propositional aspects of DAS) within individual group (TBI followed by NTA). In Group I (TBI) and Group II (NTA) both there was no significant difference for the two sub levels (propositional and non-propositional aspects) of DAS as shown in Table 45.

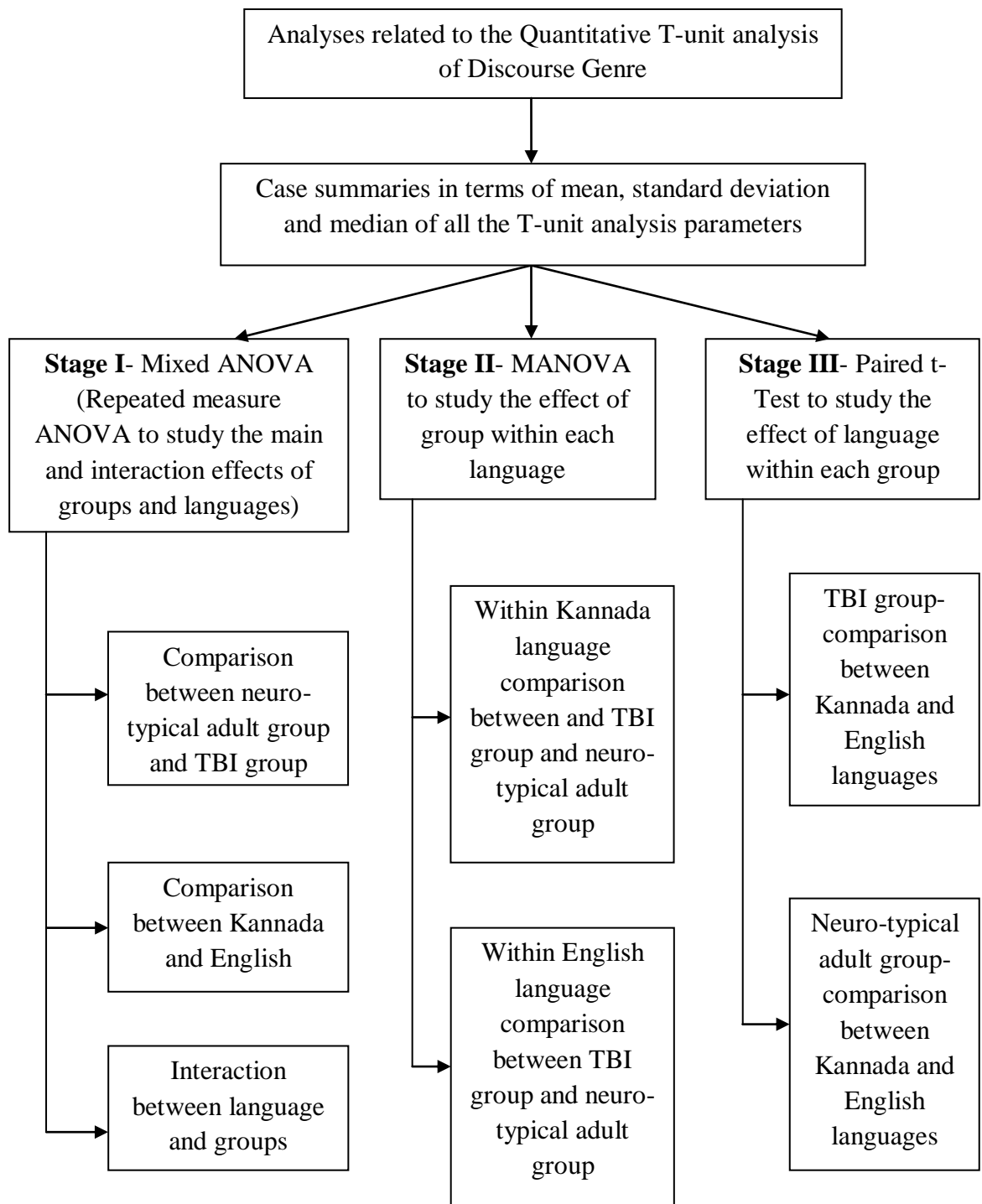
Table 45

*Results of Paired t-test to study the effect of languages within each group for the propositional and non-propositional aspects of DAS of picture description.*

<b>Groups</b>	<b>Sub levels of DAS</b>	<b>t (19)</b>	<b>p value</b>
<b>TBI</b>	Propositional aspects	1.58	0.128
	Non-Propositional aspects	2.04	0.055
<b>NTA</b>	Propositional aspects	1.45	0.163
	Non-Propositional aspects	1.96	0.084

*Note.* TBI- Traumatic brain injury, NTA- Neuro-typical adults, DAS- Discourse Analysis Scale.

**Section B: The performance of persons with traumatic brain injury (TBI) and neuro-typical adults on quantitative measures using T-unit based analysis for conversation, narration and picture description tasks.**



*Figure 6-* The statistical methods employed for the quantitative analysis of the conversation, narration and picture description discourse genres.

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### 4.3 Section B

4.3.1 Sub section I: Performance of individuals with traumatic brain injury (TBI) and neuro-typical adult (NTA) on quantitative measures of conversation using T-unit based analysis.

*4.3.1.1 Mean and standard deviation for the parameters of T-unit based analysis.*

*4.3.1.2 Stage I.*

*4.3.1.3 Stage II.*

*4.3.1.4 Stage III.*

### 4.3 Section B- Quantitative Rating Of The Discourse Samples Using T-Unit Analysis

#### 4.3.1 Sub-section I: Performance of individuals with traumatic brain injury (TBI) and neuro-typical adult (NTA) on quantitative measures of conversation using T-unit based analysis.

##### 4.3.1.1 Mean and standard deviation for the parameters of T-unit based analysis.

The parameters of T-unit based analysis includes number of T-units (NTU), number of words per T-unit (NWPTU), number of clauses (NC) and number of words per clause (NWPC). Table 46, illustrates the results of descriptive statistics of the groups (TBI and NTA) and languages (Kannada and English) for the parameters (NWPTU, NC and NWPC) of T-unit based analysis. This Table 46 shows the mean and standard deviation for the parameters of T-unit based analysis for conversation task. Figure 7, depicts lower mean value for individuals with traumatic brain injury group compared to neuro-typical adult group in both Kannada and English languages. The mean value for the parameter NWPTU and NC is higher and NWPC is lower for Kannada language compared to English language in both the groups.

Table 46

*Results of descriptive statistics for the parameters of T-unit based analysis of conversation for individuals with traumatic brain injury group and neuro-typical adult group.*

Parameters of T-units	Groups	N	Languages			
			Kannada		English	
			M	SD	M	SD
NWPTU	TBI	20	113.15	38.47	107.12	39.03
	NTA	20	172.52	53.36	170.07	53.04
NC	TBI	20	71.90	26.29	68.60	25.29
	NTA	20	117.80	28.44	108.40	26.78
NWPC	TBI	20	6.17	0.84	7.37	0.60
	NTA	20	6.62	0.48	7.42	0.73

*Note.* NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, TBI- Traumatic brain injury, NTA- Neuro-typical adults, N - number of participants, SD - standard deviation.



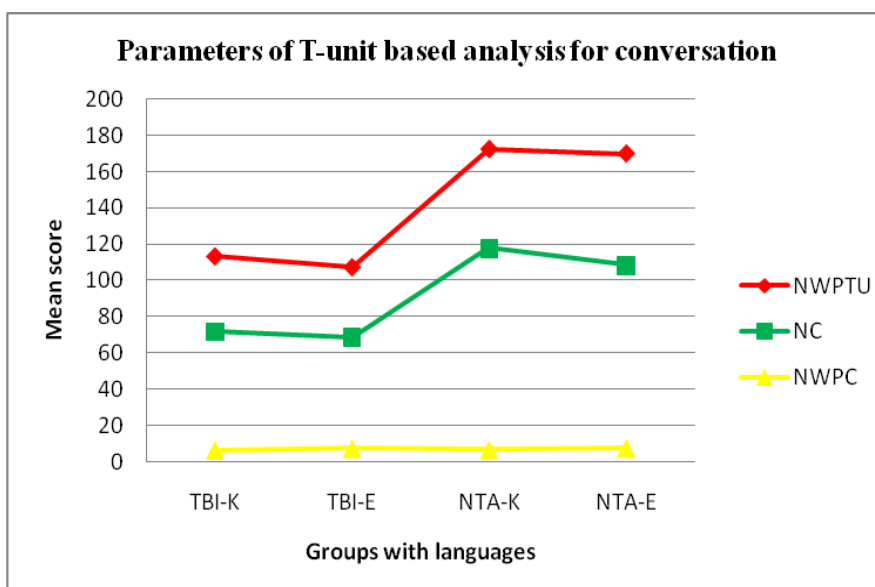


Figure 7. Mean scores of the parameters of T-unit based analysis for conversation task between the groups and languages. NWPC- Number of words per clauses, NC- Number of clauses, NWPTU- Number of words per T-unit, TBI-Traumatic brain injury, NTA-Neuro-typical adult, K-Kannada, E-English.

#### 4.3.1.2 Stage I.

Following the descriptive statistics, mixed ANOVA was administered to check the main and interaction effects of the groups (TBI vs NTA) and languages (Kannada vs English) and groups over the languages on the parameters (NWPTU, NC, and NWPC) of T-unit based analysis. Table 47, shows the results of mixed ANOVA.

Table 47

*Results of Mixed ANOVA to study the main and interaction effects of groups and languages for the T-unit based measures of conversation.*

Source	Parameters of T-unit	F (1,38)	p value
<b>Groups</b>	NWPTU	17.80	0.000**
	NC	28.80	0.000**
	NWPC	1.88	0.178
<b>Languages</b>	NWPTU	2.73	0.107
	NC	5.24	0.028*
	NWPC	76.38	0.000**
<b>Groups*Languages</b>	NWPTU	0.48	0.490
	NC	1.20	0.278
	NWPC	3.05	0.089

Note. NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, \* -  $p < .05$ , \*\* -  $p < .001$ .

Initially for between group comparisons, the results of the statistical analysis showed a significant main effect of groups for the parameter NWPTU and NC. Later for comparison between Kannada and English languages, there was a significant main effect of languages for the parameter NC and NWPC. Finally, there was no significant interaction between languages and groups for any of the parameters of T-unit based analysis.

#### 4.3.1.3 Stage II.

MANOVA was conducted to cross check the results of mixed ANOVA. This examined the difference between the groups (TBI and NTA) over the dependent variables (NWPTU, NC, and NWPC) within Kannada and English languages. The T-unit analysis at thematic level (NTU) inferred that all the participants were within the given topic during the conversation and maintained the theme. When checked at sentential level, the results showed a significant main effect of Kannada language for the parameter NWPTU, NC and NWPC. Similarly there was a significant main effect of English language for the parameter NWPTU and NC. But for the parameter NWPC, there was no significant effect of any language. Table 48, shows the results of MANOVA.

Table 48

*Results of MANOVA to study the effect of group within each language (Kannada and English) for conversation.*

Languages	Parameters of T-unit	F (1,38)	p value
<b>Kannada</b>	NWPTU	16.29	0.000**
	NC	28.07	0.000**
	NWPC	4.25	0.046*
<b>English</b>	NWPTU	18.27	0.000**
	NC	23.34	0.000**
	NWPC	0.05	0.815

*Note.* NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, \*-  $p < .05$ , \*\* -  $p < .001$ .

#### 4.3.1.4 Stage III.

Paired t-test was administered to cross check the results of MANOVA. This was done to study the effect of Kannada and English languages over the dependent variable

(NWPTU, NC, and NWPC) within individual group (TBI followed by NTA). The results of Group I (TBI) showed a significant difference for the parameter NWPTU and NWPC but there was no significant difference for the parameter NC of T-unit analysis. In case of Group II (NTA) there was a significant difference only for the parameter NWPC of T-unit analysis. Table 49 shows the results of paired t-test.

Table 49

*Results of Paired t-test to study the effect of languages within each group for conversation.*

<b>Groups</b>	<b>Parameters of T-unit</b>	<b>t (19)</b>	<b>p value</b>
<b>TBI</b>	NWPTU	5.81	0.000**
	NC	1.67	0.111
	NWPC	8.43	0.000**
<b>NTA</b>	NWPTU	0.48	0.631
	NC	1.81	0.086
	NWPC	4.46	0.000**

*Note.* NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, TBI- Traumatic brain injury, NTA- Neuro-typical adults, \*-  $p < .05$ , \*\* -  $p < .001$ .

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4.3.2 Sub section II: Performance of individuals with traumatic brain injury (TBI) and neuro-typical adult (NTA) on quantitative measures of narration using T-unit based analysis.

*4.3.2.1 Mean and standard deviation for the parameters of T-unit based analysis.*

*4.3.2.2 Stage I.*

*4.3.2.3 Stage II.*

*4.3.2.4 Stage III.*

### **4.3.2 Sub-section II: Performance of individuals with traumatic brain injury and neuro-typical adults on quantitative measures of narration using T-unit based analysis.**

#### ***4.3.2.1 Mean and standard deviation for the parameters of T-unit based analysis.***

The parameters of T-unit based analysis includes number of T-units (NTU), number of words per T-unit (NWPTU), number of clauses (NC) and number of words per clause (NWPC). Table 50, illustrates the descriptive statistics (mean and standard deviation) obtained for the groups (TBI and NTA) and languages (Kannada and English) for the parameters of T-unit based analysis (NTU, NWPTU, NC, and NWPC). Figure 8 show lower mean value for individuals with traumatic brain injury group compared to neuro-typical adult group in both (Kannada and English) languages for the parameters NTU, NWPTU and NC. But, for the parameter NTU and NWPC the results show lower mean value for individuals with traumatic brain injury group compared to neuro-typical adult group in English compared to Kannada language. The mean value for the parameter NWPTU, NC is higher in Kannada language compared to English language in both the groups. For the parameter NTU, the TBI group also showed higher mean in Kannada language compared to English language where as in case of NTA group the higher mean was in English language compared to Kannada language. Finally for the parameter NWPC, both the group showed higher mean in English language compared to Kannada language.

Table 50

Results of descriptive statistics for the parameters of T-unit based analysis of narration for individuals with traumatic brain injury group and neuro-typical adult group.

Parameters of T-units	Groups	N	Languages			
			Kannada		English	
			Mean	SD	Mean	SD
NTU	TBI	20	6.00	0.91	5.20	1.19
	NTA	20	6.80	1.47	7.15	1.13
NWPTU	TBI	20	66.20	10.98	44.55	13.14
	NTA	20	77.85	17.37	66.22	19.80
NC	TBI	20	53.75	16.98	34.90	15.00
	NTA	20	86.05	25.09	77.95	26.39
NWPC	TBI	20	6.30	0.47	6.70	0.76
	NTA	20	6.62	0.72	6.85	0.90

Note. NTU- number of T-unit, NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, TBI- Traumatic brain injury, NTA- Neuro-typical adults, N - number of participants, SD - standard deviation.

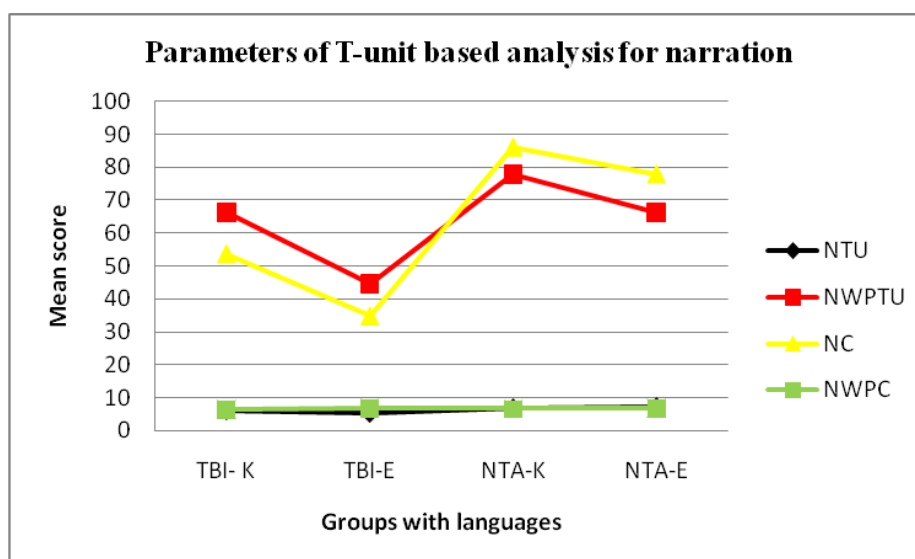


Figure 8. Mean scores of the parameters of T-unit based analysis for narration task between the groups and languages. NWPC- Number of words per clauses, NC- Number of clauses, NWPTU- Number of words per T-unit, NTU- Number of T-units, TBI-Traumatic brain injury, NTA-Neuro-typical adult, K-Kannada, E-English.

#### 4.3.2.2 Stage I.

Following the descriptive statistics, mixed ANOVA was administered to check the main and interaction effects of groups (TBI vs NTA) and languages (Kannada vs

English) and groups over the language on the parameters (NTU, NWPTU, NC, and NWPC) of T-unit based analysis. Table 51, shows the results of mixed ANOVA.

Table 51

*Results of Mixed ANOVA to study the main and interaction effects of groups and languages for the T-unit based measures of narration.*

Source	Parameters of T-unit	F (1,38)	p value
<b>Groups</b>	NTU	17.50	0.000**
	NWPTU	14.57	0.000**
	NC	39.50	0.000**
	NWPC	1.43	0.238
<b>Languages</b>	NTU	1.43	0.230
	NWPTU	49.11	0.000**
	NC	18.01	0.000**
	NWPC	6.73	0.013*
<b>Groups*Languages</b>	NTU	9.35	0.004*
	NWPTU	4.45	0.041*
	NC	2.86	0.099
	NWPC	0.52	0.472

*Note.* NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, \*-  $p < .05$ , \*\* -  $p < .001$ .

Initially for between group comparisons the results of statistical analysis showed a significant main effect of groups for the parameter NTU, NWPTU and NC. Later for comparison between Kannada and English languages there was a significant main effect of languages for the parameter NWPTU, NC and NWPC. Finally, there was a significant interaction between languages and groups for the parameter NTU and NWPTU of T-unit based analysis.

#### 4.3.2.3 Stage II.

MANOVA was conducted to cross check the results of mixed ANOVA. This examined the difference between the groups (TBI and NTA) over the dependent variables (NWPTU, NC, and NWPC) within Kannada and English languages. The results of statistical analysis of within Kannada and English languages were similar. There was a significant main effect of two languages (Kannada and English) for the parameters NTU, NWPTU, and NC. But for the parameter NWPC, there was no significant main effect of any languages. Table 52, shows the results of MANOVA.

Table 52

*Results of MANOVA to study the effect of group within each language (Kannada and English) for narration.*

<b>Languages</b>	<b>Parameters of T-unit</b>	<b>F (1,38)</b>	<b>p value</b>
<b>Kannada</b>	NTU	4.25	0.046*
	NWPTU	6.42	0.016*
	NC	22.71	0.000**
	NWPC	2.83	0.100
<b>English</b>	NTU	27.92	0.000**
	NWPTU	16.63	0.000**
	NC	40.20	0.000**
	NWPC	0.32	0.575

*Note.* NTU- number of T-units, NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, \*-  $p < .05$ , \*\* -  $p < .001$ .

#### 4.3.2.4 Stage III.

Paired t-test was administered to cross check the results of MANOVA. This was done to study the effect of Kannada and English languages over the dependent variables (NWPTU, NC, and NWPC) within individual group (TBI followed by NTA). The results of the statistical analysis for Group I (TBI) showed a high significant difference for all the parameters (NTU, NWPTU, NC, and NWPC) of T-unit analysis. In case of Group II (NTA) there was a significant difference only for the parameter NWPTU of T-unit analysis. Table 53, shows the results of paired t-test.

Table 53

*Results of Paired t-test to study the effect of languages within each group for narration.*

<b>Groups</b>	<b>Parameters of T-unit</b>	<b>t (19)</b>	<b>p value</b>
<b>TBI</b>	NTU	3.76	0.001*
	NWPTU	7.93	0.000**
	NC	4.54	0.000**
	NWPC	8.43	0.000**
<b>NTA</b>	NTU	1.12	0.273
	NWPTU	2.99	0.007*
	NC	1.68	0.109
	NWPC	1.14	0.267

*Note.* NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, TBI- Traumatic brain injury, NTA- Neuro-typical adults, \*-  $p < .05$ , \*\* -  $p < .001$ .



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4.3.3 Sub section III: Performance of individuals with traumatic brain injury (TBI) and neuro-typical adult (NTA) on quantitative measures of picture description using T-unit based analysis.

*4.3.3.1 Mean and standard deviation for the parameters of T-unit based analysis.*

*4.3.3.2 Stage I.*

*4.3.3.3 Stage II.*

*4.3.3.4 Stage III.*

### 4.3.3 Sub-section III: The performance of individuals with traumatic brain injury and neuro-typical adult on quantitative measures of picture description using T-unit based analysis.

#### 4.3.3.1 Mean and standard deviation for the parameters of T-unit based analysis.

The parameters of T-unit analysis includes number of words per T-unit (NWPTU), number of clauses (NC) and number of words per clauses (NWPC). Table 54, illustrates the descriptive statistics (mean and standard deviation) obtained for the groups (TBI and NTA) and languages (Kannada and English) for the parameters of T-unit based analysis (NWPTU, NC, and NWPC). Figure 9 show lower mean value for individuals with traumatic brain injury group compared to neuro-typical adult group in both (Kannada and English) languages for the parameter NWPTU and NC. And for the parameter NWPC individuals with traumatic brain injury group and neuro-typical adult group show higher mean value for English language compared to Kannada language. But the individuals with traumatic brain injury group show higher mean value for the parameter NWPC in both the languages compared to neuro-typical adult group. The mean value was higher in Kannada language compared to English language for the parameter NWPTU and NC in both the groups. But for the parameter NWPC, the mean value was higher for English language compared to Kannada language in both the groups.

Table 54

*Results of descriptive statistics for the parameters of T-unit based analysis of picture description for individuals with traumatic brain injury group and neuro-typical adult group.*

Parameters of T-units	Groups	N	Languages			
			Kannada		English	
			M	SD	M	SD
NWPTU	TBI	20	160.15	33.42	146.75	45.17
	NTA	20	181.10	51.61	173.15	48.34
NC	TBI	20	29.10	5.56	24.95	5.39
	NTA	20	36.80	9.01	28.70	6.20
NWPC	TBI	20	6.07	0.67	6.80	0.93
	NTA	20	5.85	0.67	6.50	0.84

*Note.* NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, TBI- Traumatic brain injury, NTA- Neuro-typical adults, N - number of participants, SD - standard deviation.

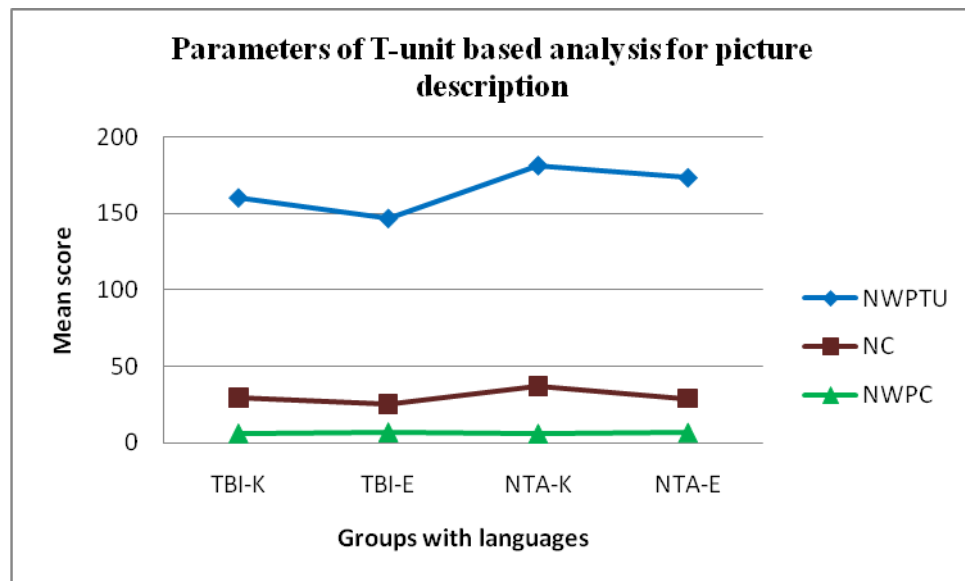


Figure 9. Mean scores of the parameters of T-unit based analysis for picture description task between the groups and languages. NWPC- Number of words per clauses, NC- Number of clauses, NWPTU- Number of words per T-unit, TBI- Traumatic brain injury, NTA-Neuro-typical adult, K-Kannada, E-English.

#### 4.3.3.2 Stage I.

Following the descriptive statistics, mixed ANOVA was administered to check the main and interaction effects of groups (TBI vs NTA) and languages (Kannada vs English) and groups over the language on the parameters (NWPTU, NC, and NWPC) of T-unit based analysis. Table 55, shows the results of mixed ANOVA.

Table 55

*Results of Mixed ANOVA to study the main and interaction effects of groups and languages for the T-unit based measures of picture description.*

Source	Parameters of T-unit	F (1,38)	p value
<b>Groups</b>	NWPTU	2.98	0.092
	NC	9.01	0.005*
	NWPC	1.30	0.260
<b>Languages</b>	NWPTU	7.06	0.011*
	NC	43.51	0.000**
	NWPC	48.58	0.000**
<b>Groups*Languages</b>	NWPTU	0.46	0.502
	NC	4.52	0.040*
	NWPC	0.14	0.706

Note. NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, \*-  $p < .05$ , \*\* -  $p < .001$ .

Initially for between group comparisons the statistical results showed a significant main effect of groups for the parameter NC only. Later for comparison between Kannada and English languages there was a significant main effect of languages for all the parameters (NWPTU, NC, and NWPC). Finally there was significant interaction between languages and groups for the parameter NC of T-unit based analysis only.

#### 4.3.3.3 Stage II.

MANOVA was conducted to cross check the results of mixed ANOVA. This examined the difference between the groups (TBI and NTA) over the dependent variables (NWPTU, NC, and NWPC) within Kannada and English languages. There was a significant main effect of two languages (Kannada and English) only for the parameter NC. Thus for the other parameters NWPTU and NWPC there was no significant main effect of any languages. Table 56, shows the results of MANOVA.

Table 56

*Results of MANOVA to study the effect of group within each language (Kannada and English) for picture description.*

<b>Languages</b>	<b>Parameters of T-unit</b>	<b>F (1,38)</b>	<b>p value</b>
<b>Kannada</b>	NWPTU	2.32	0.136
	NC	10.56	0.002*
	NWPC	1.11	0.297
<b>English</b>	NWPTU	3.18	0.082
	NC	4.15	0.048*
	NWPC	1.13	0.294

*Note.* NTU- number of T-units, NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, \*-  $p < .05$ .

#### 4.3.3.4 Stage III.

Paired t-test was administered to cross check the results of MANOVA. This was done to study the effect of Kannada and English languages over the dependent variable (NWPTU, NC, and NWPC) within individual group (TBI followed by NTA). The results of Group I (TBI) and Group II (NTA) showed a high significant difference only for the parameter NC and NWPC of T-unit analysis. But there was no significant

difference for the parameter NWPTU of T-unit analysis. Table 57, shows the results of paired t-test. The considered hypotheses have been rejected.

Table 57

*Results of Paired t-test to study the effect of languages within each group for picture description.*

<b>Groups</b>	<b>Parameters of T-unit</b>	<b>t (19)</b>	<b>p value</b>
<b>TBI</b>	NWPTU	1.99	0.061
	NC	3.82	0.001*
	NWPC	4.92	0.000**
<b>NTA</b>	NWPTU	1.81	0.085
	NC	5.37	0.000**
	NWPC	4.95	0.000**

*Note.* NWPTU- number of words per T-unit, NC- number of clauses, NWPC- number of words per clauses, TBI- Traumatic brain injury, NTA- Neuro-typical adults, \*-  $p < .05$ , \*\* -  $p < .001$ .

## CHAPTER 5

### DISCUSSION

#### Contents

##### 5.1 Section A

###### 5.1.1 Sub section I: Conversation Task.

###### *5.1.1.1 Step I- Comparison between the TBI and NTA groups.*

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## 5.1 Section A

### 5.1.1 Sub-section I: Conversation Task.

#### 5.1.1.1 Step I- Comparison between the TBI and NTA groups for propositional and non-propositional aspects.

##### 5.1.1.1.1 Propositional aspects.

As shown in Table 14, the significant differences between the groups (TBI and NTA) for Kannada and English languages are explained under different sections of propositional parameters of conversational discourse. Each of the discourse parameters are profiled and discussed in detail in the following section.

In the discourse structure, for the sub parameters ‘discourse forethought’ and ‘organizational planning’ there was a high significant difference between the groups (TBI and NTA) in the two (Kannada and English) languages. This is most likely an indication of poor organization and planning skills in TBI as compared to NTA in both the languages. Probably the lower mean value among TBI could be attributed to poorer forethoughts in conversation as compared to NTA, thus reflecting their poor discourse structure. Example of poor discourse structure in Kannada and English language is shown in Appendix M1 and Appendix M2.

In communication intent, except the sub parameter ‘greet others in response to others greeting’ all other items like ‘greeting others by themselves’, ‘start conversation’, ‘ask information’, ‘ask assistance in understanding conversation’, ‘criticize conversation by agreeing or disagreeing’, ‘imagines events correctly’ and ‘understands advancers and blockers in conversation’ parameters showed a significant difference between the groups in Kannada language and only ‘ask information’, ‘ask assistance in understanding conversation’ and ‘understands advancers and blockers in conversation’ sub parameters showed a significant difference in English language. Based on these results, discussion can be made with respect to the extent of deviations in terms of communication intent in both the groups in both the languages. Here, compared to NTA participants the TBI participants could not act as an excellent converser and were not able to follow all the manners in conversation, especially when the conversation was a semi-structured one. Since it was a semi-structured

conversation, the speech act might have taken place for the given topic of conversation. Here the NTA participants might have thought to have a descriptive/explanatory situation, so all have “initiated the conversation” by greeting others by themselves (spontaneously). But the TBI participants did not have a descriptive/explanatory situation so they had ‘greeting others’ in response to others greeting. Another plausible reason could be the personality factor. If a person does not like to contradict others, then he would not show the feelings by disagreement or criticism to the other person and vice versa. Final reason could be the topic of conversation ‘My country India’. Since this topic is very vast (extensive), participants might have been aware of few things and unaware of certain other things. This might have especially created difficulty for the TBI participants to ‘start conversation’, ‘ask information’, ‘ask for assistance in understanding conversation’, ‘criticize conversation by agreeing or disagreeing’, ‘fabricating or imagining events’ and ‘understanding advancers and blockers in conversation’ as shown in the following examples. If an individual considers all the above mentioned reasons, he/she finds ‘greeting others in response to other’s greeting’ to be safe. Thus, all the TBI participants had equivalent findings for this particular parameter alone in both the languages.

Poor communication intent- Example in Kannada language:

*I: nimma hesaru ae:nu ? (What is your name?)*

*P: nanna hesaru participants 1. (My name is Participant 1.)*

*I: naavu iiga bhaaratada bagge maatanaaDooNa. (Now shall we speak about India?)*

*P: sari. (K)*

*I: bhaarata deeshada bagge niivu maatanaaDatiira. (Will you speak about India?)*

*P: naanu bhaaratada bagge eenu maatanaaDa beeku anta? (What you want me to say about India.)*

*I: niivu bhaaratada samkruti, raajakiiya, shikshaNa mattu prasidda staLagaLa bagge maatanaaDi. (You speak about the culture, politics, education and famous places in India)*



*P: Bhaarata adara samkrutige tumbaa hesaruvaasi. illi janaru hiriyarannu gouravisuttaare. aadare iigina yuva piiLige hiriyarannu gouravisuttilla. (India, its culture is very famous, here people respect elderly people. But the present generation does not respect the elderly people.)*

*I: sari, ivaru yake gouravisuttilla? (K. Why these people are not respecting)*

*P: houdu, svalpa janaru gouravisuttare aadare svalpa jana gouravisuvudilla. prastuta aadhunikate yuvapiiLige mattu bhaaratada samkrutiyannu haaLumaaDuttide. shikshaNave idakke kaaraNavaagide. (Ya. Some people respect but some do not. The modernization of the country by the youth has spoiled the culture. Education is the main source for this change)*

Poor fabrication of events and poor understanding advancers and blockers of conversation- Example in Kannada language:

*I: naavu iiga bhaaratada bagge maataanaaDooNa? Namma deeshada bagge nimma abhipraayaveenu? (Now let us talk about India. What is your opinion about India?)*

*P: nanage military tumba ishTa. (I like Military)*

*I: sari, bhaaratavu adara military paDege prasiddiyaagideya? bhaarata yavudakke prasiddiyaagide? udaharaNege staLagaLu? (Ok. Is India famous for military system? India is famous for what and for example places?)*

*P: military tumba cannagide. illi tumba deesha bhakti.(Military is too good. There is lots of respect for the country.)*

In coherence, for both the sub parameters ‘local coherence’ and ‘global coherence’ there was a high significant difference between the groups in both the languages. This indicates poorer connected discourse in TBI as compared to NTA in both the languages. Example of the same is shown below. Ehrlich and Barry (1989), Glosser and Desser (1990), Hough and Barrow (2003) indicated that global coherence is affected more than local coherence in TBI participants. Among the TBI participants local coherence in terms of relationship of meaning or context of verbalization with that in the immediately preceding utterance produced either by interviewer or subject was relatively better compared to global coherence. Local coherence included

relationship of continuation, repetition, elaboration, subordination, or co-ordination with the topic in the immediate preceding utterance. But these individuals with TBI also had poor global coherence in terms of poor relationship of meaning or content of verbalization with respect to the general topic of conversation.

Poor local coherence- Example in Kannada language:

*I: niivu bhaaratada samkruti, raajakiiya, shikshaNa mattu prasidda staLagaLa bagge maatanaaDi. (Can you speak about the culture, politics, education and famous places in India)*

*P: nanage vimaanadalli pravaasa maaDuva aase tumba ide. Illi samskruti cannagi ide. iiDi bhaaratavanna sutta beeku aagu nanna henDatiyannu karedukonDu ella bhaaratada staLagaLanna torisabeku. (I like a lot to travel in aeroplane. Here culture is too good. I like to travel through out the country and I like to take my wife and want to show all the places in India)*

Poor local coherence- Example in English language:

*I: Can you say something about the culture, politics, education system and famous places in India?*

*P: I have a dream to travel in aeroplane. I work for a big company. Want to take my wife in aeroplane and show the different places in India.*

Poor global coherence- Example in Kannada language:

*I: niivu bhaaratada samkruti, raajakiiya, shikshaNa mattu prasidda staLagaLa bagge maatanaaDi. (Can you speak about the culture, politics, education and famous places in India)*

*P: naamma kelasa tumba kashTavaada kelasa. tumba sahane taLme inda kelasa maaDabeeku. (My nature of work is very tough. I should work with lots of tolerance and patience)*

Poor global coherence- Example in English language:

*I: I: Can you say something about the culture, politics, education system and famous places in India?*

*P: I work for a company after completion of my graduation. I want to do my higher studies but my time, situation and the financial status is not permitting me to do my higher studies.*

In topic management, the sub parameters ‘topic shift’ and ‘minimal elaboration’ showed a significant difference between the groups in both the languages. It is reported in literature that some individuals with TBI change topics rapidly within few seconds. This finding derives support from the study by Ehrlich and Barry (1989) where they report of rapid topic shift in persons with TBI. But for the sub parameter ‘topic change’ and ‘minimal response’, there was a significant difference between the groups in Kannada and English language respectively. This result is in line with the observation of Mentis and Prutting (1991) and Coehlo, Liles and Duffy (1991) observation, who found that the persons with TBI produce non-coherent topic changes compared to normal speakers. This also derives support from an Indian study done by Tanuja and Manjula (2004) who found that persons with TBI show irrelevant and non-coherent topic changes when compared to normal speakers. The sub parameter ‘perseveration in topic’ and ‘responses which expand topic’ seemed to be equal only in English language for both the groups. The reason here could be the language factor. However, there was a significant difference between the groups for the parameter ‘minimal elaboration’ in both the languages. This result is supported by previous research by Coehlo, Liles and Duffy (1991) where they found that persons with TBI provide shorter, less elaboration of a topic, more often leaving it to the communication partner to introduce and develop.

Rapid topic shift- Example in Kannada language:

*I: e ShTu nimiSha pragne iralilla? (For how many minutes you were unconscious?)*

*P: ondhu ganTe irabeku anta na:nu andukonDidi:ni aShTe.. illi nam mane alinda bandi manege bandi amele aspeTalge hogad mele gottagiddu. Nam mane viShweShwara nagar..... (I guess it was one hour that’s it, here my home, from there we came to home then later after going to hospital I came to know... My house is in Vishweshwara Nagar)*

Rapid topic shift- Example in English language:

*I: Shall we start speaking on the topic- Our country India? Can you tell me little in detail about the politics, culture, education, and famous places in India?*

*P: I don't like political system of India.... Presently it is worst..... Culture! Off course India is rich in culture. There is variety of culture, available in various states. And off course, each state is having its own culture and language. And you can find only this, and but the only pain we can see is, it is all these culture has been replaced with foreign culture, these days.*

Non-coherent topic change- Example in Kannada language:

*I: naavu bhaaratada raajakiiyada bagge maatanaaDoNa. (Shall we speak about the political system in India)*

*P: nanage raajakiiyada bagge svalpaanu ishTa illa. iigina stiti tumba keTTide. (I don't like politics. Present condition is very bad)*

*I: svalpa vivaravaagi heLtiira? (Can you tell me little in brief)*

*P: niivu ii handy kemara dina baLastiira. tumba dubaari annisutte. Tumba cennagi ide. nimma swantaddu irabeku. (You use this handy cam everyday is it? I think it is very costly. It is very good. I guess it is our personal one)*

Minimal response- Example in English language:

*I: Did you visit the famous place of our country - Delhi, to see Taj Mahal recently?*

*P: No.*

*I: How is it?*

*P: Good.*

*I: It is beautiful right. Can you tell me for what it is famous for?*

*P: Yes. It is very beautiful.*

*I: You don't know anything else about it?*

*P: no no.....*

Minimal Elaboration- Example in Kannada language:

*I: bhaarata yavudakke prassidiyaagide? (India is famous for what?)*

*P: niimage gottiro aage bhaaratada samkruti, raajakiiya, shikshaNa mattu prasidda staLagaLige prasiddiyaagide. (As you know India is famous for its culture, politics, education and different places)*

*I: samkruti yaava riiti swalpa vivaristiira? (Culture... How it is famous? Can you expand on this?)*

*P: aacaara vicaara dalli naDe nuDili cannagide. (It is good in its tradition and custom)*

Minimal Elaboration- Example in English language:

*I: India is famous for?*

*P: India is famous for its culture, heritage, education and IT field.*

*I: IT field like how?*

*P: Actually its my profession, in that it can be technical, information science and hard ware and software.*

Finally, in other discourse parameters, the sub parameter ‘message accuracy’ showed a significant difference between the groups only in Kannada language. This suggests TBI had inaccurate message in their conversation compared to NTA. But, the sub parameter ‘information content’ and ‘response time’ showed a significant difference between the groups in both the languages. This result derives support from earlier studies which have shown reduced informational content in persons with TBI (Ehrlich, 1988; Mentis & Prutting, 1991 and Chapman et al, 1992). Another study done by Tanuja and Manjula (2004) suggests that information content was more affected in right hemisphere damage group and was less affected in left hemisphere damage and bilateral hemisphere damage group compared to normal group. Thus, it is implied that TBI participants might have redundancy, incoherence and ambiguity in their speech. The scores on the perceptual rating scale for the sub parameter ‘speech style’ seemed to be equal in both the groups in both the languages and also for the sub parameter ‘linguistic fluency’ and ‘gaze efficiency’ the scores seemed to be equal in

both the groups only for English language. This suggests that the TBI group did not show any speech fluency related disturbances.

Poor information content- Example in Kannada language:

*I: illina raajakiiyada vyavaste hegide? (How is the political system?)*

*P: namma deesha tumba baDa deesha. illi ella vyavasthegaLu tumba keTTadaagide. (Our country is a poor country. Here all the system is very bad.)*

Poor information content- Example in English language:

*I: What do you say about the education system in India?*

*P: Higher and lower differentiation is more. Totally it is K.*

Inaccurate message - Example in Kannada language:

*I: namma deeshada shikshaNada vyavaste hegide? (How is the education system in our country?)*

*P: ii vishaya tumba cannaagide. idarabagge tumba maataNaDabahudu. nimige ennenu heLabeku heLi. illi cannagi illa. (This topic is too good. We can speak a lot about this topic. What you want to say, you say. It is not good here.)*

Inaccurate message- Example in English language:

*I: What are the famous places in India?*

*P: India is our country. Nice to speak on a topic called India. K what you want me to say. Can you repeat and explain the question once again to me.*

#### *5.1.1.1.2 Non propositional aspects.*

In contrast to the neuro-typical adults who were able to initiate many turns in a conversation, the TBI participants were seen to take more time to start a turn. This is in support with studies which suggest that individuals with TBI initiate very few turns and at most they take time to initiate turn in conversation (Milton, Prutting, & Binder, 1984). According to Schegloff (1987), normal individuals are reported to take contingent turns in conversation. The performance of TBI group on non-contingent turns could be attributed to the lack of perception of flow of conversation. Consequent to which they concentrated on one particular word and started speaking in relation to that word in a non-coherent way. Thus, the TBI participants could not perceive the meaning of the preceding turn due to lack of concentration. Another plausible reason

could be the problem at local coherence in persons with TBI. In normal conversation, it is expected that only when one communication partner stops, the other partner initiates the turn. Here, the TBI participants started speaking abruptly without letting the other person (listener) finish his turn and used to stay either in listener's mode or speaker's mode. This result is in support with a study by Mc Tear and Conti Ramsden (1992), who have found similar findings in persons with TBI where in they persist longer in either speaking or listening mode. This conversation behaviour can be attributed to 'shifting attention' seen in persons with TBI. It seems like TBI individuals were unable to focus on a particular sentence and hence were unable to comprehend some meanings of the sentence and in the same state started speaking on the topic. The statistical results for the other sub parameter of turn taking 'mode of conversation' and the parameter revision behaviour seemed to be equal in both the groups in both the languages. Both TBI and NTA participants used only verbal mode to communicate and did not shift to any non-verbal mode.

Non-contingent turn- Example in Kannada language:

*I: illina raajakiiyada vyavaste bagge maataDaNa, hegide anta heeLi? (K will speak about the political system, tell me how it is?)*

*P: No no..... beere vishayada bagge maataDoNa. naavu prassidiyaada staLagaLa bagge maataDoNa. (No no..... will talk about other topic. Let us talk about the famous places)*

*I: svalpa eenaadru heeLi? (Tell me little about something)*

*P: illa naniige gottilla. (No, I don't know)*

Non- contingent turn- Example in English language:

*I: What about education system in India?*

*P: Education system is good in India. In Karnataka many new schemes are present. Example is Sarva Shikshana Abhiyana.*

*I: K can you tell me something about this schemes?*

*P: Sarva Shikshana Abhiyana. I don't know much about this.*

*I: K*

*P: Education system is very good so many people from India go to abroad for their work in expectation of high salary. India had good man power in terms of education.*

For the parameter of conversation repair, there was a significant difference between the two groups for the sub parameter ‘use of self repair through repetition’ and ‘use of revision through clarification’ only in Kannada language. Use of self repair through repetition and use of revision through clarification was seen in persons with TBI because they failed to convey the message and the partner had to ask for more clarification. Presumably, this could be due to the fact that the persons with TBI had a lesser perception of their own speech and they did not make an effort to use self initiated repair. Other reasons could be the increased redundancy, incoherence and reduced information in their speech leading to inability of the conversation partner to understand the message conveyed by them. But the statistical results for the sub parameter ‘use of self repair through repetition’ and ‘use of other initiated repair’ of conversation repair seemed to be equal in English and Kannada language respectively.

Conversation repair- use of repair through repetition- Example in Kannada language:

*I: oogaTTu iddaru jana heeggiddaare illi bhaaratadalli? (Even in spite of good unity, how are people in India?)*

*P: aa bhaaratadalli a obbara kanDare obbarige aagalla. (aa.. in India some people don't like some other people.)*

*I: aagalla antha iddaaroo athavaa ooggaTTininda iddaro? (They don't like each other or are they staying in unity)*

*P: a oggaTTininda ella ooggaTTininda illa andre ooggaTTininda illa. (a.. they are not in unity. They are not in unity means they are not in unity.*

*I: houdaa! (Is it?)*

*P: obbarannu kanDare obbaru oggaTTininda illa. ondu kaDe nooDidare hindhu muslim galaaTe. (If you see one person and then the other person there is no unity. If you see one side there is Hindu-Muslim fight.*



Conversation repair- use of other initiated correction- Example in Kannada language:

*I: samskrutiya bagge innenu heLa bahudu? (What else you can say about the culture?)*

*P: samskruti bagge andare, samskruti eeno sariyaagi ide. tumba deevastanaLu ive, tumba haLee kaaladdu idu ella ive. (With respect to culture means, culture is good. There are lots of temples. The olden days this all is there.*

*I: aacaara vicaara ellaa anusarisikonDu banddiddivaa?(Are we following the custom and tradition?)*

*P: haage namma samskruti cannaagi ide. Niivu heeLida haage aacaara vicaara ellaa anusarisikonDu banddiddivi. (Like that, our culture is good. Like you said we are following the custom and traditions.)*

### **5.1.1.2 Step II- Comparison of discourse for Kannada and English language within the group.**

#### *5.1.1.2.1 Individuals with Traumatic Brain Injury group (TBI).*

The first reason for all the differences between the languages could be due to the domain chosen for conversation “My country India”. This might have served as anchor point for distinct value systems embodied in the use of Kannada rather than English. This hypothetical topic of conversation would have likely perceived as congruent while speaking in English or incongruent while speaking in Kannada language. For example, a highly congruent configuration would be with a priest, in church, about how to be a good Christian. A highly incongruent one would be a discussion with one’s employer at the park about how to be a good son or daughter. Thus, while speaking in Kannada the topic of conversation ‘My country India’ was incongruent for the TBI group so they had to greet others by themselves. And while speaking in English the same topic of conversation was congruent. Since this (English) language exposure and use was less during the post morbid condition of trauma, they tend to inquire information and ask assistance in understanding conversation. The topic management was poor in terms of non-coherent topic change and poor informational content with minimal response and minimal elaboration. Thus,

all these above mentioned parameters resulted in poor global coherence of a given topic. Second reason is with respect to proficiency, even though the issue of proficiency is closely related to that of L2 when compared with L1 use. An assessment of the effective use of L2 and of daily exposure to it should be a fundamental concern (Abutalebi, Cappa & Perani, 2001; Byalistok et al., 2005). The frequency of the use of a language in daily situations (at home and/or in an academic or professional environment) will be directly related to the automaticity obtained, which, in turn, will be linked to the ability in producing and understanding messages in the L2. For example, the L2 structures and vocabulary which are frequently accessed are more easily processed than those rarely utilized (Green, 1998). In other words, a language and/or its components remain with a high proficiency if it is frequently accessed. In the other way round, L2 retrieval and production processes may become a more effortful task if it is not frequently accessed. Similar factor would have contributed for individuals with TBI while speaking in English (less frequently accessed) when compared to Kannada (more frequently accessed) language. Finally in case of any bilinguals, exposure to the second language (English) through formal instructions like attending academic courses will manifest the L2 usage to a larger extent which in turn will be a follower at the professional field. Thus, making English language, the most frequently accessed language for any neuro-typical adults or any bilingual individuals. Since the TBI participants lack this English language exposure during their post morbid trauma duration, these TBI participants acted as a persistent listener/speaker by using self repair through repetition while speaking in English language when compared to Kannada language. In the following example, the conversational discourse in English language is poorer than the Kannada language.

Conversational discourse sample in Kannada language- Example from Participant 3: Appendix M1 holds good for the same.

Conversational discourse sample in English language- Example from Participant 10: Appendix M2 holds good for the same.

#### *5.1.1.2.2 Neuro-typical adult group.*

There was no significant difference between the two languages for all the parameters of propositional and non-propositional aspects of conversational discourse analysis

scale as shown in Table 18 and Table 19. The reason for these results could be the participant's language proficiency, which was same in both the languages. Thus, we can suspect the participants of NTA group to be balanced bilinguals at conversational discourse level.

#### ***5.1.1.3 Step III- Summary.***

There is a dearth of studies which finds difference between propositional and non-propositional aspects of discourse. But, there have been a few studies in the past by Allen and Brown (1976), Milton (1984), Mentis and Prutting (1991), where TBI patients were found to be lacking in many areas of conversational discourse like interactional aspects and propositional aspects of conversation when compared to normal individuals.

Since, there is no literature which finds the difference between propositional and non-propositional (total) aspects of discourse, the discussion done before at the level of all the individual parameters under qualitative "Discourse Analysis Scale-conversation" holds good for the same context. Finally, there was a significant interaction between languages and groups for the sub level propositional aspect of DAS.

The TBI group performed poorer than NTA group. Since a variety of deficits in cognitive functions like attention, memory, visual-spatial perception, reasoning, executive control like organization, and planning etc, are seen after TBI leading to this type of communication impairment. Attention impairment causes inability to focus on, filter relevant versus irrelevant stimuli, organize, retain and retrieve the stimuli in a conversation, thus resulting in impaired comprehension of discourse or social interaction (Hagen and Malkmus, 1979). Memory problems impair comprehension and retention, reflecting inability to retain what was said at the beginning of a conversation or remembering the topic or remembering who said what and in which order. Slow processing of information causes difficulty in shifting between speaking and listening roles. Thus, they exhibit problem at both propositional and non-propositional aspects of discourse when compared to NTA group.

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### 5.1.2 Sub section II: Narration Task.

#### *5.1.2.1 Step I- Comparison between the TBI and NTA groups.*

##### *5.1.2.1.1 Propositional aspects.*

##### *5.1.2.1.2 Non-propositional aspects.*

#### *5.1.2.2 Step II- Comparison of discourse for Kannada and English language within the group.*

##### *5.1.2.2.1 Individuals with Traumatic Brain Injury group (TBI).*

##### *5.1.2.2.2 Neuro-typical adult group (NTA).*

#### *5.1.2.3 Step III- Summary.*

## 5.1.2 Sub- section II: Narration Task.

### 5.1.2.1 Step I- Comparison between the TBI and NTA groups for propositional and non-propositional aspects.

#### 5.1.2.1.1 Propositional aspects.

As shown in Table 25, the significant differences between the groups (TBI and NTA) for Kannada and English languages are explained under different sections of propositional parameters of narrative discourse. Each of the discourse parameters are profiled and discussed in detail in the following section.

In the discourse structure, for the sub parameters ‘discourse forethought’ and ‘organizational planning’ there was a high significant difference between the groups (TBI and NTA) in Kannada and English languages. This was most likely an indication of poor organization and planning skills in TBI as compared to NTA in both the languages. Probably the lower mean value among TBI could be attributed to poor forethoughts in narration as compared to NTA, thus reflecting their poor discourse structure. This result is in support with a study as for narrative production, persons with RHD have often been described as impaired in dealing with the coherent organization of a discourse. They tend to introduce irrelevant comments and tangential utterances in their narratives, focus on irrelevant details (Ferre´, Ska, Lajoie, Bleau, Joannette, 2011; Lehman, 2006), produce fewer target concepts (Uryase, Duffy, Liles, 1991) and be unable to generate (Brownell, Gardner, Prather, Martino, 1995) and/or modify (Stemmer & Joannette, 1998; Marini, Carlomagno, Caltagirone & Nocentini, 2005) appropriate mental models during a description and/or conversation. It has been suggested that these difficulties may rely on a general impairment in the integration of ongoing information with the inferential cues derived from the situational context. Another pioneering study by Kaczmarek (1984), on the analysis of narratives produced by participants with focal lesions in different portions of the brain showed that those with both right and left frontal damage had the greatest difficulties in the organization of the information they wished to communicate. Furthermore, they could not refrain from producing tangential and irrelevant digressions as well as stereotyped phrases and sentential fillers. Example of poor discourse structure in Kannada and English language is shown in Appendix N1 and Appendix N2.

In the communication intent, there was no significant difference between the groups for the all sub parameters in the Kannada and English languages. Here all the participants in both the groups were able to initiate the narration in Kannada language compared to English language. Few TBI participants requested some prompts to initiate narration in English language.

In coherence, for both the sub parameters 'local coherence' and 'global coherence' there was a high significant difference between the groups in the Kannada and English languages. This indicates poorer connected discourse in TBI as compared to NTA in both the languages. This result is in support with a study on RHD patients by Mar (2004). He concluded by suggesting that damage to the frontal lobe of the right hemisphere may "not only obliterate broad semantic networks" as suggested by Beeman (1998) but also "impair inhibition processes proposed to take place while the left hemisphere engages in selection." According to his observations, then, he hypothesized that the majority of individuals with RHD showing narrative disturbances should have frontal damage causing difficulties in the integration of the complex information manipulated in a narrative. His hypothesis is important and it is coherent with recent studies reporting a frontal involvement in the organization of information and production of global coherence errors in different population of patients (e.g., persons with schizophrenia Marini, Spoletini, Rubino, et al. 2008; Spalletta, Spoletini, Cherubini., et al. 2010) and traumatic brain injury (Marini, Galetto, Zampieri, Vorano, Zettin and Carlomagno, 2011) involved in the narrative form of story description tasks. This finding is in support with a study by Ferre', Ska, Lajoie, Bleau and Joannette (2011), as persons with RHD are often described as impaired in dealing with the coherent organization of discourse. However, in this study the production of global coherence errors correlated significantly with the reduced percentage of informational content. This confirms that the lowered production of words that were perceived as informative was not due to microlinguistic deficits but was the epiphenomenon of a macrolinguistic impairment. Thus, these individuals with TBI also had poor global coherence in terms of poor relationship of meaning or content of verbalization with respect to the general topic of conversation. From the results of the present study it can be hypothesized that these TBI participants had varied (greater) involvement of left hemisphere region compared to right

hemisphere region which could be due to varied impact of trauma. This hypothesis can be proved with further neuroimaging studies.

Poor local coherence- Example in Kannada language:

*I: prayaaNakke modalu bere ella eenu tayyari maaDikonDri? (Before your journey what all preparations you have made?)*

*P: nammadu ide kiT ella tayyari maaDi matte 4:30 ashTTu hottige horaTvi. Kocinalli tumba sheke ide. sheke keTTadaagi ide. tumba bejaaru aahitu. (I have that. Made the kit ready and we left at 4:30. It is very hot in Cochin. It is very bad hot season. I felt very bad.)*

Poor local coherence- Example in English language:

*I: Imagine your past/future journey to a place and narrate the same in past or future tense?*

*P: I am working as a politician. Mysore Milk Federation is providing many facilities to the village people. My colleagues and other people, joining together we are planning to do few things. It is very difficult to fulfil any individuals need. I hope things go on in a nice pace.*

Poor global coherence- Example in Kannada language:

*I: niuu ondu uurige prayaaNa maaDiroddanna nanige vivaravaagi tiLisi. (Can you narrate your past journey to a place in detail?)*

*P: naau ooda vaara naalku jana ella hoogadu antaa andukonDvi. sari ilinda nanjana guuDige hoogi alli deevastanaadalli puuje mugisidvi. hodvi alli ondu cekpoosT. cekpoosTalli mugisidvi nammadu alli ondu koyambatturalli nammade ondu bahaLa ishTavaada ondu pub ide. nanige tumba ishTa. (We all four of us taught to go out for one week. K we left to Nanjanagud from here and did pooja there. We went to a check post there. We completed in that check post. Our own one favourite pub is there is Coimbatore. I like that a lot.*

Poor global coherence- Example in English language:

*I: Imagine your past/future journey to a place and narrate the same in past or future tense?*

*P: This Saturday and Sunday we are planning to do something. I like spending time with friends having party and want to spend time just relaxing. After this incident I have lost contact with my friends and they don't call me or meet me. I feel very bad about this situation.*

In topic management, the sub parameters 'topic shift' and 'minimal elaboration' showed a significant difference between the groups in Kannada and English languages. It is reported in literature that some individuals with TBI change topics rapidly within few seconds.

Rapid topic shift with minimal elaboration- Example in Kannada language:

*I: uuTa elli mugisidri? (Where you had your lunch?)*

*P: hodvi alli ondu cekpoosT. cekpoosTalli mugisidvi nammdu alli ondu koyambatturalli nammade aada ondu bahaLa ishTavaada ondu pub ide. allige hoogidvi alli nanige tumba ishaTa pub ondu ganTe kaala kaLedvi. (We went there one check post. We completed in that Check post. Our own one favourite pub is there is Coimbatore. We went there. I like that a lot. We spent one hour there.)*

*I: sari innu yaavatara samaya kaLadri nimma prayaanadalli? (In your journey in what other ways did you spend you time?)*

*P: ange DVD nooDikonDu Taim kaladvi. (We spent our time by watching DVD's)*

Rapid topic shift with minimal elaboration - Example in English language:

*I: Which seat you preferred in your bus journey?*

*P: Seat, I have a big car, I enjoy driving my car. I love it from my heart. It is my soul. I have a passion towards car.*

*I: How did you spend your time in your journey to Bangalore?*

*P: Just watching the sceneries in Bangalore- Mysore road.*

In other discourse parameters, the sub parameters 'information content', 'message accuracy', and 'temporal causal relation' showed a significant difference between the groups in the Kannada and English languages. The TBI participants



showed reduced ‘information content’ in their narrative discourse. For this particular result there is a supporting study by Marini, Carlomagno, Caltagirone and Nocentini (2005). They compared the narrative performance of persons with RHD with a group of persons with left hemisphere damage who did not develop aphasia and a group of healthy control participants. The three groups were administered three story description tasks. In the first condition, they were asked to retell previously read stories. In the second, they described what was going on in a set of cartoon picture stories. In the third condition, they had to arrange a set of pictures to reconstruct a well-formed story. In the first condition, all groups performed quite well on both within- and between-sentence measures. In the two picture description tasks, however, the performance of the persons with RHD were poorer than those of the other two groups when examined in terms of information content and coherent aspects of narrative production. Similar to this, the TBI participants of the present study have also shown poor information content and poor message accuracy since the narrative discourse task of this study involved the verbal sequential arrangement of events in an organized manner. It is reported in literature that some individuals with TBI have difficulty in producing a narrative that is temporally anchored in a dominant tense, as well showing their pragmatically-motivated tense shifting, a kind of rhetorical flexibility is absent in their overall narration. These considerations provide evidence for the claim that individuals with TBI lack a consistent temporal perspective in their second language. This might have been caused by their limited cognitive abilities rather than by their language proficiency. Thus, they did not have any information about the correct description of people, location, objects, activities and attributes that played a role in the event being narrated.

Poor information content- Example in Kannada language:

*I: niuu ondu uurige prayaaNa maaDiroddanna nanige vivaravaagi tiLisi. (Can you narrate your past journey to a place in detail?)*

*P: naanu nanna kaaranna togonDe amele naanu bengaluurige gaDi hoodisikonDu hoode. (I took my car then I drew car and went to Bangalore.)*

Poor information content- Example in English language:

*I: K like this you reached Bangalore?*

*P: We travelled in a car. My brother was driving and my mom and sister was sleeping at the back seat. I was in the front seat. My brother felt sleepy so I started driving and like this we reached Mangalore.*

Inaccurate message- Example in Kannada language:

*I: sari samaya yaava riiti kaLadri prayaaNadalli? (K how did you spend your time in your journey?)*

*P: samaya ange nidde maaDadvi. ashTe innu eenu maDtaare. naanu malagde. nidde cannagi banthu. tumba kaDime samaya togotu. (Time.. Like that only we slept. That is all. What else we do. I slept. I got a nice sleep. We took very less time.)*

Inaccurate message- Example in English language:

*I: What preparation you made to start the journey?*

*P: Preparation nothing one kit with my cloths and belongings. That is all I do. I don't have patience to do anything extra. This is enough right.*

Temporal and causal relation- Example in Kannada and English language:

*The TBI participants did not use any temporal terms like then, and then, first, next, before, and after. And they did not use any causal terms like because, when, if, while, and until throughout their narrative samples (Appendix- N1 and Appendix- N2).*

In speech related parameters, there was no significant difference between the groups in the Kannada and English languages. All the participants of both the groups used specific vocabulary in specific situation and did not exhibit any linguistic non fluencies and abnormal speech style in terms of inappropriate dialectal structural forms, code switching, style-shifting. But, only one participant among the TBI group had a flat intonation with respect to the particular context of narration.

#### *5.1.2.1.2 Non- Propositional aspects.*

For the parameter of repair strategy, there was a significant difference between the two groups for the sub parameter 'use of self correction', 'use of self repair through repetition or revision' only in English language and 'use of other initiated correction' in Kannada and English language. Use of repair strategy was seen more in persons with TBI compared to NTA group. In particular 'use of self correction' and 'use of

self repair through repetition or revision' sub parameters were seen in NTA compared to persons with TBI because it was a prestigious issue for them to use English language since the task was a constrained narrative task where these participants had to talk only in one particular language (Kannada or English language). For the TBI participants it was not the prestigious issue instead effective communication in any of the residual language. Thus, they had to use other initiated correction in Kannada as well as in English language compared to NTA group. Thus, on an observation it can be seen that the availability of Kannada language was comparatively better compared to English language in majority of the TBI participants.

Repair strategy- use of self correction- Example in English language:

*I: Imagine your past/future journey to a place and narrate the same in past or future tense.*

*P: I will have to travel to Bangalore tomorrow, so I have to take permission for that. I mean, I have to take leave.*

Repair strategy- use of repair through repetition or revision- Example in English language:

*I: K you went through Chamarajanagar road?*

*P: Ya we went through this road. There one check post check post is there. We finished checking and everything. Next we had our lunch.*

Repair strategy- use of other initiated correction- Example in Kannada language:

*I: alli modalu allinda yaavatara hoodri? (First from there how did you people go?)*

*P: gaaDi maaDidvi ondu miini bassu. miini bassu maaDi. (We had booked a vehicle, mini bus. We booked a mini bus.)*

*I: K ToorisT bassu? (K tourist bus.)*

*P: ToorisT bassu maaDi namma saamaanu ella adara hoLage aakikonDu hoodvi. (We had booked a tourist bus and we kept our entire luggage inside that and we left.*

Repair strategy- use of other initiated correction- Example in English language:

*I: How did you go from Nanjanagud to Shabarimale?*

*P: From Nanjanagud we reached Gundalpet, from Gundalpet Kerala road, road, the road which takes deviation.*

*I: K From that Kerala route.*

*P: Ya we went through Kerala route.*

### **5.1.2.2 Step II- Comparison of discourse for Kannada and English language within the group.**

#### *5.1.2.2.1 Individuals with Traumatic Brain Injury group (TBI).*

Bilingual Kannada and English narration showed more similarities than differences with respect to all the parameters of propositional and non-propositional aspects of narration except for the sub parameter ‘use of self correction’ under repair strategy of non propositional aspects. These bilinguals seem to attempt to produce in their second language (English) which was very similar to the ones they produce in their native Kannada language. Despite this attempt, bilingual narrators seem to find themselves limited by their lower command of the vocabulary and grammar of the second language, English. Thus, few participants made an attempt to use self corrections while narrating in English language compared to Kannada language since the vocabulary in this language was spontaneously generated and adequate to the context of verbalization. Few other reasons for similarities between the language usage and/or the mild differences could be due to the prestigious issue of English language usage compared to Kannada language. Narrative production is a cultural activity with respect to first language. Children growing up in different communities learn to organize their narrative experiences in ways that respond to their community’s cultural expectations. According to Wang and Leitchman (2000), Americans and Chinese differ with respect to their thinking and reasoning patterns. Americans generally attend to the internal attributes of a person or object, analyze individual components in isolation and succession, and decontextualize a behavior from its environment while making dispositional judgments. In contrast, the situational context plays a significant role in how Chinese people think and reason, and they tend to focus on relations between a person or an object and the environment as the antecedent of a behavior. This cultural variation may have led Chinese young children

to be more sensitive to others' emotional states and make references to the feeling states of story characters and other people's emotions in their stories than their American peers. Appendix N1 and Appendix N2 shows the examples of narrative discourse samples by an individual with TBI where there is over use of self correction in English language compared to Kannada language.

#### *5.1.2.2.2 Neuro-typical adult group.*

There was no significant difference between the two languages for all the parameters of propositional and non-propositional aspects of discourse analysis scale of narration as shown in Table 29 and Table 30. The reason for these results could be the participant's language proficiency, which was same in both the languages. Thus, we can suspect the participants of NTA group to be balanced bilinguals at narrative discourse level.

#### *5.1.2.3 Step III- Summary.*

There is a dearth of studies which finds difference between propositional and non-propositional aspects of discourse. Since, this is an initial attempt in literature which finds the difference between propositional and non-propositional (total) aspects of discourse, the discussion done before at the level of all the individual parameters under qualitative "Discourse Analysis Scale-narration" holds good for the same context. Finally, there was a significant interaction between groups for the sub level propositional and non-propositional aspects of DAS and between languages there was interaction only for the sub level propositional aspect of DAS. By considering the mean scores of discourse in Kannada and English language, the TBI group performed poorer than NTA group in these two languages. Hence this can be used as a reference to differentiate TBI group from the NTA group and infer better performance in English language compared to Kannada language.

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### 5.1.3 Sub section III: Picture Description Task.

#### *5.1.3.1 Step I- Comparison between the TBI and NTA groups.*

##### *5.1.3.1.1 Propositional aspects.*

##### *5.1.3.1.2 Non-propositional aspects.*

#### *5.1.3.2 Step II- Comparison of discourse for Kannada and English language within the group.*

##### *5.1.3.2.1 Individuals with Traumatic Brain Injury group (TBI).*

##### *5.1.3.2.2 Neuro-typical adult group (NTA).*

#### *5.1.3.3 Step III- Summary.*

### 5.1.3 Sub-section III: Picture Description Task.

#### 5.1.3.1 Step I- Comparison between the NTA and TBI groups for propositional and non-propositional aspects.

##### 5.1.3.1.1 Propositional aspects.

As shown in Table 36, the significant differences between the groups for both Kannada and English languages are explained under different sections of propositional parameters of picture description discourse. Each of the discourse parameters are profiled and discussed in detail in the following section.

Failure to structure discourse occurs when the discourse of the speaker lacks forethought and organizational planning. Due to these characteristics, the discourse will be confusing, even if all of the propositional content is present. As shown in Table 36 under discourse structure, for the sub parameter ‘discourse forethought’ there was a highly significant difference between the groups only in English language. Thus, the TBI participants showed poor discourse forethought by supporting Zalla, Phipps and Grafman (2002), where they found certain characteristics associated with Pre Frontal Cortex Damage (PFC) patients’ discourse production specifically in the context of story-telling, include difficulty recalling narrative components of a story, processing inference and appreciating the story’s thematic aspects or gist. But for the sub parameter ‘organizational planning’ there was a significant difference between the groups in the two languages.

Poor discourse structure- Example in Kannada language:

*I: Show the picture (Shyamala & Ravikumar, 2008), of a picnic spot.*

*P: ondhu samudra ide..... pakka uDuga nintidaane.... Ondu kuri ide.... alli ondu beTTa ide mate ondu karu ide....illa ondu shale tara makLu horagaDe a:Ta aDtidaare.. shaantawaada waatavarna iro hange ide.. ondu hengasu kaafi berastaidaLe.... Ondu aDagu ide.. ivaru vishranti madtidare.....ondu uDuga gaLi paTa harastaidane...ellaru ondu picnic tara oragaDe bandidare.. ondu karu ide.. ondu doDa mara ide.. ondu mane ide.....*

*(One ocean is there. Next to it one boy is standing. One goat is there. There is one hill and one car is there. No it is one school, children are playing outside. It seems to be a*

*peaceful place. One lady is preparing coffee. One ship is there. These people are taking rest. One boy is playing with a kite. It seems like all have come out for a picnic. One car is there. One big tree is there, one house is there)*

Poor discourse structure- Example in English language:

*I: Show the picture (Shyamala & Ravikumar, 2008), of a picnic spot.*

*P: One goat is standing. Tree is there and mountains are present. Car is parked and boy is playing with something. One man and women is sitting and doing something or selling some things. One school or village house is located here. It looks like there are relaxing at the evening time. In the river one man or boy is going in a boat.*

In communication intent, only the sub parameter ‘imagines events correctly’ showed a significant difference between the groups in both the languages. This is because; few (four out of twenty) TBI participants imagined the picture to be a ‘school setup’ and ‘village scene’. This result derives support from few literature findings where the discourse production deficits associated with RHD show difficulties in integrating information for generating some types of inferences (Rehak, Kaplan, Weylman, Kelly & Brownell, 1992; Myers & Brookshire, 1996), revising interpretations (Brownell, Potter, Bihrlé & Gardner, 1986; Tompkins, Bloise, Timko & Baumgaertner, 1994), or selecting the most plausible meaning of a passage (Tompkins, Baumgaertner, Lehman & Fassbinder, 2000; Tompkins, Lehman-Blake, Baumgaertner & Fassbinder, 2001; Tompkins, Fassbinder, Blake, Baumgaertner & Jayaram, 2004). The statistical results for the sub parameter ‘initiation of picture description’ seemed to be equal only in Kannada language for both the groups. The reason could be that Kannada being their native language, they would have been exposed to Kannada language immediately after the trauma when compared to English exposure happening at a later duration of time. This influence might have taken place even in spite of equal proficiency in both Kannada and English languages.

Imagines events incorrectly- Example in Kannada language:

*P: puurti citra nooDidre, puurti ondu ondu haLLi, ondu haLLinalli eenenu beeku yaava tara baduka beeku anta andare ondu uuralli badukallike ondu kelasa, ondu mane ede, svayam uddyogagaLu irtavalla aage ide. (If I see the complete picture, Completely one one village. What is needed in a village? How to lead a life means in*



*a village to lead a life one requires a job and one house is there. It depicts like a self employment place.*

Imagines events incorrectly- Example in English language:

*P: It looks like a village scene. Here typical village activities are going on. Like one lady is making a garland. The man or a cobbler is occupied with his job keeping the box in front of him and one pair of chappals are left beside him. There is a house. All are occupied with their routine day to day activities. Like a boy is playing with a kite and a man is washing something near the river bank. One boat is sailing.*

In coherence, for both the sub parameters ‘local coherence’ and ‘global coherence’ there was a high significant difference between the groups in both the languages. This was more affected in TBI participants because the literature reports that these individuals have poor ability in structuring discourse. In another study, one approach of discourse analysis involving examination of the cognitive functions distinguishing macrostructural and microstructural discourse processing have revealed that TBI participants demonstrates greater difficulty with global than local coherence and showed more performance variability among participants in global as compared to local coherence (Van Dijk & Kintsch, 1983; Glosser, 1993; Myers, 1999; Hough & Barrow, 2003).

Poor local coherence- Example in Kannada language:

*P: pravasakke bandidaare. ondu naayi ide. matte ella avara kelasaddali toDagiddare. idu ondu citra ashTe. adu huDuga nintidaane. naahi nintide. (They have come for a picnic. One dog is there. All are busy in their own work. This is one picture that is all. That boy is standing. Dog is standing.)*

Poor local coherence- Example in English language:

*P: It is a picnic spot scene. One tree is there. One boy is playing with a kite. It is a pleasant place. Lady is busy preparing coffee. One boat is sailing in the river. Here a family has come for a picnic and they are occupied with their own jobs. There is a river. A man is busy reading a book. One man is watching his cloths.*

Poor global coherence- Example in Kannada language:

*P: ondu shaale vaatavaraNa.... makkaLu shaale munde aaTa aaDutta iddare. ondu kaaru ide, mara aide, shaale munde kuutidaare jana. (One school setup, children are playing in front of the school, one car is there, tree is there, people are sitting in front of the school.)*

Poor global coherence: Example in English language:

*P: It looks like a school scene. Here some school activities are going on. Like one man is reading a book. The man has parked the car. All are occupied with their activities. Like a boy is playing with a kite and a man is washing something near the river bank. One boat is sailing. Overall it is in a village.*

In topic management, the sub parameter ‘introducing topic’ and ‘minimal elaboration’ there was a significant difference between the groups in both the languages. These results were seen because few (four out of twenty) TBI participants irrelevantly initiated the topic to be as ‘school situation’ or ‘village scene’. This is in support with the study by Mentis and Prutting, (1991) and Coelho, Liles and Duffy, (1991) who found that TBI individuals produced unrelated topic changes in their discourse associated with minimal elaboration. But the results of the statistical analysis for the sub parameter ‘perseveration in topic’ and ‘elaboration of topic’ seemed to be equal in both the languages for both the groups. These two parameters were negative behaviours which were not present in both the groups.

Irrelevantly initiating topic with minimal elaboration- Example in Kannada language:

*P: ii citra... ii citra nooDidare ondu haLLiyalli jana jiivan naDesuta iirodu. ondu mane ide, samudrada pakka ide. ondu huDuga, hengasu, ganDasu, naayi, kaaru ede. ivaru avara kelasadalli toDagiddare. elaarv vishranti togotaa iiddare. pravasakke bandiddare. (This picture.. This picture depicts a village scene where people are leading their life. One house is there. It is next to the ocean, one boy, women, men, dog, car is there. These people are involved in their work. All are taking rest. They have come for a picnic.)*

Irrelevantly initiating topic with minimal elaboration- Example in English language:

*P: This picture is like a village scene. Here these village people are leading a peaceful life. One lady is there. One man is reading a book. One car, boy, dog, house and boat is there in this picture. There is a ocean and a boat is sailing. They all are resting under a tree.*

Finally in other discourse parameters, the sub parameter ‘information content’, ‘message accuracy’ and ‘gist of information’ showed a significant difference between the groups only in Kannada language. Here, the TBI participants showed poor information content because there was an inappropriate topic shift which was non-coherent (inaccurate message) with the main topic (gist of information). This result is in support with the findings of Zalla, Phipps and Grafman (2002); Frattali and Grafman, (2005) who reported that subjects with RHD having difficulty in recalling narrative components of a story, processing inference and appreciating the story’s thematic aspects or gist specifically in the context of story-telling task. There is no literature based on single picture description task which can support the present finding. But the sub parameter ‘response time’ showed a significant difference between the groups only in English language. The reason could be that Kannada being their native language the participants might have been exposed immediately to Kannada after the trauma when compared to English exposure which might have happened at a later duration of time. Thus, the TBI participants might have taken more time to start picture description in English language when compared to neuro-typical adults. The results of the statistical analysis for the sub parameter ‘vocabulary specificity’ seemed to be equal only in Kannada language for both the groups but for the sub parameter ‘linguistic fluency’ and ‘speech style’ the results seemed to be equal in both the languages for both the groups. In total all these three parameters were negative behaviours which were not present in both the groups in both the languages.

Poor information content and message inaccuracy- Example in Kannada language:

*P: appa amma avara kelasa maaDataa iddare. ondu magu malagide, ondu huDuga gaaLi paTa haarisutta iddane. (Dad and mom, they are doing their work. One baby is sleeping. One boy is playing with kite.*

*P: shaalenalli dvajaarooohaNa naDedide. kuri saakaaNikeyalli haLLi jivana naDitaide. ondu haLLi jivana. (Flag hoisting is done in the school. Village life is going on with sheep nurture, one village life.)*

#### 5.1.3.1.2 Non- Propositional aspects.

Participants in both the groups showed the presence of revision behaviour in both the languages. But there was a high significant difference between the groups for the sub parameter ‘use of self correction’ and ‘use of repair through repetition or clarification’ of repair strategy only in Kannada language. The TBI participants showed this feature to a greater extent compared to NHT group. This result for ‘use of self correction’ is supported by a study by Tanuja and Manjula (2004), who found that within TBI group RHD subjects showed more of self repair than LHD subjects. The possible reasons for use of too much self correction could be due to confusion, which was the result of poor ability in structuring discourse. This result for ‘use of repair through repetition or clarification’ contradicts with the result found by Marsh and Knight, (1991) where the TBI individuals do not ask for clarification even if they do not understand the conversation. Literature on the basis of picture description task is not available. The reason for the presence of excessive use of repair strategies in the speech of TBI group in the present study can be reasoned on the basis of their inability to add on further information in speech in terms of giving clarification. Few participants while using self correction as a repair strategy used more repetitions and few participants made an effort to use clarifications given by the investigator and tried using the same as revisions.

Repair strategy- use of self correction- Example in Kannada language:

*P: appa amma avara kelasa maaDataa iddare. ondu huDuga gaaLi paTa haarisutta iddane. ondu magu malagide, illa adu magu alla..... aa ganDasu appa avana cappal biTTu caape mele kuuttiddare. (Dad and mom are doing their job. One boy is playing with kite. One baby is sleeping, no that is not a baby..... aa... that men has left his chappal and is sitting on a mat.)*

Repair strategy- use of repair through repetition or revision- Example in Kannada language:

*P: ondu mane ide. ondu manetara athiti gruha ide. (One house is there. Like one house guest house is there.)*

### **5.1.3.2 Step II- Comparison of discourse for Kannada and English language within the group.**

#### *5.1.3.2.1 Individuals with traumatic brain injury group.*

Few (four out of twenty) TBI participants had interpreted the gist of the picture wrongly due to poor global coherence during the first session of recording, where they used one language (example - L1) with very few correct information content due to good local coherence. In the second session, participants had interpreted correctly in other language (example - L2) with few correct information content. While interpreting at second time, the participants had asked assistance in understanding the picture and had a delayed response time, but there was a correct response. They also had to use more self correction repair strategies. Thus, there was a difference between the L1 and L2 for the sub parameters- ‘information content’, message accuracy’ and ‘use of self correction’.

Discourse sample of picture description in English language: Example from Participant 1

*P: It is a family, who has come for a picnic. It is some particular place. In this place, there is a guest place. In front of guest house, car will be parked. In front of that, one tree will be there. Under the tree they are sitting, may be husband and wife. Husband is reading, and wife is pouring the coffee or milk into the cup. There is one baby sleeping beside them. No it is the chappals of that man. The child is flying..... the kite. There will be a lake or pond. In that pond, the yacht will be moving, and also beside that child, one dog will be there. Two members are washing their cloths. And also one flag is there like in school..... No one lady she is pouring the coffee or tea into the cup so it is a picnic spot, she is listening to music also. In between them one bag/basket is there.*

Discourse sample of picture description in Kannada language: Example from Participant 1

*P: pravasakke bandidaare. ondu naayi ide. matte ella avara kelasaddali toDagiddare. appa amma avara kelasa maaDataa iddare. ondu huDuga gaaLi paTa haarisutta iddane. idu ondu citra ashTe. naahi nintide. ondu dvajaarooohaNa naDedide. aa pravasi taaNada munde ondu dvaja ide. aa ganDasu appa avana cappal biTTu caape mele kuuttiddare. hengasu kaafi baeraesutta iddare. ondu buTTi ide avara munde, ivaru ondu doDDa marada keLagaDe kuLitu vishranti paDedu koLLutta iddare. alli haaDu keLutta iddare. ivaru kaarinalli bandu kaarannu pravaasi gruhadalli nillisiddare. pakkadalli ondu samudra atava nadi ide. alli ondu dooNi ide. pakkadali jana eno baTTe hogeyutta kelasa maaDutta iddare. (They have come for a picnic. One dog is there and all are involved in their work. Dad and mom are doing their work. One boy is playing with kite. This is one picture that is all. Dog is standing. One flag hoisting is done. aa.. in front of the guest house flag is there. That men dad has left his chappal and is sitting on the mat. A woman is preparing coffee. One basket is there in front of them. They are sitting under a big tree and taking rest. There they are listening to music. They have come by a car and car is parked in the guest house. Near by there is sea or river. There one boat is there. Near by some people are washing their cloths and doing some work.)*

#### 5.1.3.2.2 Neurotypical adult group.

There was no significant difference between L1 and L2 for all the sub parameters of propositional and non-propositional aspects. But, based on the observation of raw scores the sub parameter 'extra elaboration of topic' only showed a difference between (Kannada and English) languages. Only two participants showed this particular parameter in their discourse of Kannada language compared to English language. The reason for this could be the influence of Kannada as their native language.

#### 5.1.3.3 Step III- Summary.

There is a dearth of studies which finds difference between propositional and non-propositional aspects of discourse. Since, this is an initial attempt in literature which

finds the difference between propositional and non-propositional (total) aspects of discourse, the discussion done before at the level of all the individual parameters under qualitative “Discourse Analysis Scale-picture description” holds good for the same context. Finally, there was a significant interaction between groups for the sub level propositional and non-propositional aspects of DAS and between languages there was interaction only for the sub level non-propositional aspect of DAS and there was interaction between groups and languages only for the sub level non-propositional aspects of DAS. By considering the mean scores of discourse in Kannada and English language, the TBI group performed poorer than NTA group in these two languages. Hence this can be used as a reference to differentiate TBI group from the NTA group and infer better performance in English language compared to Kannada language.

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## 5.2 Section B

### 5.2.1 Sub-section I- Conversation.

The conversational discourse abilities of all the participants were quantitatively analyzed using T-unit analysis. The results suggested that Group I (TBI) made significantly more discourse deficits than Group II (NTA). The conversational measures selected for sentence production were the total number of clauses and subordinate clauses. The use of T-unit based analysis permitted the experimenter to assess the thematic level of a given topic and the sentence-level grammatical ability as well as intersentential cohesion. Thus, one can infer the cognitive abilities underlying the organization and production of utterances in various tasks. All the parameters (NTU, NWPTU, NC and NWPC) of T-units were calculated from the conversation genre of about 10-15 minutes duration. The two groups, TBI and NTA were compared between each other on Kannada and English language discourse samples on all the parameters (NTU, NWPTU, NC and NWPC) of T-unit based analysis.

The between group comparison revealed poor performance of TBI as compared to NTA in both Kannada and English languages. The results of the statistical analysis showed a significant difference for the parameter NWPTU and NC suggesting the inadequate representation of discourse in the TBI compared to NTA. TBI participants used lesser number of words as compared to participants in the neuro-typical adult group.

All the participants used the same number of T-units (NTU) during their discourse elicitation time. Thus, the T-unit analysis at thematic level inferred that all the participants were within the given topic during the conversation and could maintain the theme. But all the TBI participants used a lesser number of propositions in their discourse in English language compared to Kannada language. This accounted for less discourse output in TBI as compared to NTA in both the languages. Although there was some content in their speech, they lacked the ability to produce adequate information in terms of better planning and organization required to complete the topic of conversation. This is in agreement with Wyckoff's (1984) study on the CHI subjects. These subjects were noted to use significantly fewer cohesive ties per communication unit (roughly equivalent to a T-unit) than the normal controls in both

the narrative and procedural discourse tasks. This finding was felt to provide evidence that their discourse lacked continuity. However, Liles, Coelho, Duffy and Zalagens (1989) had reported that the number of cohesive ties (per T-unit) produced by their CHI subjects was same as the normal subjects for both story generation and story retelling. Thus, both the groups were able to talk at sentential level and intersentential level on all the sub-topics related to the conversation which was provided by the experimenter.

The between language comparisons revealed that both TBI and NTA participants performed poorer in English language compared to Kannada language on all the measures of T-unit analysis and there was a significant difference for the parameter NC and NWPC. There were a few incomplete sentences in TBI participants' speech. Unlike English, while dividing clauses in Kannada, each sentence represented a clause in most of the conversation sample. But in English, some sentences were independent clauses and others dependent clauses. Thus, relatively there could be a difference in dividing clauses in each language itself. So the decreased statistical (mean) values for the parameters (NWPTU, NC and NWPC) at sentence level analysis of T-units in English language of TBI reflect their inability to convey the information in their speech. Finally, there was no significant interaction between languages and groups for any of the parameter of T-unit based analysis.

The better performance in Kannada language in both the groups may be because of the higher exposure to the topic of conversation (due to native language exposure, environmental factors like family and society) or simply the easy availability of immediately retrieved linguistic items after the trauma. The complexity, abstractness, and monitoring of the discourse are controlled centrally and may be impaired in individuals with brain damage. Coelho, Liles and Duffy (1995) and Godefroy (2003) linked these deficits to poor executive control suggesting a relationship between components of discourse and other aspects of resultant linguistic-cognitive functioning. Thus, the results of T-unit showed that the discourse production was more cognitively demanding for TBI, consequent to which they exhibited difficulty in formulating and sequencing sentences appropriate to the topic of conversation in comparison with NTA.

### **5.2.2 Sub section II- Narration.**

The narrative discourse abilities of all the participants were quantitatively analyzed using T-unit analysis. The two groups, TBI and NTA were compared within, and between each other on all the parameters of T-unit based analysis (NTU, NWPTU, NC and NWPC).

The between group comparison revealed poorer performance of TBI as compared to NTA in both Kannada and English languages. The differences were noted at both thematic level (NTU) and the sentential level (NWPTU, NC and NWPC) of T-unit analysis. This indicates that TBI participants were not able to maintain the theme, but were able to talk on the sub-topics related to the narration which was provided by the experimenter. Thus, they had extra elaboration in their talk which was non cohesive. In both the groups, Kannada language performance was better compared to English language as per the statistical (mean) values for the parameters NTU, NWPTU and NC and not for NWPC. Thus, the measure selected for sentence production was the total number of words per clauses, where this did not show any significant differences between the groups. This justification is in support with the between language comparison, where it was found that the differences were only at the sentential level and not at the thematic level of T-unit analysis.

The comparison between the groups within each Kannada and English language showed a significant difference for the parameters NTU, NWPTU, and NC in common. There is very little literature support, mainly done on children. Spontaneous narrative productions elicited from bilingual Spanish- and English speaking second-grade children using a wordless picture book were compared in each language for their proportion of grammatical T-units (Gutierrez-Clellen, 2002). Children demonstrated comparable grammaticality in both their Spanish and their English stories. Another study compared bilingual Spanish- and English-speaking 9- to 11-year-old children's linguistic encoding of mental states in their narrative retellings (Silliman, Huntley, Brea, Hnath-Chisolm & Mahecha, 2002). A variation in the amount and type of clauses used in encoding the mental states was attributed to the language of story retelling. Children used more clauses in Spanish, with more adverbial than nominal clauses. In English, children used more nominal clauses than adverbials, and children used relative clauses the least in both the languages. Evidence

from these studies demonstrate that bilingual children employ language-specific linguistic devices to formulate narratives in each of their languages, but are grammatical in each of their languages. So the diffuse injury to the brain areas controlling the thematic coherence in the TBI participants may have led to the differences in the parameters NTU, NWPTU and NC compared to the neuro-typical adult group in both the languages.

The effect of languages (Kannada vs English) within each group showed a significant difference for the parameters NTU, NWPTU, NC and NWPC in the TBI group and only NWPTU in the NTA group. In the TBI group, the parameter NTU, the thematic level of T-units analysis was more in Kannada language compared to English language. This was because, the Kannada language exposure and use is longer in duration (the frequency of use at residence or hospital and or/ intervention centres) compared to English. Although the L2 structures and vocabulary which are frequently accessed are more easily processed than those rarely utilized (Green, 1998), but these TBI participants were more comfortable with their L1. It might also be possible that they were exposed to either L1 or L2 residual after the trauma for easy communication. Since there will be a gap in usage of two languages immediately after the trauma or they might have used either one language which had made them to perform better in the more exposed language even though they had equal proficiency in both. Thus, in the present study it was observed that the maximum usage was Kannada compared to English language in spite of equal proficiency in both the languages. The TBI group produced a greater number of incomplete and inaccurate clauses, and less number of responses (in English compared to Kannada) that did not led to the expansion of the topics. They had very poor initiation skills. The narration task almost resembled an event related task because the experimenter had to prompt in sequences for organized responses on several instances and individuals with TBI answered to that particular sequence of event, lacking relevant elaborations. Another possible reason for the differences documented in discourse across languages may be due to both cultural and linguistic differences. For example, cultural differences in the expectation of performance may play a large role in the types of narratives that children produce because children learn from the narrative examples produced by their families and their culture (Gutierrez-Clellen, Peña, & Quinn, 1995; Minami &

McCabe, 1995; Melzi, 2000). In a study comparing the narrative elicitation style of Central American and European American mothers and their preschool children, Melzi (2000) found that the Central American mothers focused more on the conversational aspects of narration, whereas the European American mothers focused more on the structural and organizational aspects of their children's stories. The sociocultural role of stories and narrative style in U.S. Latino culture may vary from mainstream American culture, thereby influencing the kinds of stories children learn to tell.

The present study reports an average length of 36.8 and 29.1 clauses in the Kannada narration and 28.7 and 24.9 in English narration of NTA and TBI groups respectively. This result is in support with Hema and Shyamala (2011), where they found increased number of clauses in Kannada language compared to English language narration of normal adult bilinguals. Thus, the results indicate that the adult bilingual narrations are correlated with T-unit analysis, as well as richness and sophistication of vocabulary, narrative marking such as the use of the past tense in a sequence of individual events, cohesive devices such as the appropriate use of nouns and pronouns as referencing devices. The study identifies cross-linguistically common, possibly universal or quasi-universal features and linguistically or culturally specific features of good narration. It has been shown that in both Kannada and English, narrating an event is expected to be told in the past tense, and should be extensive and use a large number and variety of words.

In NTA group, the significant difference was seen only for the parameter NWPTU. This was because, the English language exposure and use is longer in duration (the frequency of use at residence or academic and/or professional environment) compared to Kannada. The L2 structures and vocabulary which are frequently accessed are more easily processed than those rarely utilized (Green, 1998). Thus, in the present situation the maximum usage is English compared to Kannada language.

On observation of the narrative task of the TBI groups. They had problem with the component functional elements of a narrative, which can be analyzed into two basic ones: referential are those elements that relate events to the listener and orient

him/her as to who and what was involved in those events and when and where they occurred; and the evaluative elements are those that demonstrate the specific perspective the narrator takes on the events. The other is referential elements provide the basic organizational structure of the narrative, in the form of different types of appendages introducing and ending the stories, complicating action and resolution (composed of the basic sequence of events that makes up the story), and orientation to characters, place and time. Thus, the TBI group did not follow the same pattern of narrative elements when compared to NTA group in both Kannada and English languages. It can be concluded that the problem could be only at the narrative element level and not at the language level. This could be probably because of equal language proficiency in the two languages in NTA and TBI group. However, it would be interesting to study these in bilingual speakers with unequal proficiency in the two languages.

Thus, to conclude about the selection of this particular task, a study by Griffith, Ripich and Dastoli (1986) reports that, static pictures used to elicit narration were not effective in eliciting information regarding a character's internal responses or intentions, and the information told to the listener will be limited. Personal narratives elicited as spontaneous stories yielded more clauses and subordination than did picture sequences (Klecan-Aker, Mc Ingvale & Swank, 1987). Therefore, one elicitation methodology may be better suited than another to provide an optimal context for particular features of narration. The topics of personal narratives may also have an effect on narrative performance. For instance, Peterson and McCabe (1983) examined length and complexity of personal narratives as related to the topic. Stories about trips, car accidents, hospitalizations, and pets yielded the longest and most complex narratives, whereas doctor visits and accidents in the home, such as spilling or breaking, yielded shorter and less complex stories. These studies demonstrate that the amount of contextual support provided by the elicitation procedure and the previous knowledge and experience with a topic will affect the complexity of the individual's narration. Any task should be of a timed and with standard stimulus (picture) may possibly rule out the extraneous variables and have predictable contents to make the task more equivalent among different participants with less transcription time. Thus, it may help in making differential diagnosis among the clinical population

and also to establish the normative data in discourse. All these possibilities are present in a picture description task. In the following section an attempt has been made to study the same.

### **5.2.3 Sub-section III- Picture description.**

The discourse abilities of all the participants were quantitatively analyzed using T-unit analysis. In this picture description task, there was a single theme “picnic spot scene”. This was inferred from the parameter NTU of T-unit based analysis. The two groups, TBI and NTA were compared within, and between each other on all the propositional parameters of T-unit based analysis (NWPTU, NC and NWPC). The between group comparison revealed poor performance of TBI as compared to NTA in both Kannada and English languages. The differences were noted at both thematic level (NTU) and the sentential level (NWPTU, NC and NWPC) of T-unit analysis. This indicates that TBI participants were not able to maintain the theme, but were able to talk on the items related to the picture stimuli, which was provided by the experimenter. Thus, they had incorrect information and related extra elaboration in their talk which was non cohesive to the main theme. This was only an observation made. At thematic level (parameter NTU) few (four participants) individuals with TBI had wrong interpretation of the picture stimulus as ‘village scene’, ‘school scene’ and ‘forest area’. Thus, only sentential level of T-unit analysis was considered and the objective value for the parameter NWPTU, NC and NWPC was considered for the statistical analysis to see the differences between the languages. In both the groups Kannada language performance was better compared to English language on the parameters NWPTU and NC and not for NWPC. Thus, the measure selected for sentence production was the total number of words per clauses, where this did not show any significant difference between the groups. This could be justified with the between language comparison, where it reveals that the differences were at the sentential level of T-unit analysis. But the extra observation suggests that the individuals with TBI exhibit difficulty primarily at the thematic level of T-unit analysis followed by sentential level.

### **5.2.4 Overall discussion of sub section I, II and III.**

Along with conversation task, narrative production tasks also tap the ability to integrate cues underlying the macrostructure (Tucker & Hanlon, 1998). Ulatowska,

Freedman-Stern, Doyle and Macaluso-Haynes (1983) noted that narration is a complex and critical communicative event. Narrative task is considered to fit within the realm of discourse, its monologue format does not allow for a re-creation of the conventions and subtleties of conversational exchange (Snow, Douglas, & Ponsford, 1999). Narration includes a different set of demands. As such, competences on a narration task do not imply competence in conversation. However, examining discourse production, especially through narrative production tasks, have shown to be especially sensitive to subtle language deficits (Tucker & Hanlon, 1998). In addition, Snow, Douglas and Ponsford (1999) have suggested that persons who demonstrate difficulty using the narrative genre will have difficulty reconstructing their own life experiences in order to share with others. Clark (1994) suggests that discourse, when viewed as a joint activity, also applies to single narration told to others by single narrators. Finally, narration tasks provide a controlled environment. As opposed to a more open-ended conversational analyses of discourse, an event narrative task is structured enough to sample the behaviours of interest and yet similar enough to discourse that takes place on a daily basis to elude the difficulties brought about by the use of more artificial tasks.

As mentioned earlier picture description remains one of the interesting and simplest of tasks to elicit a discourse sample that remains as a most commonly used task during diagnostic assessment. The brevity of discourse typically generated through picture descriptions has led to answer some research questions, whether such tasks elicit sufficient language and present great enough cognitive-linguistic challenges to reveal the language production abnormalities of adults with acquired brain injury. This has been justified, considering that the picture description task is having the added benefit of predictable content that yields relatively brief language samples within short duration and later it requires little time to transcribe, assess and infer the abstract information and efficiency of coherence among concrete items in the stimuli. Other way is use of a timed, standard picture stimulus, which may possibly rule out these extraneous variables and make the task more equivalent among different participants. Thus, it may help in making differential diagnosis among the clinical population and also to establish the normative data in discourse.



## **CHAPTER 6**

### **SUMMARY AND CONCLUSIONS**

The present study was aimed at investigating the discourse abilities in non-aphasic individuals with traumatic brain injury (TBI) compared to neuro-typical adults (NTA). There were certain objectives considered for the present study.

1. To investigate and compare discourse parameters of non-aphasic individuals with traumatic brain injury and neuro-typical adults on conversation, narration and picture description tasks.
2. To profile discourse parameters seen in non-aphasic individuals with traumatic brain injury in comparison with neuro-typical adults qualitatively and quantitatively.
3. To compare the discourse parameters in L1 (Kannada) and L2 (English) respectively in non-aphasic individuals with traumatic brain injury.

Studies related to individuals with traumatic brain injury in western and Indian scenario concentrated on measuring specific symptoms and characteristics in the same. There are very few studies which profile the entire discourse abilities in individuals with traumatic brain injury. And importantly, considering bilingualism and its effects on discourse abilities in this population is a first attempt in Indian context. Understanding the cognitive-communication impairment in individuals with traumatic brain injury is necessary to develop new approaches to diagnose and plan appropriate management strategies to help individuals with traumatic brain injury to maintain their communicative abilities despite their better talking abilities. Currently study focused on the profiling the discourse abilities in L1 (Kannada) and L2 (English) languages of non-aphasic individuals with traumatic brain injury ad compared to neuro-typical adults.

A standard group comparison was made by considering non-aphasic individuals with traumatic brain injury and neuro-typical adult (25-48 years) participants. A total of 40 individuals participated in the study which comprised of 20 non-aphasic individuals with traumatic brain injury (TBI) and 20 neuro-typical adults (NTA). All the participants had minimum of 10 years of formal education. They also

had vision and hearing acuity within normal limits and the handedness was right according to their self report. The clinical and non-clinical group participants were separated based on a set of criteria. General histories with demographic details were taken from all the participants along with the consent for agreeing to participate in the study. The Mini Mental Status Examination (MMSE, Folstein, Folstein, and McHugh, 1975) was used to screen any cognitive difficulties which would influence the communicative abilities of non-aphasic individuals with traumatic brain injury.

Data collection involved two parts. The first part was assessing language proficiency, cognitive screening to assess cognitive impairment and rule out the presence or absence of aphasia component in the participants using International Second Language Proficiency Rating Scales (ISLPR- Wylie & Ingram, 2006), Mini Mental Status Examination (MMSE, Folstein, Folstein & McHugh, 1975), Western Aphasia Battery (Shyamala & Ravikumar, 2008) respectively. The second part of data collection involved two phases: Phase-I to build rapport and Phase-II to obtain discourse samples of all the participants. Discourse genre considered was conversation, narration and picture description. A standard group comparison with two by two research design was used for the study.

Video recorded discourse genres were transcribed using IPA (International Phonetic Alphabets) symbols (Schiffman, 1979). The results obtain from discourse samples were subjected to the statistical analysis. The discourse samples were analyzed both qualitatively and quantitatively. Qualitative and quantitative analyses of the conversation, narration and picture description samples were performed using Discourse Analysis Scale (DAS) by Hema and Shyamala (2008) and T-unit analysis respectively. Each sample was rated by three judges including the experimenter. Inter-judge reliability was measured for qualitative and quantitative analysis using Cronbach's Alpha co-efficient. An experienced statistician conducted the analysis using SPSS 18 (Statistical Package for Social Science, 18<sup>th</sup> version).

The significant findings of the present study are discussed under two sections (A &B). Section A includes the performance of TBI and NTA on discourse tasks (conversation, narration and picture description) which are measured qualitatively using Discourse Analysis Scale (Hema & Shyamala, 2008). Following this

comparison is made between the L1 (Kannada) and L2 (English) language discourse samples. Section B includes the performance of TBI and NTA on the same discourse tasks which are measured quantitatively using T-unit based analysis. As in section A, a comparison is made between the L1 (Kannada) and L2 (English) language discourse samples.

To summarize the findings of the present study, in section A of results the qualitative discourse analysis of conversation, narration and picture description suggested that the TBI and NTA differed from each other on discourse structure, communication intent, coherence and few parameters of topic management and other discourse parameters of propositional aspects of discourse with TBI group performing poorer. In case of non-propositional aspects of discourse also there were differences only in few parameters of turn taking and use of conversational repair, which were found to be poorer in TBI group.

Individuals with traumatic brain injury group (TBI) have poorer forethoughts in conversation as compared to neuro-typical adult (NTA), thus reflecting the good discourse structure in neuro-typical adults. Only the NTA could act as an excellent converser and could follow all the rules in conversation, especially when the conversation was a semi-structured one while other contributing factors like personality variables besides vastness/specificity of topic may be contributing too. But the poor discourse structure in narration task may rely on a general impairment in the integration of ongoing information with the inferential cues derived from the situational context. The same TBI participants showed difficulties in integrating information in order to generate correct inferences from the picture and following this minimal elaboration was associated with inappropriate topic shift. There is a strong literature support for the poor coherence in the discourse of individuals with TBI. Considering the parameter of 'topic management' the literature has found that persons with TBI provide shorter discourse with lesser elaboration of a topic, more often leaving it to the communication partner to expand. In other discourse parameters, individuals with TBI did not show accurate message and adequate information with proper temporal causal relation in their conversation and narration compared to NTA. Thus, it is suggested that TBI participants might have redundancy, incoherence and

ambiguity in their speech, while not showing any speech fluency related disturbances under propositional aspects of discourse.

In non-propositional aspects of discourse, persons with TBI used non-contingent turns. The reason for this could be attributed to lack of perception of flow of conversation due to shifting attention and another reason could be the problem at local coherence. Thus, they were unable to comprehend some meanings of the sentence and in the same state started speaking on the topic without taking appropriate turns with the communication partner. Use of self repair through repetition and use of revision through clarifications were frequently seen in persons with TBI when compared to NTA because they failed to convey the message and the partner had to ask for more clarification. In narration task, for the TBI participants it was not the prestigious issue instead effective communication in any of the residual language. Thus, they had to use other initiated correction in Kannada as well as in English language compared to NTA group. In picture description task, while using self correction as a repair strategy the TBI participants used more repetitions and made an effort to use clarifications given by the investigator and tried using the same as revisions.

Language difference was not seen for all the parameters of propositional and non-propositional aspects of discourse analysis scale for conversation, narration and picture description tasks in NTA group since they had same proficiency for both the languages. But in case of the TBI group, the differences were seen at communication intent, topic management, coherence and other discourse parameters of propositional aspect of conversation, narration and picture description. Under non-propositional aspects, differences were seen at turn taking and use of repair strategies. The English language was the most frequently accessed language for any neuro-typical adults and since the TBI participants lack this English language exposure during their post morbid trauma duration, these participants acted as a persistent listener while speaking in English language. Thus, few TBI participants requested some prompts to initiate conversation and narration in English language compared to Kannada language. In picture description task, the TBI participants had to use more self correction repair strategies in first session of recording. While interpreting at second

time, the participants had asked assistance in understanding the picture and had a delayed response time, but there was a correct response.

The section B of the results provided information on the performance of persons with TBI on different discourse related tasks. The quantitative analysis of discourse genres detected subtle changes in communicative abilities between the groups in terms of complexity. The T-unit analysis at thematic level (NTU) inferred that all the participants were within the given topic during the conversation and maintained the theme. But all the participants with TBI used lesser number of propositions in their discourse in English compared to Kannada language. This accounted for lesser discourse output in TBI as compared to NTA in both the languages. Although there was some content in their speech, they lacked the ability to produce adequate information in terms of better planning and organization required to complete the topic of conversation. Thus, at the sentential level (NWPTU, NC and NWPC) of T-unit based analysis, there was a significant difference between TBI and NTA group in the two languages. In case of narration, the between group comparison revealed poor performance of TBI as compared to NTA in both Kannada and English languages. The differences were noted at both thematic level and the sentential level of T-unit analysis. This indicates that TBI participants were not able to maintain the theme, but were able to talk on the sub-topics related to the narration which was provided by the experimenter. Finally in the picture description task, TBI group performed poorer compared to NTA at both thematic and sentential level of T-unit based analysis in both the languages. Here few of the TBI participants failed to tell the correct gist of the picture and thus the sentences used to describe the picture were inaccurate. Thus, it was inferred that they had severe problem at both the thematic and sentential level of T-unit analysis.

Therefore, among the three elicitation methodologies (conversation, narration and picture description) any one or all the three methodologies may be better suited to provide an optimal context for particular features of discourse production. Thus, the present study demonstrates that the amount of contextual support provided by the elicitation procedure and the previous knowledge and experience with a topic will affect the complexity of the TBI individual's discourse production.

Language difference was not seen at thematic level but was present at sentential level where there was a difference between Kannada and English which can be attributed to factors like native language exposure and use, since this was immediately available and the individual could immediately retrieve the linguistic items in that language after the trauma, besides environmental factors such as supportive family and social milieu. One of the major reason could be the individual language structure itself. For example the agglutinative nature (each word may be a combination of several morphemes) of Kannada itself might have led participants to produce less number of words than in English. Hence while speaking in Kannada language, information can be conveyed with less number of words per T-unit, less number of clauses, less number of words per clauses. But, while speaking in English language, it required greater number of words per T-unit, greater number of clauses and greater number of words per clauses. Thus, the assessment should be done separately in both the languages.

### **Implications of the study**

The present study demonstrated two major implications, first in terms of research contributing to the existing knowledge about discourse and second is in terms of clinical implications in using discourse analysis in the field of diagnosis and rehabilitation of TBI.

The study employed three different tasks that revealed different effects. The discourse assessment should therefore be done separately for these three different discourse genres. Methodologically, discourse genre can be quantified using T-unit based measures. This method helps to divide the huge discourse sample into different chunks in terms of clauses. This helps the clinician or the researcher to identify the linguistic errors in the discourse and helps in tagging the same. This can be clinically helpful in assessment and rehabilitation of TBI.

Discourse analysis is a non-standardized assessment. Discourse analyses are time-consuming to perform but yield information regarding linguistic, cognitive, and social functioning that can be helpful in designing customized interventions for

individuals with TBI. This qualitative analysis of the discourse genre signifies, the role of speech-language pathologists in the identification, diagnosis, and treatment measures seen in literature of TBI and these are well documented in the present study.

Cognitive-communication problems create serious challenges to an individual's potential for social, vocational, and academic success. Therefore, management of individuals with TBI should incorporate assessment and treatment of discourse impairments. The study has provided examples at several instances for providing a clearer picture of the cognitive-linguistic difficulties which are experienced by individuals with TBI in an Indian context and highlight the role of speech-language pathologists to plan for the rehabilitation in an effective manner.

An important highlight from the present study is that bilinguals may have their advantage of L1 or L2 depending on certain factors like language exposure with their family, profession, world knowledge, prestigious issue and culture. In the present study individuals with TBI were able to cope better in L1 compared to L2.

The study has identified the relative importance of linguistic variables in discriminating persons with TBI from NTA. The outcome thus contributes to the pre-existing knowledge of the changes happening in persons with TBI with empirical evidence of subtle cognitive-linguistic changes in them. However, further research in this area, is necessary to explore specific type of deficits among various sites of lesions using other methods of discourse analysis.

### **Limitations and future recommendations**

The present study was limited to a small number (20 persons with TBI) of clinical participants which probably restricts the generalization of the findings. Owing to the small sample, the participants could not be matched for gender and site of injury with neuroimaging data which would have probably enhanced the sensitivity of the study. The study incorporated only spontaneous speech sample and hence further studies focusing on lexical related tasks with the restricted language environment may be further explored. The study could be replicated using other methods of discourse

analysis such as Computerized Language Analysis Program (CLAN), Systematic Analysis of Language Transcript (SALT), cohesion analysis, critical discourse analysis, socio-cognitive discourse analysis, etc. Further research investigating the way L1 and L2 of bilinguals' affects their linguistic performance across the life span will help in obtaining evidence based research findings for management of traumatically brain injured.



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**APPENDIX- A1****NIMH Socio-Economic Status Scale, Revised Version**

(Venkateshan, 2011)

<b>A.</b>	<b>Pooled Monthly Income</b>		<b>Score</b>
	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>B.</b>	<b>Highest Education</b>		<b>Score</b>
	1.	Illiterate	1
	2.	Primary/Secondary School	2
	3.	Matriculation	3
	4.	Graduation	4
	5.	Post Graduation & Above	5
<b>C.</b>	<b>Occupation</b>		<b>Score</b>
	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
<b>D.</b>	<b>Family Properties (Immovable &amp; Movable)</b>		<b>Score</b>
	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
	<b>Total</b>		

*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.

## APPENDIX-A

### Glasgow Coma Scale

(Jennet & Teasdale, 1981)

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Physical response	Coma Score	
<b>Best Eye Response</b>	No eye opening	1
	Eye opening to pain	2
	Eye opening to verbal command	3
	Eyes open spontaneously	4
<b>Best Verbal Response</b>	No verbal response	1
	Incomprehensible sounds	2
	Inappropriate words	3
	Confused	4
	Orientated	5
<b>Best Motor Response</b>	No motor response	1
	Extension to pain	2
	Flexion to pain	3
	Withdrawal from pain	4
	Localizing pain	5
	Obeys Commands	6

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*Note.* Interpretation: Mild= 13 to 15, Moderate Disability= 9 to 12, Severe Disability= 3 to 8.

## APPENDIX-B

### Neuroimaging results and GCS score of all the participants of clinical group (individuals with traumatic brain injury) at the time of recording

Sl no.	Age/sex	GCS score	Neuroimaging results
1.	25/M	15/15	Mild Cerebral Edema
2.	25/M	15/15	? Contusion
3.	25/M	15/15	Mild Cerebral Edema
4.	48/M	15/15	Mild Cerebral Edema
5.	30/M	15/15	Mild Cerebral Edema
6.	32/M	15/15	Mild Cerebral Edema
7.	25/M	15/15	Cerebral Edema
8.	33/M	15/15	Right periorbital and temporal soft tissue swelling
9.	26/M	15/15	Right frontal lobe contusion
10.	43/M	15/15	Right frontal lobe contusion
11.	43/M	15/15	Mild Cerebral Edema
12.	32/M	15/15	Left frontal lobe contusion
13.	30/M	15/15	Left periorbital soft tissue injury
14.	28/M	15/15	Mild Cerebral Edema
15.	25/M	15/15	Right frontal lobe contusion
16.	29/F	15/15	Mild Cerebral Edema
17.	42/M	15/15	Cerebral Edema
18.	28/M	15/15	Left parieto-occipital contusion
19.	28/M	15/15	Mild Cerebral Edema
20.	26/F	15/15	Mild Cerebral Edema

*Note.* GCS- Glasgow Coma Scale, M- Male, F- Female.



**APPENDIX- C**  
**All India Institute of Speech and Hearing, Naimisham**  
**Campus, Manasangothri, Mysore-570006.**

## CONSENT FORM

### Doctoral thesis on

Discourse Analysis in Kannada-English Bilingual Individuals with Traumatic Brain Injury

### **Information to the participants**

I, Ms. Hema N. have undertaken the research study entitled “**Discourse Analysis in Kannada-English Bilingual Individuals with Traumatic Brain Injury**” under the guidance of Dr. Shyamala K. C, Prof and Head, Dept. of Speech – Language Pathology, AIISH, Mysore – 6. The aim of the research is to study the discourse in terms of cognitive communication abilities in bilingual individuals with traumatic brain injury as compared to neuro-typical adults. I need to collect data from 20 individuals with traumatic brain injury. Information will be collected through an interview and audio & video recording for the duration of one hour each in one – two sittings. 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 identifying cognitive-communication deficits in individuals with traumatic brain injury and providing more information about management programs for discourse impairment.

### **Informed Consent**

I have been informed about the aims, objectives and the procedure of the study. The possible risks-benefits of myself participation as human subject in the study are clearly understood by me. I understand that I have a right to refuse participation as participant or withdraw my consent at any time without adversely affecting my/my ward’s treatment at AIISH. I am also aware that by subjecting to this investigation, I will have to give more time for assessments by the investigating team and that these assessments may not result in any benefits to me. I have the freedom to write to Chairman, AEC in case of any violation of these provisions without the danger of my being denied any rights to secure the clinical services at this institute.

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

Signature of participant/ care taker  
(Name and Address)

\_\_\_\_\_  
\_\_\_\_\_

Signature of investigator  
Date

**APPENDIX- D**

**General Information Sheet**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Age/Sex: \_\_\_\_\_ Date of birth: \_\_\_\_\_

Mother tongue: \_\_\_\_\_ Languages Known: \_\_\_\_\_

Bilingual: Yes/No \_\_\_\_\_ Medium of instruction: \_\_\_\_\_

Highest educational qualification: Graduation/Post Graduation

Handedness: Writing \_\_\_\_\_ Throwing \_\_\_\_\_ Drawing \_\_\_\_\_ Brushing \_\_\_\_\_

Occupation: \_\_\_\_\_

Present illness: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Investigations:

Date:

CT scan: \_\_\_\_\_

MRI: \_\_\_\_\_

EEG: \_\_\_\_\_

Others (vision or auditory etc): \_\_\_\_\_

Associated illness (depression, psychiatric disorders, aphasia, dysarthria etc): \_\_\_\_\_

Any others: \_\_\_\_\_

Diagnosis: \_\_\_\_\_

**APPENDIX- E**

**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- F**

**Mini-Mental State Exam**

(Folstein, Folstein & McHugh, 1975)

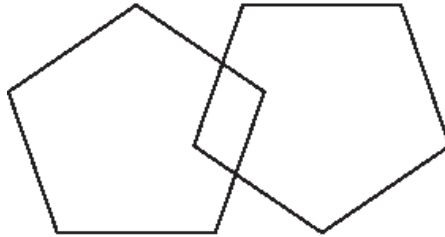
Patient \_\_\_\_\_ Age/Sex \_\_\_\_\_  
Date \_\_\_\_\_

*Maximum*      *Score*

- Orientation**
- 5      (   )      What is the (year) (season) (date) (day) (month)?
- 5      (   )      Where are we (state) (country) (town) (hospital) (floor)?
- Registration**
- 3      (   )      Name 3 objects: 1 second to say each. Then ask the patient all 3 after you have said them. Give 1 point for each correct answer.
- Then repeat them until he/she learns all 3. Count trials and record.
- Trials \_\_\_\_\_
- Attention and Calculation**
- 5      (   )      Serial 7's. 1 point for each correct answer. Stop after 5 answers.
- Alternatively spell "world" backward.
- Recall**
- 3      (   )      Ask for the 3 objects repeated above. Give 1 point for each correct answer.
- Language**
- 2      (   )      Name a pencil and watch.
- 1      (   )      Repeat the following "No ifs, ands, or buts"
- 3      (   )      Follow a 3-stage command:
- "Take a paper in your hand, fold it in half, and put it on the

floor.”

- 1 ( ) Read and obey the following: CLOSE YOUR EYES
- 1 ( ) Write a sentence.
- 1 ( ) Copy the design shown.



\_\_\_\_\_ **Total Score**

ASSESS level of consciousness along a continuum

\_\_\_\_\_

*Coma*

*Alert*

*Drowsy*

*Stupor*

**APPENDIX- G**

**International Second Language Proficiency Rating Scales**

(Wylie & Ingram, 2006)

<b>Score with level of proficiency</b>	<b>SPEAKING</b>	<b>LISTENING</b>	<b>READING</b>	<b>WRITING</b>
<b>0 Zero Proficiency</b>	I can't communicate anything at all in spoken Indonesian.	I can't understand anything at all when I hear Indonesian spoken, however familiar the topic may be, and however slowly and carefully the other person may speak.	I can't understand anything at all when I read the language, however familiar the topic, and however simple the text	I can't communicate anything at all in written Indonesian.
<b>0+ Formulaic proficiency</b>	I can communicate by using a limited range of simple stock Indonesian phrases I have learned.	I understand a limited range of short, simple things that I have often heard in Indonesian (e.g. basic personal questions, my own language teacher's basic classroom or tutorial	I recognise and understand a limited range of short, simple texts that I have often seen (eg the names of major cities, titles of familiar textbook, common street signs).	I can communicate by using a limited range of simple stock Indonesian phrases I have learned.

			instructions).		
<b>1-</b>	<b>Minimum 'creative' proficiency</b>	I communicate mainly with simple stock Indonesian phrases. I can be 'creative' (ie. say new things I have not learned as stock phrases) but any creative language consists of no more than, for example, a subject and verb with perhaps also an object or adverb, and I make many mistakes that most people have great trouble understanding unless the context makes it very predictable.	I understand a range of short, simple things that I have often heard in Indonesian. I can also understand some 'novel' (i.e. new to me) things in face-to-face situations, provided they are very short and simple (generally consisting of a single clause) and very predictable (e.g. answers to my own questions where the range of possible answers is very limited) and provided the other person uses gestures, and slow, careful speech, and is willing to re-word things in Indonesian to help me.	I recognise and understand a range of short, simple texts that I have often seen. I can get the essential information in some very simple 'novel' (ie. new to me) texts on very familiar topics provided they are very short (generally consisting of a single clause).	I communicate mainly with simple, stock Indonesian phrases I have memorised. I can be 'creative' (see SPEAKING) but any creative language consists of just, for example, a subject and verb with perhaps also an object or adverb. Even using a dictionary I make so many mistakes that most readers have great trouble working out what I want to convey unless the context makes it very predictable. I'm usually concentrating so much on the basic vocabulary that I can't worry about grammatical accuracy.
<b>1</b>	<b>Basic transactiona</b>	I can communicate my basic needs and basic factual	I understand very simple conversations in face-to-	I get the essential information in short, very	I can communicate my basic needs and basic

---

<b>I proficiency</b>	<p>information in situations or on topics that are very familiar (eg I can conduct basic shopping transactions and outline such things as how long and where I have learned Indonesian). I can maintain a very simple conversation (satisfying minimum courtesy requirements) with a simple series of exchanges, using complete, though very simple sentences (generally consisting of a single clause). I make a lot of mistakes and I may have to repeat myself often to be understood.</p>	<p>face situations with a background speaker of Indonesian, provided the topics are very familiar or have direct relevance to me (e.g. how long and where I have studied the language) and provided the other person uses simple sentences, speaks slowly and repeats or re-words things in Indonesian to help me.</p>	<p>simple 'novel' texts (eg. notices and or advertisements for familiar events or products). I can follow short, very simple instructions (eg consisting of a set of several single-clause sentences) about things I am familiar with. I am lost with longer, more complicated text on less familiar topics.</p>	<p>factual information about very familiar things to a background speaker who is sympathetic and/or experienced in communicating with beginning learners of Indonesian. I can use complete, though very simple, sentences (generally consisting of a single clause). When I need to use more than one sentence to convey a message, I can't make links between the ideas in these sentences through language (with words such as 'however' or 'therefore') so I rely on the reader's knowledge of the context and ability to 'read between the lines'. Even using a dictionary I make a lot of mistakes, but I generally</p>
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					get my meaning across if the reader has good will and patience.
<b>1+</b>	<b>Transactional Proficiency</b>	I speak Indonesian well enough to take part in simple social conversations in face-to-face situations with a background speaker. My language is 'creative' enough (see above) to allow me to interact as an individual, and complex enough to convey my simple opinions about familiar matters. I make a lot of mistakes and I often have great trouble coming up with the vocabulary and structures I need. I make mistakes in grammar, particularly when I am trying to express more complex ideas (e.g. with an 'if' clause).	I understand simple conversations in face-to-face situations with a background speaker of Indonesian provided the topics are familiar or of particular interest to me. I can follow some complex sentences (e.g. with an 'if' or 'because' clause) provided the other person is willing to speak slowly and carefully. I understand just isolated bits of very simple news stories on Indonesian TV or radio.	I get the essential information in simple texts on familiar topics where the meaning is clearly spelled out or where they are fairly predictable (eg circulars about routine events or simple personal notes addressed to me). If the notes are handwritten, the style of handwriting must be one I am familiar with, and the writing neat. I can understand some complex sentences (eg with an 'if' or 'because' clause.). I can follow short, very simple instructions (eg consisting of a set of several single-clause sentences) about things I am familiar with. I	I can write Indonesian well enough to conduct simple social correspondence with background speaking friends and to describe myself to a stranger such as a member of the community who has volunteered to be a language partner. My language is 'creative' enough (see SPEAKING) to allow me to interact as an individual, and complex enough to convey my simple opinions about familiar matters. Even if I use a dictionary, however, I make a lot of mistakes, particularly when I try to express more complex

				am lost with longer, more complicated texts on less familiar topics.	things (e.g. with an 'if' clause) but I generally get my ideas across.
2	<b>Basic social proficiency</b>	I speak Indonesian well enough to take part in face-to-face conversations with a number of background speakers and in telephone conversations describing familiar things and relating familiar events, and conveying my opinions fairly precisely 'off the cuff'. I use a range of complex sentences (eg with an 'if and 'because'). I often have trouble coming up with the vocabulary I need. I get frustrated in conversations about complex or abstract issues, because I can't express the things I want to, and I worry that other people may think I am ignorant. I use a variety of constructions with clauses but I make	I understand when I am participating in conversations with background speakers of Indonesian (face-to-face or on the telephone) about topics that are familiar or of interest to me. If I am not a participant in a conversation (e.g. when I overhear people talking on a bus), I generally understand very little. I can get the main ideas of very simple news stories on Indonesian TV and radio on general (e.g. human-interest) topics, provided the newsreader is speaking relatively slowly.	I get the essential information in simple texts on familiar topics (eg short, simple human interest stories from a daily paper and personal letters to me about everyday events). Handwriting must be in a standard style and neat. I may need to use a dictionary to help with unfamiliar key items.	I can write Indonesian well enough to describe familiar things, relate familiar matters and to convey my opinions about them fairly precisely 'off the cuff'. I use a range of complex sentences (eg, with 'if' and 'because'). Even using a dictionary I make a lot of mistakes but I generally get my ideas across. I have limited ability to tailor my language as outlined below.

		mistakes in grammar, particularly when I am trying to express more complex ideas (e.g. with an ‘unless’ clause). Beyond basic courtesy forms I have limited ability to tailor my language as outlined below.			
<b>2+</b>	<b>Social proficiency</b>	I am midway between the description above and the one below.	I am midway between the description above and the one below.	I am midway between the description above and the one below.	I am midway between the description above and the one below.
<b>3</b>	<b>Basic vocational proficiency</b>	I can speak Indonesian well enough to substantiate my own and discuss other people’s opinions effectively in conversations or unprepared monologues, although I can’t pursue my ‘argument’ to great depths. I make mistakes, though these rarely confuse or amuse the listener. In familiar situations I can generally tailor what I say and how I say it to considerations such as the formality of the	I understand almost everything when I am participating in social conversations with background speakers of Indonesian on fairly complex and abstract topics (e.g. the extent to which a government should subsidise sporting activities). I can generally follow a conversation I overhear between background speakers (e.g.	I get the essential information from straightforward texts such as general news stories in the daily paper and semi-technical texts in familiar fields (eg middle school text books in a subject I am interested in). I don’t need a dictionary unless I want a full understanding of these (eg to do a translation). I can read short popular novels for enjoyment,	I can write Indonesian well enough to substantiate my own opinion and to discuss other peoples’ opinions, though I can’t pursue my ‘argument’ in great depth. Readers generally follow the development of my reasoning, though it may seem quite ‘second-language’ in its organisation. Even when I use a dictionary I make mistakes, but these rarely



		occasion and whether the person I am talking to is older or younger than me, though I can't always come up with the appropriate vocabulary or structure.	on a bus) even though I can't understand some things that they say. I can use the telephone for most purposes and I understand most TV and radio news stories.	although I need a lot more time than a similarly educated background speaker.	confuse or amuse the reader. In familiar situations I can tailor what I write and how I write it to considerations such as the intended audience, my purpose in writing, and the type of text.
3+	<b>Basic vocational proficiency plus</b>	I am midway between the description above and the one below.	I am midway between the description above and the one below.	I am midway between the description above and the one below.	I am midway between the description above and the one below.
4	<b>Vocational proficiency</b>	I can operate effectively in complex in-depth discussions or monologues in social and academic or work situations. My language is mostly accurate, fluent and appropriate to the situation. Someone might think I was a background speaker for a few moments, but they wouldn't be fooled for long.	I understand most things in the language, even things as difficult as complex radio documentaries with fast speech. However I tend to miss subtle plays on words or references to 'deep' aspects of the culture. I have difficulty with some accents.	I generally understand quite complex texts (eg editorials in an 'intellectual' newspaper and very detailed articles in my own field of interest) although I miss subtle plays on word or references to 'deep' aspects of culture. I read these texts nearly as fast as a similarly educated background speaker does. I	I can write texts as complex as a major project report or a senior school history assignment. My language is mostly accurate and appropriate. Someone might think I was a background speaker after reading a few sentences but they wouldn't be fooled for long.

				cope with most forms of print and handwriting	
<b>4+</b>	<b>Advanced vocational proficiency</b>	I am midway between the description above and the one below.	I am midway between the description above and the one below.	I am midway between the description above and the one below.	I am midway between the description above and the one below.
<b>5</b>	<b>Native-like proficiency</b>	I speak the language just as well as similarly educated background speakers do. There is nothing about the way I speak that suggests that I am not a background speaker.	I understand the spoken Indonesian language just as well as similarly educated background speakers do. I understand subtleties and cultural references just as well as they do, and cope just as well when people speak very fast, mumble or have a heavy, unfamiliar accent, or when there is severe interference from background noises.	I understand the written language just as well as similarly educated background speakers do. I understand subtleties and cultural references and cope with non-standard or untidy handwriting just as well as they do.	I write the language just as well as similarly educated background speakers do. If I make any mistakes, they are the sorts of mistakes that such background speakers make.

## APPENDIX- H

### Western Aphasia Battery

(Shyamala & Ravikumar, 2008)

#### I. Spontaneous Speech

1. How are you today?
2. Have you been here before?
3. What is your name?
4. What is your address?
5. What is your occupation?
6. Tell me a little about why you are here? Or what seems to be the trouble?
7. Description of picture.

#### II. Auditory Verbal Comprehension

##### A. Yes/No Questions

	Verbal	Gestural	Eye Blink
1. Is your name Kuppa swampy? (“no” should be correct)			
2. Is your name Rama Krishna? (“no” should be correct)			
3. Is your name _____?			
4. Do you live in Bangalore? (“no” should be correct)			
5. Do you live in _____?			
6. Do you live in Calcutta? (“no” should be correct)			
7. Are you a man/woman? (“yes” should be correct)			
8. Are you a Doctor? (“no” should be correct)			
9. Am I a man/women? (“yes” should be correct)			
10. Are the lights on in this room? (“yes” should be correct)			
11. Is the door closed? (“yes” should be correct)			
12. Is this a hotel?			

13. Is this \_\_\_\_\_?
  14. Are you wearing red dhoti? (“no” should be correct)
  15. Will paper burn in fire?
  16. Does March come before June?
  17. Do you eat a banana before you peel it?
  18. Does it rain in July?
  19. Is a horse larger than a dog?
  20. Do you cut the grass with an axe?
- 

B. Auditory Word Recognition

Real objects	Drawn objects	Forms	Letters	Numbers
Cup	Matches	Square	J	5
Matches	Cup	Triangle	P	61
Pencil	Comb	Circle	B	500
Flower	Knife	Arrow	K	1867
Comb	Pencil	Cross	M	32
Knife	Flower	Half Moon	D	5000

Colors	Furniture	Body parts	Fingers	Right-Left
Blue	Window	Ear	Thumb	Right shoulder
Brown	Chair	Nose	Ring Finger	Left knee
Red	Desk	Eye	Index Finger	Left ankle
Green	Light	Chest	Little Finger	Right thigh
Yellow	Door	Neck	Middle Finger	Left Elbow
Black	Ceiling	Fore head	Right Ear	Right cheek

Sequential Command

	Score
1. Raise your hand.	2
2. Shut your eyes.	2
3. Point to the chair.	2
4. Point to the window, then to the door.	4
5. Point to the pen and the book.	4
6. Point to the pen with the book.	8
7. Point to the comb with the pen.	8
8. With the book point to the comb.	8
9. Put the pen on top of the book the give it to me.	14

10. Put the comb on the other side of the pen and turn over the book.

20

### III. Repetition

	Maximum score
1. Hand	2
2. Nose	2
3. Bed	2
4. Window	2
5. Banana	2
6. Rain bow	4
7. Forty five	4
8. Ninety-five percent	6
9. Sixty-two and a half.	10
10. The farmer is ploughing.	8
11. He is not coming back.	10
12. All that glitters is not gold.	10
13. First Indian Field Army.	8
14. No ifs, ands or buts.	10
15. Load my cart with five dozen bags of white wheat.	20

### IV. Naming

#### A. Object naming

Stimulus	Response	Tactile cues	Phonemic cue	Score
Paise				
Ball				
Knife				
Cup				
Safety pin				
Mirror				
Tooth brush				
Book				
Lock				
Pencil				
Scissors				
Key				
Needle				
Bangle				
Comb				

Watch  
Spoon  
Flower  
Plate  
Matches

---

#### B. Word Fluency

Ask the patient to name as many animals as he or she can in 1 minute. The patient may be helped if hesitant; “Think of a domestic animal, like the horse, or a wild animal, like the tiger”. The patient may be prompted at 30 seconds. Score 1 point for each animal named (except for those in the example), even if distorted by literal paraphasia.

#### C. Sentence Completion

1. The grass is \_\_\_\_\_ (green)
2. Sugar is \_\_\_\_\_ (sweet or white)
3. Roses are red, Jasmines are \_\_\_\_\_ (White)
4. They fought like cats and \_\_\_\_\_ (dogs)
5. Indian Independence day is in the month of \_\_\_\_\_ (August)

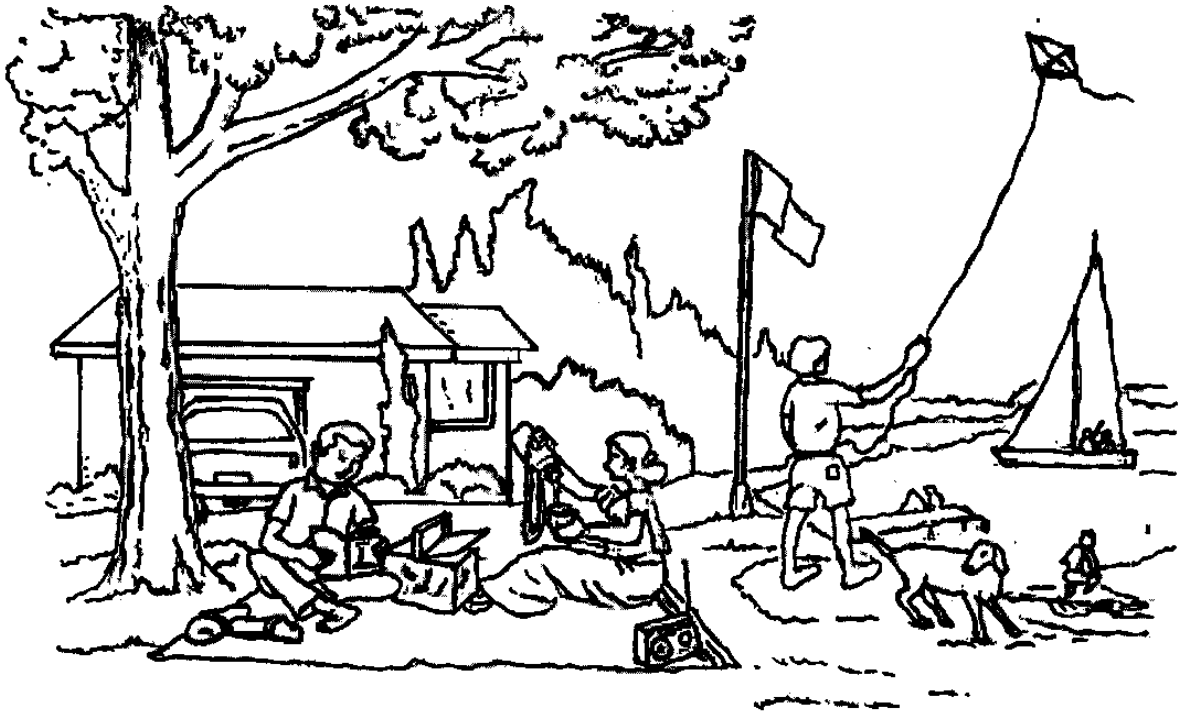
#### D. Responsive Speech

1. What do you write with? (pen, pencil)
2. What color is Milk? (white)
3. How many days are in a week? (seven)
4. Where do doctors work? (hospital)
5. Where can you get stamps? (post office, variety store)

APPENDIX- I

Picture Description Task stimuli - picture card from Western Aphasia Battery

(Shyamala & Ravikumar, 2008)



## APPENDIX-J

Conversation, narration and picture description discourse samples of a single participant from neuro-typical adult group.

### **1. Single participant's conversational discourse sample in English language on a topic 'My country India'**

*Investigator:* Can I know your name?

*Participant:* My name is Vani.

*Investigator:* So we are here to speak on a topic called India. What do you say about India?

*Participant:* India is a beautiful country, with diversified culture and landscapes both. We have a stunning snow cap mountains, in the Himalayas, and down comes the magnificent sea. There are so many languages, and so many religions, still it is so nice, that we have peace. Even having all the religions and cultural issue, still we have peace in our country. In languages, it is very nice, to know that we have Kannada, Tamil, Telugu, Malayalam, Hindi, Bojpuri, Gujarathi, and Punjabi etc. All the culture has its own significance in it. It is very nice, to know that, now globalization has become one thing, where all people from all the different states are in all the states. It is becoming nice, to know the culture of all other people. It is not like, Kannada people only stay in Karnataka; it is like, that all from north is coming to south, because of IT. Thanks to IT, and all other Industrial things. It has become, like people are coming to know each other very nicely.

*Investigator:* K this was about the culture. What do you say about the politics in India?

*Participant:* Our political system is also stable. Because in these recession time all other countries are getting so panic, due to these things. But in India, it is stable, because of our nationalized banks. Thanks to them, and even with all the political corruptions and everything, still India is stable, and having a peaceful life. We can know that, if we go to other country, and come back to India, then we will know the value of our country. Then only we can know that. It is true. Because I was there, Qatar and Bernie in Gulf, from there, I came to know our country is the best.

*Investigator:* K our country is the best. What do you say about the education system in India?

*Participant:* Education system is very nice, because of that only, we can have a stable thing in the country, and otherwise we could not have that. We have good education now, because of MBA, IT, and everything, all higher education, the people thinking level is



very high. It is proved everywhere in the world, Indians are high. May be they are in that country, and become a citizen there, but still the origin is from Indians. They are very intellectual people. From that, we can make out that our education system is very nice.

*Investigator:* What do you say about the famous places in India?

*Participant:* We are very very rich in that, the landscapes and the places like in Maharashtra, we have the sea and Bollywood. Bollywood has made all the things very beautiful, no need to go to all other foreign places. From there, they have shouted, all the places which are very nice. Even in AndhraPradesh, in Hyderabad is famous for pearls, and again for Husain Sagar Lake, and the statue of Buddha is there. And even in Tirupathi. If it comes to religious, we can go to Tirupathi, Madras/Chennai, and the temples sculptures are very famous here. Again Karnataka is famous for Belur and Halebidu all those things. For temples and structure Khajuraho, and sun temple in Orissa, Jaganath temple. Like that, wherever you name, we have a special thing in that. In India, small villages also you can see so many things. Every place we don't have that much time to live, and see these places in India. We don't have that much time, to see all the places in India.

*Investigator:* What do you say about the politics in India?

*Participant:* It is corrupted, but it is not so corrupted, that we can't take the country forward. There are people, who are struggling, to take back that, and make the country better. That's why; we are in the 3<sup>rd</sup>, or 2<sup>nd</sup> place in the fastest developing countries. That's why, our things are stable, even in this recession, there is so big problem in the world, because of globalisation and everything. But India is peaceful, and having a stable state. We are not in any emergency situation. It is stable. Overall I am very proud to say that I am an India.

## **2. Single participant's narrative discourse sample in English language on a topic 'Journey to a Place'**

1. At present I am at the institute. I will have to travel to Bangalore tomorrow so I have to take permission for that, since I have to apply for leave. So, once I get the permission I will go home and pack whatever is necessary. Since I will be staying in Bangalore for at least 2 to 3 days, I need to pack cloths and other necessary things. Then I should finish all the work by evening itself. So since, I have to start, early morning tomorrow. So, since I have to travel early morning tomorrow I have to sleep early tonight.
2. Once I am planning to get up around 5:30, so, I have to catch a bus at around 6:30 and once I get up, I will quickly get ready. I will take my stuff, since I would have already finished packing. Then I will start at around 6 'o' clock and I will catch an auto to the bus stand.
3. Once I reach the bus stand. I will go to the ticket counter. I will buy the ticket and I will wait for my bus.
4. I would have taken something to eat before it and some books to read on the way and some music to listen so I won't feel bored during the journey. Hopefully, the journey will be around two and half to three hours.
5. And once I get on to the bus. I hopeful to find a comfortable seat and then comfortable seat, in the sense it should be in the front not too back, because if it is in the back the journey will be very terror-some, since the roads are bad, so then I am also hoping to find a seat beside a window.
6. So then, I will again buy something on the way then once the journey begins. I am hopeful that journey will be smooth. There won't be any bus breakdown because I want to reach early.
7. Then I will, since, I would have taken my books I have stuff to eat. Once I start my journey, I will have to usually look out of window, and since I have already got books to read, music to listen I won't be bored. I will have to listen to music and read books and in between when I feel hungry I will eat something probably, I would have got some chocolates, bread, and jam.
8. By that time and they will also give a break in between/stops, since I will be sitting for almost one and half hours, I would go down and take a walk and then come back.
9. Once the journey starts again and throughout the way, probably I will speak to the person next to me to just pass the time, then if there is a TV in the bus I would watch movie.
10. Then by doing all these the time passes very quickly and I will reach Bangalore by around 9:30 if possible 9.

### **3. Single participant's picture description discourse sample in English language on a topic 'Picnic spot'**

This picture depicts a picnic scene. It looks like a family of three, have come out for an outing. It is an outdoors. It looks like there is mother, father and their son. They have come by car, and they also have a small house. Mother and father are sitting, under a tree, with a picnic basket. So they are relaxing. Mother is preparing coffee, and then the child is a boy, he is flying kite, near the shore of the sea. It looks like a sea shore. There are boats sailing. They also have a dog, so the dog is there. There is a flag pole, in front of the house. So it looks like, it's a bright sunny and pleasant day for their out. They have come by a car. They also have the music system. They are sitting under the tree, on the mat. There is also just a man, very far of, who is fishing.

## I PA SYMBOLS

(Ref : Schiffman, H., 1979)

ಅ	ಆ	ಇ	ಈ	ಉ	ಊ	ಎ	ಏ	ಒ	ಓ	ಔ	ಃ
a	aa	i	ii	u	uu	e	ee	o	oo	ou	ai
ಕ	ಖ	ಗ	ಘ	ಙ							
k	kh	g	gh	n							
ಚ	ಛ	ಜ	ಝ	ಞ							
c	ch	j	jh	n							
ಟ	ಠ	ಡ	ಢ	ಣ							
T	Th	D	Dh	N							
ತ	ಥ	ದ	ಧ	ನ							
t	th	d	dh	n							
ಪ	ಫ	ಬ	ಭ	ಮ							
p	ph	b	bh	m							
ಯ	ರ	ಲ	ವ	ಶ	ಷ	ಸ	ಹ	ಳ			
y	r	l	v	sh	S	s	h	L			

**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 advances 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

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

**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

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

**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)**





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

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

## APPENDIX –M1

Conversational discourse sample in Kannada language- Example from TBI participant 3 with poor discourse structure.

*I: nimma hesaru? (What is your name?)*

*P: naviin raaj. (Naveen Raj)*

*I: naviin raaj, eenu kelasa maaDtiiraa?(Naveen Raj. What are you doing?)*

*P: Lecturer aagi.(Lecturer)*

*I: Lecturer aagi kelasa maaDtiira. sari iivaaga naavu kuutukonDirodu bhaarata annoo ondu vishayada bagge maataaDooNa anta. bhaaratada bagge eenu anninutte niimage? (You are working as lecturer. K as you know we are here to speak on a topic called India. What your opinion about India?)*

*P: bhaarata iiga Develap aagtaaroo deesha. a idu innuu beLi beeku. eekendre yaavude ondu vishayadalladaruu modalu naavu horadeeshadinda tiLkonDre tiLkonDu maaDoodakinta naavee modalu yaavudu ondu idanna beLavaNigeyannu maaDabeeku. (India is a developing country. This should grow even more. Because if we consider consider any matter, it is better to do some progressive thing instead of just speaking about it.*

*I: sari aa illina raajakiiya vyavasthe bagge eenu heeLtiiraa. (K what do you say about the politics in India?)*

*P: raajakiiya eenappa heeLtaare. aa raajakiiyadalli namage tumba idu ide. namage yaaruu ishTTa illa eenandare raajakiiyadalli eenu naDeyutte anta ondu saamaanya janakke tiLiyoodilla. iiga ondu udaaharaNe andare iiga dine dine ii peTrol bele eertta ide a peTrol bele eertta ide anta barutte Tivili ashTu nooDkootivi. naavu adakke bele koDtiivi. eeride anta biTTu yaakinge aagutta ide andu biTTu naavu saamaanya janakke tiLkoLokke aagtaane illa. adu ellaaru eeLtaare. (What do you say about politics. About politics I have this something. I don't like anybody in this. You know what happens in politics the local people will not know. Now if you take for example, now day by day petrol rates are increasing. Petrol rate is increasing. This comes in TV and we all just watch that and we respect it. Why it is increasing, the reason is not know to us. We common people, this all will say. )*

*I: sari inneenaadru heeLabahudaa? yaava riiti adanna sari paDisabahudu. (K anything else you say? How can we rectify this problem?)*

*P: eenendre raajakiiyadalli iiga bi.je.pi. sarakaara bantu. aa yaDayuurappa barii avara idanne beLesi koLLutaare. iiga naaLe dina gouda idu barabahudu aaga bandaaga gowDru beLeyoodu. naanu adaralli obba aagirabahudu aadruee gowDrudu bandaaga avaranne beLesuttare. andare adu ishTa aagalla raajakiiya andre ashTe ashTe be. (In politics BJP is now in position, Yadiyurappa just looks other himself. Tomorrow gowda rule might come. That time gowda*

*people will improve. I may be one among them. But when they come to rule they improve themselves but this is not good. Politics means that's all that's all.)*

*I: sari illina shikshaNada vyavaste bagge eenu heeLtiiraa? (K what do you say about the education system in India?)*

*P: shikshaNada vyavaste adu cennagide. eekendare nammalli iivaaga yaaru madyama varga jana irtaare saamaanya janakinta meelpaTTavaru maatra oLLe oodtaare. avaru maatra horagaDe hoogtaare. avarige kelasa sigutte. iivaaga 70% sarakaari shaaleyalli sigutte. adare sarakaari shaalenalli ai.si.es.i, senTral silabas eeneenide aduu adee taraha vishaya iduu avarige buddishakti cennagi aagabeku irabeku illadiddare avarige sarakaaradallii eeneenu bisi uuTa annoodantaa.....nanage adalla oLLe shikshaNa sigabeeku. allu cennagi irabeku. (Education system this is good. Here people who belong to middle class and people who are above this class only can take good education. Only these people go abroad. They get job. Now 70% education is taken from government school. But in government school there will be ICSC syllabus central syllabus. I don't like getting hot meals in the school. This is not the good education system. But getting CBSC syllabus should give them lot of intelligence. That will be a good education.)*

*I: adee innu cennaagi aagabeeku. (That only should be good)*

*P: adee innu cennaagi aagabeeku. (That only should be good)*

*I: illivareguu cennagi iroodu eenide? (Till now what is good)*

*P:cennagi iroodu andare. (Good means what)*

*I: beere deeshakke hoolisidare nammadu shikshaNada vyavaste eenu cennaagi iddiya? (If we compare with the other country how is the education system in our country?)*

*P: kalcar tumba cennaagi ide. (Culture is too good)*

*I: shikshaNada vyavasteyalli?( In education?)*

*P: shikshaNada vyavasteyalli eenendare tumba cennaagi eenendare avaruu oodi beereekaDe hoogoo opsan ide. nammalli kaLuhisikoDooke svalpa sarakaara sahaya maaDutte. (In education system what I say, it is good what I say is they take good education and has more option to go out. To send abroad our government should help.*

*I: sari. (K)*

*P: adu nanage cennaagide. (It is good for me.)*

*I: sari adu biTre iiga samskruti bagge eenu heeLtiiraa?(K leaving that apart. What do you say about the culture?)*

*P: samskruti andare bhaaratada samskruti tumba cennaagi ide. habba naavu aacarisutteve bere ella hoolisikonDre. naavu tumba cennaagide nammadu idu maaDoodu aa.... Culture means, Indian culture is too good. We celebrate festivals if we compare other things. We are too good that what we all do.)*

*I: yaava riiti cennaagide? (How it is good?)*

*P: aa samskruti tumba cennaagide avaru idu habbagaLannu acarisoodu matte gouravisoodu adellaa naan heeLbeekaadre uDuge toDugegaLu adu beere deeshakke hoolisidre nammadu tumbaa cennagide. (a culture is too good. They all celebrating festivals and respecting this all if I have to say. If we compare to other country our dressing style is too good.*

*I: ashTeena? (That's all?)*

*P: ashTe. (That's all.)*

*I: sari prasiddiyaagi ro staLagaLu yaavudu.?(K which are the famous places?)*

*P: dellina hoolisikonDre raashTrapati bhavana. aagabahudu aa matte ii agraadallina taajmahal aagabahudu. (If we compare to Delhi it can be Rashtrapathi Bavan, then the Taj Mahal of Agra.*

*I: ashTeena? (That's it?)*

*P: ashTe. (That's all)*

*Note: The discourse structure is very poor in terms of poor planning and organization compared to the discourse structure of neuro-typical adults (Appendix J).*

Conversational discourse sample in English language- Example from TBI participant 10

*I: We are here to talk on a topic called India. So what do you say about India?*

*P: India is a one of the poorest country in the world. But according to the other countries, they are feeling like the India is world richest country. But poor people are living in this country. Like this they are feeling. Majority of more legends are there in India. Like Gandhiji, Subash Chandra Bose, like that so many legends are there from India. Like that so many places are there in India, like Bombay, Hyderabad, Delhi, Kolkotta and also.*

*I: These places are famous for what?*

*P: Bombay is famous for Taj hotel, and also India gate. And Kolkatta is the first city, in India having metro train facility in India. It is the first city. And also Karnataka, it is famous for because of seven poets, there are getting "Gnanapeeta prizes" in all over India, if we compare, to one of the seven members are from Karnataka only. So this is the major achievements from our Karnataka. These are famous politicians.*

*I: It is poets or politicians?*

*P: It is poets.*

*I: Then what else?*

*P: Bangalore is the famous garden city in India. And also in Mysore. Especially in Karnataka, Mysore is the famous, because we are doing Dasara, it is the world famous and major concentration.*

*I: K this all you talked about the famous places in India. What do you say about the culture in India?*

*P: Culture in India means, from India we have different languages and different types of people, and also different type of categories also. There are different types of caste.*

*I: In spite of all these different languages, what is special?*

*P: Especially we are living in unity. Because we are Indian like that.*

*I: What about education system in India?*

*P: Education system is very poor. Now a day, it has become business only. The richer is getting richer, and the poorer is becoming poorer.*

*I: In education?*

*P: Education only madam. That has become a business now a day. Like politicians will be running the institution, if the students are merit student also, they are not getting free seat. Particular word I am not getting.*

*I: What do you want to say?*

*P: For the name sake, they are telling, we are helping for poor people; like that they are telling for the name sake only, in the parties or any meetings like that. But personally or*

*practically this is not happening. Only they are saying for name sake, only but they are minting the money.*

*I: India has good human resource know?*

*P: Ya India has good human resource.*

*I: Is it because of good education system or something else?*

*P: Education system also one of the factor but, now a days, it is.....(pause) kalushita (Spoiled).....*

*I: Is it spoiling?*

*P: not spoiling, PAUSE..... /iiga parisara maalinya matte vaahu maalinya anta heLtaaralla...../*

*I: Poluted..*

*P: Ya now it is polluted, started polluting because of politicians. Not like that, only we are also responsible for that only. Because we are giving vote, for them and we are only putting them in that place only. So we are also culprit and responsible for these entire thing.*

*I: What do you say about the politics in India?*

*P: Politics is ..... (pause). According to my knowledge, and my thinking, I want to give for more chance to youth, especially who have more exposure to practical situation, or practical or practicability is very important. Even though age will be counted, I think give more chance to youth. Who are having more practical knowledge that is practicability?*

*I: So once you are experienced only, you will be having more practical knowledge know. For that you should be old enough.*

*P: But in old enough they have to compromise for everything. But in youths they have the guts, that they have to go, and they won't stop again, they can lead life. Means in that way, politicians have to compromise, for everything in every situation, every aspect and in every issue, they have to compromise.*

*I: So compromization will be more in youth.*

*P: No that is in older persons when compare to youths.*

*I: Anything else you want to say about India?*

*P: Nothing.*

*Note: The discourse structure is very poor in terms of poor planning and organization compared to the discourse structure of neuro-typical adults (Appendix J).*

## APPENDIX- N1

Narrative discourse sample in Kannada language- Example from TBI participant 3.

*P: naanu ii saari maisuuru horaDtaa iddiini bengaloorinda. (K I am leaving to Mysore this time. From Bangalore)*

*I: bengaloorinda maisuurige horaDtaa iddiira? (From Bangalore you are leaving to Mysore)*

*P: bengaloorinda ii prayaaNa naanu nanna kaaralli maaDataa iddini. karalli maaDodu. ella vyavaste maaDikoLLa beeku. nanna saamanu ella togobeeku. Ella togonDu nanna byaagu iTkonDu amele horaDtiini. (Bangalore. This journey I am doing in my car. Journey by car. I should make all the arrangements. I should take all my luggages. I will take everything and will take my bag and then I will start.)*

*haaDu keLake siDi togotiini. deevara haaDuvontu irolla beLagge aadarunu yaavudadaru cannaagi iro aaDanna keLtini. (I will take CD's to listen to some music. There will be no holy songs. Even if it is morning, I will listen to some nice music.)*

*biDadili taTTe iDLi tumba cennaagi irutte, naanu taTTe iDli ondu eraDu muuru tintini. (There will be nice idli in Bidadi. I will have one-two-three idli.)*

*gaaDi ooDisake beejaaru aagutte aaga eenu maaDalla. raste maatra tumba cennaagi ide. prayaaNavontu sakkataagi irutte. aamele ashTe maisuru taluptiini. ( I wont do anything if I get bored of driving. But the road is very nice. Journey will be too good. Later I will reach Mysore.)*

*I: sari eshTu ganTeli taluptiira? (K at what time you reach?)*

*P: aa adu ellu nilsalla andre madyadalli. nillisikonDu barodaadare andaaaju aagutte sumaaruru hottu. (That in between, I wont stop everywhere. If I stop in between and reach, it may take approximately some amount of time.)*

*I: ii riiti taluptiira? (This is how you reach?)*

*P: oudu. (Ya)*

*Note: There is no over use of self correction in Kannada language sample compared to English language sample (Appendix N2).*

## APPENDIX- N2

Narrative discourse sample in English language- Example from TBI participant 3.

*P: Today night I am leaving to Goa by train. So I am preparing for that. I am giving my clothes for ironing, and then I will pack.*

*For night train during travelling, I have to eat now. So now only, from my home only I am taking food. At night 8:30, I will be leaving my home, through an auto to railway station, and then I will catch the train.*

*No no I am sorry first my luggages should be ready already. I will take tooth brush, paste, clothes, and also my shoes. And also important thing is money. And also any other details, like my identity card and all those things. And also ATM card especially, and then all the luggages specially food also.*

*From there, night it will go to Hubli, and then to Goa. So early morning I will reach.*

*I: So how u will spend your time in your journey?*

*P: During night, till I get sleep, I will read up some book. After that I will go to sleep.*

*I: That's how you enjoy your journey*

*P: Ya this way I enjoy.*

*Then in the early morning, I will get up, and brush up in the train only. And I will face my wash. No sorry I will wash my face. And then I will get prepared, to get out of the train. And will be ready to reach the destination. I will reach by early morning at around 10:30.*

*Note: There is over use of self correction in English language sample compared to Kannada language sample (Appendix N1).*