SCALE FOR ASSESSMENT OF CONVERSATION IMPAIRMENT IN INDIVIDUALS WITH TRAUMATIC BRAIN INJURY

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MAY - 2004

Certificate

This is to certify that this dissertation entitled **"Scale for Assessment of Conversation Impairment in Individuals with Traumatic Brain Injury"** is bonafide work in part fulfillment for the degree of **Master of Science (Speech and Hearing)** of the student **(Register No. 02SH0021).**

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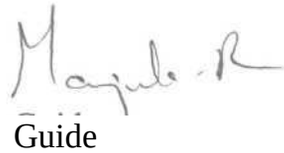
Certificate

This is to certify that this dissertation entitled **"Scale for Assessment of Conversation Impairment in Individuals with Traumatic Brain Injury"** has been prepared under my supervision and guidance. It is also certified that this dissertation has not been submitted earlier in any other university for the award of any diploma or degree.



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DECLARATION

This is to certify that this dissertation entitled **"Scale for Assessment of Conversation Impairment in Individuals with Traumatic Brain Injury"** is the result of my own study under the guidance of **Dr. R. Manjula,** Reader and HOD, Department of Speech Pathology, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier in any other university for the award of any diploma or degree.

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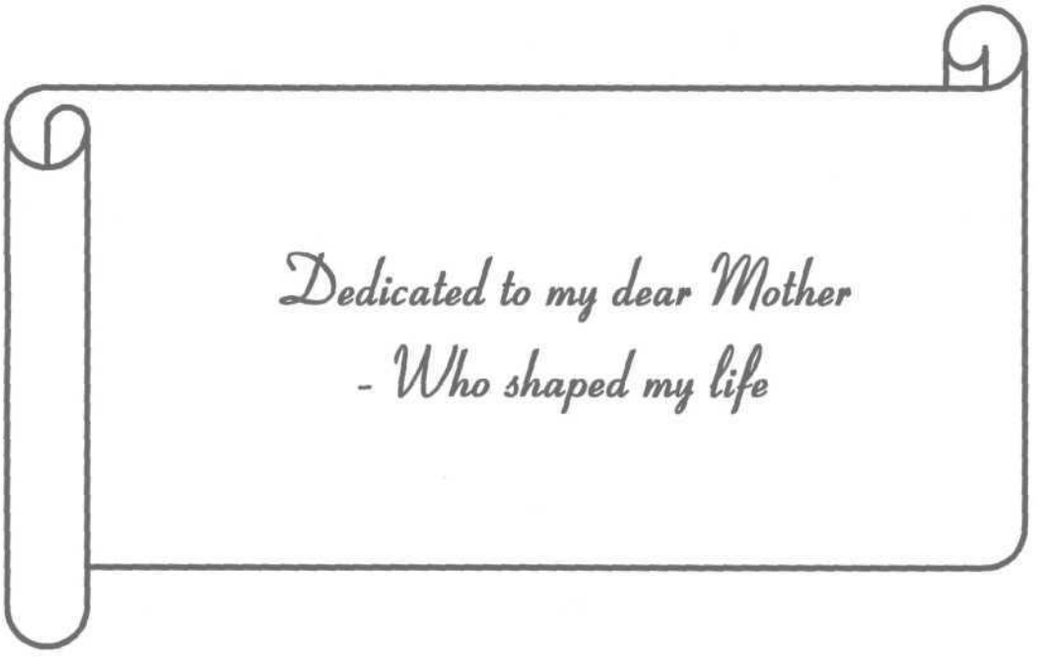
Dedicated to my dear Mother
- Who shaped my life

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My heartfelt thanks to my guide, ***Dr. R. Manjula,*** *for her timely help to complete this research study.* ***Ma'am without your guidance I wouldn't have been able to do this research.***

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INTRODUCTION

"Aphasic individuals communicate better than they talk but individuals with traumatic brain injury (TBI) talk better than they communicate" (Sohlberg and Mateer, 1989). This statement aptly highlights the fact that in individuals with TBI, language may be phonologically, syntactically and semantically intact yet lack meaning because of irrelevant, confabulatory, circumlocutory, or tangential responses in relation to a specific topic, sequencing and thoughts (Hagen, 1989). These factors lead to impairment in their conversational discourse. Sohlberg and Mateer (1989) 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).

Haynes and Haak (2002) studied discourse in referential communication and conversational task in 10 college students with closed head injury. They found that most of them had a significantly higher percentage of conversational discourse errors. In various other studies (Milton, 1984; Allen and Brown, 1976; Mentis and Prutting, 1991), TBI patients were found to be lacking in many areas of conversation discourse like interactional aspects and propositional aspects of conversation.

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 (Luria 1973; Hagan 1979; Mailkums, 1980; Jacobs 1989). 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.

Need for the study

Over the years, many scales are developed to tap the pragmatic deficits in neurogenic communication disorders. But very few are developed exclusively for traumatic brain injured population. Many tests are developed to assess conversation deficit in TBI patients but none of the tests are able to give a comprehensive picture of all the affected parameters in conversation. Following tests are developed in the west to tap pragmatic deficits in the TBI individuals.

1. Damicos clinical discourse analysis (CDA) (Damico, 1985). It was specially developed for TBI population and covers around 9 conversation parameters. Drawback of the test is that, error in the quality and manner of accounting for the bulk of the discourse errors produced by both, normals and TBI group.

2. Modified clinical discourse analysis (CDA-M) (Snow, Douglas, Pansford, 1997b). It is modified version of CDA. It assesses 10 parameters of conversation. Disadvantage is that it is able to show difference between the two groups only for 3 conversation parameters.
3. Profile of functional impairment in communication (PFIC) (Linscott, Knight, Godfrey, 1996). It assesses 10 parameters of conversation. One of the disadvantage of the test is that there is lack of research inspecting its ability to discriminate discourse of TBI individuals from normal conversation discourse.
4. Pragmatic protocol (Prutting and Kirchner, 1987). The test covers seven verbal and non verbal parameters of conversation. It was originally not developed for TBI population but was later administered on brain injured individuals to see the efficacy.
5. Conversation analysis (CA) (Friedland and Miller, 1998). It is not a test but a descriptive analysis procedure. It fails to indicate the severity of the conversation impairment.
6. Scale for rating conversational ability (Enrich and Sipes, 1985). It covers 13 aspects of conversation but reliability of the test has not been addressed.
7. Rating communication behaviors in head injured adults, (Ehrlich and Barry 1989). It is a 9-point rating scale and covers only 6 aspects together for verbal and non-verbal communication.

In summary, there scales do not include all the parameters of conversation. Moreover they do not deliberate upon variability if any in terms of hemispheric

involvement. Left hemisphere damaged individuals exhibit different conversational impairment compared to Right hemisphere damaged individuals. The tests do not comment on whether it is meant for TBI individuals without aphasic component or for TBI individuals with aphasia, as the conversation impairment varies in these two groups. Hence an attempt is made to profile all the affected conversation parameters in non-aphasic individuals with various types of lesions in TBI and to develop a scale to aid or a screening tool for assessing impairment in conversation of TBI adults.

Aim of the study

The aims of the study are as follows :

1) To collate conversation parameters seen in normals as well as in TBI individuals.
2) To compare the conversation of TBI and normal subjects on the given parameters.
3) To quantify and delineate affected parameters seen in TBI individuals.
4) To form a severity rating scale depending on the observed parameters in the study.

In the study, conversation speech samples of eight TBI individuals and age education and sex matched normal group was collected. The obtained sample was transcribed and analysed to look into differences between the two groups on the selected parameters of conversation. Various parameters are analysed under two major domain, viz, I) Propositional aspects of speech in conversation and II) non-proposition aspects of speech in conversation. Each of the domain were further categorized to look into specific features as shown in table 1.

Table 1: Propositional aspects of conversation.

Parameter	Features
A. Topic management	1. Introduction of topic 2. Relevancy of topic 3. Rapid topic shift 4. Non coherent topic changes 5. Inappropriate topic changes 6. Perseveration 7. Responses which expand topics 8. Minimal responses 9. Extra elaboration to topics 10. Minimal elaboration
B. Information adequacy	
C. Information content	
D. Coherence	1. Local coherence 2. Global coherence
E. Communication intent	1. Greets others a. By themselves b. In response to others 2. Introduces self 3. Starts a conversation. 4. Asks for information 5. Asks for assistance in understanding conversation 6. Criticize the conversation 7. Agrees to a part in the conversation. 8. Disagrees to a part in the conversation. 9. Fabricates \ imagine events. 10. Understands advancers in the conversation 11. Understands blockers in the conversation

Table 2 : Non propositional aspect of conversation.

Parameter	Feature
A. Turn taking	1. Non contingent turns 2. Unable to take prosodic cues 3. Rapid shift in the mode 4. Persistence in listeners or speakers mode 5. Initiation of turn 6. time taken to start a turn
B. Conversation repair	1. Self correction 2. Repair through repetition 3. Repair through clarification 4. Repair through revision 5. Other initiated correction 6. Request for clarification

T test and contingency value was calculated to note if there was significant difference between the two groups in term of conversation impairment. A severity scale was developed to assess severity of the impaired conversation in individuals with TBI.

Limitations of the study

- Sample size considered is very less therefore it cannot be generalized to the entire TBI population.
- A better conversation sample could have been obtained in an informal day to day situation rather than a semistructured conversation.
- Subject variability in terms of severity and site of lesion was not controlled.

Implication of the study

The severity scale will help in assessment of conversational deficits in TBI individuals. It will further help in planning intervention strategies during the rehabilitation of these individuals.

REVIEW OF LITERATURE

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.

Classification of TBI

Brain injuries arising from head trauma are generally classified into two broad types: non penetrating (closed) injuries and penetrating (open) brain injuries. In non penetrating or closed head injuries, the meninges remains intact, even though the skull is fractured. Penetrating or open head injuries, on the other hand, occur when the coverings of the brain are ruptured as a result of tearing of the dura mater by skull fragments. This may occur in depressed fractures of the skull or when the brain is penetrated by some missile such as bullet or is lacerated by depressed bone fragments (Poremba, Keidel, Douglas, Miller, 1996).

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.

TBI is also classified according to severity and level of altered consciousness experienced by the patient following the trauma. For assessment of disturbance of consciousness, the Glasgow coma scale (Teasdale and Jennett 1974, 1976) is adopted. The classification of TBI according to severity is as shown in Table 3.

Table 3 : Glasgow Coma Scale

Classification	Post Traumatic Amnesia	Glasgow Coma Scale	Features
	(a)	(b)	(c)
Mild (minor)	< l hr	13-15	Unconsciousness & clouding of consciousness for up to 1 hour with subsequent complete recovery.
Moderate	1-2 hr	9-12	Unconsciousness & clouding of consciousness for up to 24 hours
Severe	1-7 days	3-8	Unconsciousness & clouding of consciousness for longer than 24 hours without signs of brain stem dysfunction.
Very Severe	1 week	<3	Signs of brain stem dysfunction in an already unconsciousness state of less than 24 hours.

(a) Modified from Jennet & Teasdale (1981)

(b) Modified from Miller (1986)

(c) Modified from Todorou, Oldenkott, Poremba, Petersen (1992)

The Glassgow Coma Scale (GCS) is the most commonly used clinical scale. The patient is assigned a score between 3 and 15 on the GCS, with points being assigned for the followings:

- Eye opening (ranging from 4 points for spontaneous eye opening to 1 point for no response).
- Best motor response (ranging from 6 points for obeying commands to 1 point for no response).
- Best verbal response (ranging from 5 points for good orientation to 1 point for no response).

The greater the scores on the GCS, the higher the conscious level in a patient. A total score of 13-15 indicates mild TBI, a score of 8-12 indicates moderate TBI and a score of 3-7 indicates a severe TBI.

As an alternative to GCS, the severity of TBI is also estimated on the basis of duration of post-traumatic amnesia (PTA). PTA represents the period from the time the patient regains consciousness but is still in a disoriented and confused state to the time the patient's memory for ongoing events becomes reliable and accurate.

Course and Prognosis after TBI

In mild TBI, functional disturbances in the brain are always reported to be reversible and are said to clear up without leaving a trace (Andrews, 1990). After approximately 3 months of trauma, 90% of the patients complain of occasional or lasting headache, giddiness, nausea, sickness and sleep disorder. Follow up studies showed performance losses (attention, information processing) even in patients who were symptom free (Levin 1987). In moderate to severe TBI, all the subjects with GCS course

below 8 will have mortality rate of 34-50% and 15-20% will survive with severe disability (Vollmer & Dacey, 1990).

Biomechanics of Head Injury

The after effects of TBI lead to neurological defects and communication disorders. These are due to complex biomechanical processes associated with head injury. The biomechanical forces involved in closed head injury include, compression, acceleration - decceleration and rotational acceleration which result in brain tissue being compressed, torn apart by the effects of tension and sheared by rotational forces (Murdoch, 1990).

Neuropathophysiology of TBI

The pathologies associated with closed head injury are categorised into two types: (a) Primary injuries (immediate on impact) and (b) secondary injuries (secondary to impact).

(a) Primary injuries are the result of instantaneous events caused by the blow. It includes:

- *Diffuse axonal injury:* It 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. (Bigler, 1990 and Pang, 1985). 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.

- *Primary focal lesion:* It includes contusions (bruise) consisting 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).
- *Laceration:* 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:* It 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 (Coloquhoun & Rawlinson 1999).
- *Cranial nerve lesions:* A severe closed head injury can cause dysfunction of a number of cranial nerves either by damaging the cranial nerve nuclei in the brainstem or at intra cranial or extra cranial course (Murdoch, 1990).

(b) Secondary injuries include cerebral edema, intra cranial hemorrhage, ischemic brain damage, increased intra cranial pressure, cerebral atrophy and ventricular enlargement (Murdoch, 1990).

Conversation and TBI

Individuals with TBI, have difficulty to put forth the ideas in an effective manner and to follow the conversation rules. This in turn results in failure of meaningful conversation, thus annoying the conversation partners. Many investigators have made

incidental comments on the salient impairments in conversation exhibited by subjects with TBI (Levin, Grossman, Rose, Teasdale, 1979; Thomson, 1975).

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 behaviors (Auberach, 1986). Owing to the presence of these difficulties, individuals with TBI display lack of social perception, poor self image, impaired self analysis and reduced ability to follow social rules and have effective communication (McDonald 1993). Before going into details of conversational discourse impairment after TBI, let us look into what is "normal conversation".

Grice (1978) proposed his model of conversational practice, within a pragmatic framework in which to measure the success of conversation. Grice's opinion is that the speaker cooperates and expects cooperation while conversing with each other. As a part of this cooperation, they implicitly recognize that any communication act will follow four conversational maxims:

1. Quantity : The speaker will say no more or less than what is required.
2. Quality : The speaker will say only what he/she believes to be true and has evidence for.
3. Relevance : The speaker will say only what is relevant.
4. Manner : The speaker will impart information in a manner, which is clear and unambiguous.

Grice also states that the flouting of these maxims in certain circumstances is carried out purposefully to produce a divergent conversation. Example, if a speaker says something blatantly counterfactual, the listener will be cooperative in formulating utterances, will search for an alternative nonliteral meaning and reinterpret the remark as sarcasm or irony. On the other hand, failure to adhere to the maxims that is not due to a deliberate communication strategy will result in clumsy, ineffective or failed communication (Mc Donald 1993).

Conversational efficiency relies on an exquisitely attuned, coordinated and adaptive system for processing continuous symbolic information. The shifts made when conversation partners are dynamic, rely not only on linguistic aspects, but on a complete interaction of neurology, learning and context (Pernn, 2000).

TBI typically results in diffuse axonal injury with a multi-focal lesion of temporal & frontal medial lobes (Pang, 1989). While temporal lobe pathology following TBI is associated with disorders of memory & new learning, frontal lobe damage and diffuse axonal injury have been associated with loss of regulatory control over cognitive processes & affective & social behavior (Auberach, 1986). With lack of inhibitory control, the individuals with TBI may produce excessive, tangential and inappropriate discourse that displays a lack of social perception, poor self-image, impaired self-analysis, and reduced ability to follow social rules (Mc Donald, 1993). Alternately other individuals with TBI may demonstrate impoverished communication because of their

inability to formulate & initiate goal-directed behavior and reduced desire to express emotion or engage in social interaction (Auberach, 1986).

Snow, Douglas & Ponsford (1995) studied three TBI patients and three normals on four types of discourse tasks. The tasks were semi-structured conversation with the examiner, procedural discourse and story generation. The results showed that semi structured and procedural discourse failed to differentiate the two groups of subjects while story generation and communication questionnaires did differentiate the two groups (control and experimental). The reasons suggested for no difference were (1) small sample size (2) subjects were not familiar with the researcher (3) researcher might have taken more lead in communication.

With all these evidences, it is seen that there is an obvious disturbance in the conversation of individuals with TBI. The deficits if any in the speech of a TBI is best tapped by analyzing the speech sample of TBI client in a conversation discourse mode. This is otherwise called as conversation analysis. So in order to study these deficits, we need to do a detailed analysis of the samples obtained from TBI population. The procedure of analysis of discourse is called as conversational analysis.

Conversational analysis (CA) is a procedure for the investigation of interaction and in particular, 'task-in-interaction' which uses a naturalistic observation based approach to study actual verbal and non verbal behaviors (Schegloff, 1987a; Drew 1994). Conversational analysis has developed from the sociological practice of

ethnomethodology. Pioneered by Garfinkel (1972), the focus of ethnomethodology is to understand new social order. This is achieved through the use of social methods in a step-by-step procedure to meet the particular needs of any particular moment in interaction. CA examines how participants display to each other, what is going on in interaction. There is no set pattern in a conversation but it is obtained according to the context in which the conversation is occurring. Participants reveal directly by their responses, their analysis of preceding speakers turn. Eg : A conversational turn is context shaped in that it can only be understood with reference to the context from which it is built. The context is dynamic with meanings of utterences emerging from interactional work. This approach therefore emphasizes the collaborative achievement of interaction with participants working together to negotiate meaning. Using this methodology conversational analyst can demonstrate the impaired ability in terms of turn taking, topic management and conversation repair in neurogenic population.

In addition to these parameters few more parameters are included in conversational analysis to allow for detailed study of communication breakdown and to aid in the development of a scale for assessment of communication.

Following are the additional parameters considered for CA in normal as well as in TBI population.

I] Propositional aspects of Communication

It includes the notion of relevancy, clarity of reference & coherence. It deals with how discourse is organized with respect to overall plan, theme or topic and how individual utterances are conceptually liked to maintain unity (Hartley, 1995).

This includes subcategories like:

A. Topic Management

Topic can loosely be defined as "what is talked about through some series of turns at talk" (Lesser & Milroy, 1993). Topical coherence can be defined as something that is constructed across turns by the collaboration of participants.

Sack (1992) stated that conversationalist could be seen to work to achieve stepwise topic relatedness in which one topic flows into another. One topic closure and initiation of other topic can be done either by using phrases like "by the way" or "did you hear that". Sometimes when there is prolonged gap after the turn of one converser the other converser will have to change the topic, as the long gap implies that there is nothing more to say by the other converser. An effective topic management would include following characteristics.

- Competent speakers are able to select topics that are appropriate and relevant to the conversational context and to introduce new topics in appropriate manner.

- For ongoing nature of conversation, participants should give more than minimal responses and maintain the topic by producing responses that expand or contribute to the topic.
- Too many topics should not be included in a shorter time.
- Topic change should be done by using appropriate carrier phrases like "oh, by the way...."

Mentis and Prutting (1991) analyzed the topic spoken by a TBI subject and a control subject. They observed that the person with TBI produced non coherent topic changes, ambiguous, unrelated and incomplete ideational units, fewer new information ideational units, and more passes and agreements/acknowledgement units than did the normal. Coelho, Liles and Duffy (1991), found that individuals with TBI provide shorter, less elaborate contributions to a topic, more often leaving it to the communication partner to introduce, develop and extend a topic of conversation.

B. Informativeness

It is the variation in the amount and form of context based on the assumption about shared knowledge and the needs of a listener. A good speaker should understand the partners listening needs and according to that he/she should give elaboration without ambiguity or redundancy. Ehrlich (1988) concluded that more words and time may be required to convey the important information through spoken language of CHI subjects.

Hartley and Jensen (1991) reported that their subjects with CHI produced only one-half or two-thirds the amount of accurate context produced by the normal speaker. Togher (2000) conducted an experiment on TBI population on information delivery in different context. Seven male subjects with spinal cord injury and seven normal adults matched for age, sex and education were tested on the two tasks of interaction. The subjects had to interact with two groups; one was with children about an awareness program and one was with the researcher. Results showed that TBI individuals were able to interact in the same manner as control subjects in information requesting if they were in a powerful role as determined by the context. So informativeness was concluded to differ with context.

C. Response appropriateness/relevance

Coelho, Lies, Duffy (1991) evaluated the appropriateness of TBI subjects utterances within conversation utilizing procedures described. The authors noted that CHI subjects had a greater number of turns per conversation than the normals. In addition, the CHI subjects had decreased response adequacy resulting in utterances, which were at times disjointed and seemingly irrelevant to conversation. They had more difficulty initiating and sustaining conversation, which results in generation of more obliges (utterances that clearly summon or demand a response are designated 'obliges'). Many utterances produced by CHI subjects required interpretation and clarification by the research assistant, resulting in additional obliges.

D. Coherence

Hough & Barrow (2003), described two types of cohesive ties that is (a) global coherence and (b) local coherence.

Global coherence is defined as the relationship of meaning or content of verbalization with respect to the general topic of conversation. Local coherence is defined as the relationship of meaning or context of verbalization with that in the immediately preceding utterance produced either by interviewer or subject. It includes relationship of continuation, repetition, elaboration, subordination, or coordination with the topic in the immediate preceding utterance.

Hough and Barrow (2003) studied descriptive discourse of seven TBI adults. They found that TBI exhibited reduced performance in maintaining overall theme in the descriptive discourse. TBI patients showed more difficulty with global than local coherence.

E. **Communicative Intent**

The communicative intent or the purpose of each turn is analyzed.

Usually this induces various speech acts such as:

Ritualizing*:* This further includes factors such as

a) Greet others

- Introduces self
- Starts a conversation

b) Asking for/giving information

- Requests

c) Controlling behaviors of others

- Asks for favors or assistance
- Makes a complaint/criticism
- Tries to persuade/convince others

d) Expressing feelings

- Gives/accepts apology
- Expresses agreement/disagreement

e) Imagining

- Fabrication or imagination of the events in the conversation.

II] Non propositional or Interactional aspect of conversation

This is one of the important category of social communication behavior. These behaviors reflect the reciprocal nature of conversation & the joint cooperation required of the participant (Mc Tear, 1985). Under this, following subcategories are considered.

A. Turn taking

Turn taking refers to sharing of time and sequencing of contributions evident in any conversation.

According to Sack, Schegloff and Jefferson (1974), the mechanism which accounts for this split second timing is a rule that operates on a turn by turn basis as a sharing device for the communication partner to take the conversational floor. They

propose that turns are made up of "turn constructional units" determined by syntactic and prosodic fractures. Some of the rules to take turns are -

- Conversation is organized so that participants initiate and give turns with a minimum of overlap or gaps (Sack, Schegloff & Jefferson, 1974).
- Conversational turns are locally governed, with each turn contingent on the preceding utterance or situation.
- Turn taking is signaled through eye gaze, prosody and pauses.
- Skilled participants shift easily from speaker to listener roles without remaining too long in either mode (Mc Tear & Conti-Ramsden, 1992).
- Milton, Prutting, Binder (1984) found that three of the five adults with brain injury had problem in initiating turns, taking turns without excessive pause time, and relating each turn to the preceding utterance. Similar results were obtained by Liles and Duffy (1990). The individuals with TBI in this study had problems in initiating turns, and also had tendency to respond to the requests or questions of the communication partner with adequate but minimal responses without making efforts to facilitate the continuation of the conversation.
- TBI patients also fail to reinforce during their partners conversational turn, and fail to show interest in the communication of their partner.

B. Conversational Repair

In conversation, there are many trouble sources like need to change the message, false starts, disfluencies, mishearings and misunderstanding. Conversation analyst use the term trouble source in preference to errors, and the organization of repair provides

mechanisms to deal with trouble sources. "Repair mechanism" is a particularly important device for the communication disordered population given the variety of potential trouble sources which may impede the progression of conversation (Milroy & Perkins, 1992).

Schegloff, Jefferson and Sacks (1977) make two important distinction in repair work

1. Self initiated repair Vs.
2. Other initial repair

Self initiated repair refers to the ability of the converser to understand the conversation and to initiate the repair when there is breakdown. Other initiated repair refers to the repair made by the speaker on the request of the partner. Here repair is not initiated by the speaker but is prompted by the communication partner. The self initiated repair should always be more than other initiated repair. Other factors in conversation repair includes

Conversational repair should occur in both listener and speaker's role. Participants have a responsibility to initiate repair when communication breakdown occurs. When listener fails to understand the speaker, the speaker should understand and initiate repair through repetition, clarification or revision. (With the help of puzzled look on the listeners face). Eg : a speaker might respond to a listeners puzzled look by providing more specific directions or restating the request.

Communication impairment in individuals with Right hemisphere damage

The maxims of conversation in the Right hemisphere damage subjects is reported to be as follows:

1. When a speaker utters a statement, which is a clear violation of one of the maxims (flouting a maxim), it acts as trigger for the listener. Rather than assuming that the speaker is being uncooperative, the listener uses her knowledge of the world, knowledge of linguistic and conversational conventions, and knowledge of the speaker to interpret the violation as meaning something more or something other than what is actually said like sarcasm or irony (Murphy, 1990). This faculty is affected in RHD.
2. Other statements are blockers which one participant uses to turn the conversation away from another participant's goal. When a participant blocks the direction of the conversation the other participants must find a way to make a "repair" in order to advance the conversation.
3. A conversant must be able to judge the intentions, which lie behind other conversants advancing and blocking moves.
4. Conversation partner is likely to become annoyed if others block a conversation which he/she is trying to direct towards a specific goal. The results in a study by Rehar (1992) indicates that RHD subjects function normally in canonical, directed conversation. However, they have difficulty interpreting & judging the effect of blocking statements, particularly with regard to tangential utterances.

5. Successful conversant must be able to judge the emotional impact of conversational moves as other participants in the conversation. Otherwise, annoyance because of block in conversation may occur.

RHD subjects have deficits in two interdependent areas (a) understanding language used in a non canonical manner & (b) integrating varied information in order to interpret discourse materials appropriately (Weinstein & Kahn, 1955; Wechsler, 1973; Gardner, 1975; Gardner, Brownell, Wapner, & Michel on 1983; Lezar, 1983; Joanette, Ska, Goulet & Nepoulous, 1986). With regard to the first category, investigators have found that RHD patients have trouble interpreting indirect requests (Hirst LeDouse & Stein 1984; Foldi, 1987; Weylman, Brownell, Roman & Gardnes, 1989) understanding jokes (Bihrle, Brownell, Dowelsons & Gardner, 1986; Brownell & Gardner, 1988) & interpreting nonliteral language such as metaphors, irony & sarcasm (Kaplan, Brownell, Jacobs & Gardner 1990). Under the second category, these subjects have difficulty with holistic context-dependent tasks such as deriving the main point or theme of a dialogue or narrative (Gardner, 1983; Hough, 1990) and drawing inferences in stories (Brownell, Potter, Bihrle & Gardner, 1986).

Clinicians have noted that RHD subjects are often tangential and seem inappropriately positive or unconcerned about serious situations; they also maybe inappropriate both in their manner of addressing others and in the conversational topics which they bring up. (Weinstein & Kahn 1955; Gardner, 1975; Geshnuid, 1976; Lezak, 1983; Heilman, Boucers & Valenstein, 1985). It is also observed that repetitive or

redundant conversation is not observed. There is a tendency for such subjects to be unconcerned & to interpret statements and behaviour in the most positive light (Sackham, Greenberg, Weiman, Gur, Hungerbuhler & Geshwind, 1982; Davidson, 1984).

RHD is also observed to be associated with lowered sensitivity both to speech prosody and to affective information in general. All these characteristics leads to breakdown in one or more aspects of their conversational modes. They present difficulty in interpreting and responding to advancers and blockers in conversation. They are generally insensitive to the fact that a cooperative participant in a directed conversation will only violate a maxim as a means of advancing the communication (Eg. requests & sarcasm). These subjects may not be able to recognize such violations or may be unable to devise motivation behind them. They have difficulty in making appropriate use of advancers and blockers in discourse.

So with these observations in mind, Kaplan and Gardner (1992) conducted an experiment in which 13 RHD subjects were tested for these blocks in conversation. Three prerecorded conversational types were used: tangential, redundant and control. The subjects were asked to interpret the blockers and advancers in the communication. The results showed that they had little difficulty in interpreting advances but had great difficulty in understanding blockers.

Vanhalle, Lemieux, Joubert, Goulet, Ska, Joanette (2000) studied processing of 2 speech acts by 14 RHD subjects. Four control groups were taken. The two speech acts

were direct (literally express communicative intent of the speaker) and indirect (intention is not conveyed explicitly in the literal message). The three situations were - (a) Natural task - interview assessing general health of the subjects (b) Non natural task - Interpretation of interaction of two individuals, (c) Pseudo-natural interview with clinician whose naturalness lies within (b) & (c) Results showed that RHD subjects process speech acts well in natural or pseudo-natural task & is worse in non natural task.

In summary it can be stated that TBI individuals with moderate to severe brain injury present a variety of conversation problems. The difficulties may be in terms of Topic management, topic initiation, acknowledgements, turn taking, informativeness and coherence and others.

According to literature the right hemisphere damaged patients, have no problem in a directive conversation but have problem in understanding advancers and blockers used in the conversation. The severity of the conversation impairment depends on many factors like recovery period, severity of trauma, age etc. In the present study an attempt is made to analyze the variation in conversation in TBI subjects and compare the behaviour with normal group.

METHOD

Investigators have reported that in TBI patients, impairment in communication, especially in discourse is evident as a sequelae of brain insult. These discourse disabilities are very subtle in nature and persist for a longer time even when other impairments are resolved. The study attempts to identify and quantify impairments in communication abilities of the TBI patients.

The aims of the study are:

1) To identify the impaired parameters of conversation discourse in TBI individuals.
2) To quantify and delineate these parameters as compared to discourse in normal subjects.
3) To develop a severity rating scale to tap the conversation impairment in TBI individuals.

Subjects

Experimental group comprised of six male and two female adults with traumatic brain injury. Eight normal adults matched for age, sex and education were selected as control group. The experimental group was divided into three subgroups depending on the loci of brain insult viz. left hemisphere damage, right hemisphere damage and bilateral damage. Demographic data of the subjects can be found in Table 4.

Table 4 : Demographic data of TBI subjects

Patients Name	Age / Sex	DAA	Type of trauma	Severity	Damaged hemisphere	Lesion	GCS	PTA
Vijayanarasimha	18yrs/M	10M	RTA	Severe	RHD	Frontoparietal	3/15	+ve
Raghunandan	18yrs/M	12M	RTA	Severe	RHD	Rt. Temporal frontal contusion	6/15	+ve
Ritu Sharma	24 yrs / F	17 M	RTA	Severe	BHD	Frontal contusion frontal bone fracture	7-8/15	+ve
Savitha	24 yrs/F	10 M	RTA	Moderate	BHD	DAI	13/15	+ve
Srivatsa	18 yrs/M	9M	RTA	Moderate	LHD	Left temporal linear fracture with frontotemporal extraclusal hematoma (Frontal and temporal)	6-7/15	+ve
Manjunath	45 yrs / M	15 M	RTA	Moderate	LHD	Temporoparietal Lt. Posterior temporal and parietal contusion	9/15	+ve
Parshappa	20 yrs / M	17 M	RTA	Severe	RHD	Temporal and parietal (temparoparietal extradural and subdural hematoma	8/15	+ve
Sandesh	18 yrs/M	10M	RTA	Severe	BHD	Bifrontal injury	4/15	+ve

RTA = Rood traffic accidents
RHD = Right hemisphere damage
LHD = Left hemisphere damage
BHD = Bilateral hemisphere damage
GCS = Glassgow coma scale

M = Months
DAA = Duration after accident in months
PTA = Post traumatic amnesia

Selection criteria

Subjects with confirmed lesions in the brain based on the neurological evaluation (as reported in Table 4) and who were willing to participate in the study was selected. They were however kept behind to the purpose of the study. It was also required that the subjects were willing to participate in 2 to 3 sessions of extended sampling session. All the patients included in the study did not have Aphasia confirmed by Western Aphasia Battery test (Kertesz, 1979).

Only subjects with history of road traffic accident as a cause of traumatic brain injury were included in the study. Subjects were also selected according to the severity of the trauma. Subjects who were identified as having moderate to severe injury on the basis of Glasgow Coma scale (Jennette and Teasdale, 1975) were selected for the study. Subjects with any other type of trauma like open head injury and mild insult were not selected for the study. All subjects presented a history of posttraumatic amnesia and there was a gap of at least 6 months post accident.

Control group comprised of normal individuals with no history of traumatic brain injury or any other brain insult. They were also screened for any speech, language, cognitive-linguistic and hearing impairment. They were matched for age and sex of the subjects in the experimental group.

Experimental setup

The target task was free conversation between the subjects and investigators. The conversation was carried out between the investigator and the subjects on various topics. A total of three sessions of conversation each varying from 30 to 40 minutes was carried out. The conversation was recorded on a magnetic tape recorder. The subjects were aware that their speech was being recorded. All the recordings were carried out in a quiet room with no distraction in between the recordings. Before recording, the subjects were instructed to talk in a way similar to two friends talking to each other. They were also informed that, they were free to ask any questions to the examiner during the conversation. First session was aimed to improve interaction between the investigator and the subjects to build the rapport. Succeeding two sessions were tape-recorded. Conversation sample centered around list of general topics like hobbies, sports, food traveling, cricket etc. in order to keep the topics of conversation constant across all the subjects.

Instrumentation

A Philips RR 212, Cassette recorder was used to record the conversation. During the transcription of the data by the investigator, a digital clock was used to record the initiation time taken by the subjects to start a turn.

Procedure

Thirty to forty minutes' conversation was recorded for each of the three sessions on three alternate days. Since the subjects were accustomed to the investigator and

showed less inhibition in their conversation on the third session, only 20 minutes speech sample of this session was selected for the final analysis.

Transcription procedure

From the recorded audio sample, transcription was done using format given by Atkinson and Heritage (1999). For transcription of text in Indian languages Roman Transliteration was used.

Speech of both investigator (I) and subject (S) was transcribed. During transcription, pause time, filled pauses, unfilled pauses and false start etc. was carefully noted.

Following special symbols were used to indicate conversation turns.

1.[[Overlapping of two sentences

Eg. I: Soni ..[it's a female

S: [it's a female

2. = Continuation of two lines.

Eg. S : I have finished my first sem =

I : hu … hu

S : = and I will be going to the second sem.

3. -Abrupt pause

Eg. I am -I will go.

4. . . . . Small pause between words

Eg. ya. . . . . such things happen.

5. (2) A long pause without any audible sound with time in seconds inside the brackets.

Eg. I don't think (3), its not possible!

Before transcribing the samples of the study, the investigator carried out a pilot study in which she practiced transcription of the recorded speech of two normal subjects for duration of 10 minutes in a normal setup.

Using different sources of literature and available scales for measurement of discourse impairment, the conversation sample was analysed for two aspects.

I. Propositional aspect of conversation.

II. Non-propositional aspect of conversation. Each of these was further divided into different features.

Details of sub features of the parameters are shown in the following Table 5 and Table 6.

Table 5 : Propositional aspects of conversation.

Parameter	Features
A. Topic management	1. Introduction of topic 2. Relevancy of topic 3. Rapid topic shift 4. Non coherent topic changes 5. Inappropriate topic changes 6. Perseveration 7. Responses which expand topics 8. Minimal responses 9. Extra elaboration to topics 10. Minimal elaboration
B. Information adequacy	
C. Information content	
D. Coherence	1. Local coherence 2. Global coherence
E. Communication intent	1. Greets others a. By themselves b. In response to others 2. Introduces self 3. Starts a conversation. 4. Asks for information 5. Asks for assistance in understanding conversation 6. Criticize the conversation 7. Agrees to a part in the conversation. 8. Disagrees to a part in the conversation. 9. Fabricates \ imagine events. 10. Understands advancers in the conversation 11. Understands blockers in the conversation

Table 6 : Non propositional aspect of conversation.

Parameter	Feature
A. Turn taking	1. Non contingent turns 2. Unable to take prosodic cues 3. Rapid shift in the mode 4. Persistence in listeners or speakers mode 5. Initiation of turn 6. time taken to start a turn
B. Conversation repair	1. Self correction 2. Repair through repetition 3. Repair through clarification 4. Repair through revision 5. Other initiated correction 6. Request for clarification

Each of these subfeatursare and the scoring procedure is shown in Appendix A.

Scoring

Each parameter was rated and recorded on a specific criteria as shown in Appendix A.

Raw scores were calculated and, T test was applied for following parameters to measure the significance of the values obtained.

1. Topic management.
2. Turn taking
3. Conversation repair

A five point perceptual rating scale was used to score four of the parameters, which included the.following-

1. Information content
2. Information adequacy
3. Coherence
4. Communication intent

A contingency value was calculated for these parameters to compare between the experimental and control group. The five point rating scale is shown in Appendix A.

The investigator repeated the process of transcription of conversation sample of two TBI and two normal subjects for verification of transcription, scoring, and reporting of the features. The findings were found to be correlating in the two situations.

RESULTS AND DISCUSSION

Impairment in conversation is one of the persisting, subtle and sub clinical feature reported in TBI individuals even after months of recovery from the medical ailments. An attempt is made in the study to describe the features impaired in the discourse mode of conversation in TBI individuals and to compare the performance with that of normal control subjects.

Six male and two female adults with TBI served as experimental subjects. Age, gender and education matched normals served as subjects in the control group. From the corpus of speech recorded from the subjects, speech sample of duration of 20 minutes recorded in the ultimate interaction session with the subjects was chosen for analysis. The data was transcribed verbatim and various features of propositional and non propositional aspects in the speech of the subjects was tabulated and subjected to analysis.

The frequency of occurrence of the behavior was calculated for most of the features. The results are interpreted using suitable statistical procedures wherever possible. T-test was applied to test the significance of three parameters, viz, topic management, turn taking and conversation repair. Non parametric test was applied to features of information content, information adequacy, coherence and communication intent. Contingency value of these features was computed for the two groups in order to understand the type of association in the performance of the two groups. The differential performance of TBI subjects with left hemisphere damage (LHD), right hemisphere

damage (RHD) and both hemisphere damage (BHD) as compared to normal subjects are discussed in detail under various sections.

The results are presented under the following sections:

A. Topic management

1. Introduction of topic
2. Relevancy of topic changes
3. Non-coherent topics
4. Inappropriate topic changes
5. Rapid topic shift
6. Perseveration
7. Responses that expand topics
8. Minimal responses
9. Extra elaborations and
10. Minimal elaborations

B. Information content

C. Information adequacy

D. Coherence

1. Local coherence
2. Global coherence

E. Communication intent

1. Greeting others
    a. Greeting initiated by themselves
    b. Greeting in response to others

2. Introduces self
3. Starts conversation
4. Asks for information
5. Asks for assistance in understanding conversation
6. Criticizes
7. Agrees to a part of conversation
8. Disagrees to a part of conversation
9. Fabricates\imagines events
10. Understands advances in conversation
11. Understands blockers in conversation

F. Turn taking

1. Non contingent turns
2. Difficulty in understanding prosodic cues to take over the turn
3. Rapid shift from listeners to speakers mode
4. Persisting too long in either speaker or listeners mode
5. Initiation of turns
6. Time taken to start the turn

G. Conversational repair

1. Self initiated repair
   - Self repair by repetitions
   - Self repair by clarifications
   - Self repair by revisions
2. Other initiated repair
3. Request for clarification

A. Topic management

Topics are defined as what is talked about through some series or talk (Lesser and Milroy, 1993). Speech of TBI subjects and control subjects was analyzed for this aspect of conversation under 10 different sub-features as shown in Table 1. Table 1 depicts the frequency of occurrence of the said features in a speech sample duration of 20 minutes that was selected for the study. T-test was applied to infer the significance of the obtained values. Following results were obtained for each of the parameter under topic management.

1. Introduction of topic

It is calculated as the number of topics introduced by the subjects in a 20 minutes conversation. Results in Table 7 show that there is no significant difference between the two groups for the feature of "introduction of topic", although the mean values suggest that the topics are introduced in a slightly better way by normals than TBI subjects. The reason for poor introduction of topics by the experimental group could be because of the semi-structured nature of conversation elicited in the experimental design. In spite of two to three familiarity sessions held with the investigator, the subjects might have felt that introduction of topics during conversation was more a responsibility of the investigator, because of which it is probable that they did not introduce more topics..

Table 7 : T- Scores obtained for the feature of "topic management" for TBI group and normal group.

SI. No.	Parameters	Gp	Mean	SD	t value	Significance
1.	Introduction of topic	T	7.37	4.92	-0.34	0.7 (NS)
		C	8.00	1.51		
2.	Relevancy of topic	T	4.62	2.38	-3.37	0.04*
		C	8.00	1.51		
3.	Non coherent topic changes	T	4.0	4.37	0.00	0.02*
		C	0.00	0.00		
4.	Inappropriate topic changes	T	0.5	1.06	1.323	0.20 (NS)
		C	0.0	0.00		
5.	Rapid Topic shift	T	5.0	7.21	1.961	0.70 (NS)
		C	0.0	0.00		
6.	Perseveration	T	1.75	1.58	3.130	0.007 **
		C	0.00	0.00		
7.	Responses which expand topics	T	60.63	23.91	-2.309	0.037 *
		C	80.57	4.93		
8.	Minimal responses	T	17.25	19.24	0.02	0.06 (NS)
		C	3.62	1.84		
9.	Extra elaboration to topics	T	3.0	3.54	0.03	0.11 NS
		C	0.75	1.16		
10.	Minimal elaboration	T	5.74	9.46	0.01	0.14 (NS)
		C	0.5	0.92		

Gp = group, T = TBI group, C = control group, SD = Standard deviation
* Significant at 0.05 level, ** Significant at 0.01 level, NS = Non significant

A comparison of scores for LHD, RHD, and BHD within TBI group were made, and it was seen that RHD group introduced more topic changes than the other two groups. LHD group is seen to introduce least topics and in BHD group one of the subject introduced topics like RHD group and two subjects introduced topics similar to LHD group.

2. Relevancy of topic

It is the second parameter considered under topic management, wherein the frequency of occurrence of relevant topic introductions was calculated across the subjects. From Table 7, a significant difference at 0.05 level is seen between the normal and TBI group in terms of this feature. All the subjects in control group introduced topics in the conversation relevantly, but TBI group had problem in relevantly introducing or changing the topic. These findings support the observations of Mentis and Prutting, (1991) and Cohelo, Liles and Duffy (1991) who found that TBI individuals produced unrelated topic changes. Example below shows how an irrelevant topic change was made by one of the TBI subject: *(Note: I = investigator and S = subject)*

I: *What is your dissertation topic?*

S: *It is related to the nutrocity properties of food colorants.*

I: *So which colours do you feel is the best.*

S: *According to me, light blue color and light _ and navy blue color is the best.*

I: *But we don 't put these colors in food?*

S: *No .. we don't put these colors in food ... there are some ... like ... somethings are there, in which we add those colors.*

I: hu…

S: *But I like these two colours in clothes and all its …so tempting.*

I: *So you like these colours in food, but you are studying the colours in food no?*

S: *There is nothing like that in food*

I: *ha ?*

S: *I like good tasty food and nothing else.*

In the above example, investigator asked about the food colors and the subject deviated from the topic and spoke about the colors of the clothes, which she likes. The topic shift is coherent but it is not relevant to the question asked.

3. Non- coherent topic changes

To analyze this feature, number of non-coherent topic changes in 20 minutes conversation was counted. Results in Table 7 indicate that there is a significant difference at 0.05 level in the mean scores of the control and experimental group. This implies that TBI subjects produced more of non-coherent topic changes as compared to normal subjects. Mentis and Prutting (1991) and Cohelo, Liles and Duffy (1991) also observed that TBI subjects produced non-coherent topic changes as compared to normal subjects. The findings of the study thus support their observation.

Following is an example of non coherent topic changes found in the speech of one of the TBI subject.

I: *matte here yenu maDutira niivu? (What else do you do?)*

S: *ha allaa ...bramhanawaru gottiratte ãndare bereawarage. ...avaru ãmmaa appaa helkoDtaarc.adu..... naavu...frenD, nannaa frenDs kLladre naanu heLalla. awaru appaa heLtare... idu... naanu.... avaru... naanu heLbaarado... awaru kivige heLtaare. (ha no ....bramhavanavaru will know that is for others ... they mother father teach them...that...we...they...I...should not tell ...they ears tell)*

In the above example, investigator (I) asked the subject "what does he do" with the previous context of daily activities. But the subject did not understand the question in relation to the context and started explaining about his "swamiji" and "what he told about the swamiji to his friends". Here topic changed is non coherent in nature.

4. Inappropriate topic changes

The number of inappropriate topic changes made by subjects was counted. For the given feature, there is no significant difference between the TBI group and control group. None of the subjects in the normal and TBI groups showed inappropriate topic changes except for one TBI subject. The finding is not in agreement with the findings of Mentis and Prutting (1991) and Cohelo, Liles and Duffy (1991) who reported that TBI individuals produce inappropriate topic changes. Following example shows inappropriate topic change showed by one of the TBI subject who was damaged in both the hemispheres.

I: *So how do you find the place?*

S: *Mysore?*

I: *Ya Mysore.....got some friends?*

S: *Like where I study they have comparative system. There ... if one person is getting ninety he will be the topper with A grade... three out three and one person who is getting seventy... seventy is not bad marks... but if people are getting above you, you will get B and C grade. Thank god mine is B grade.*

In the above example, subject (S) has introduced totally inappropriate topic. There was no connection between the response and the preceding context of conversation.

From the findings in sections on irrelevant, non-coherent and inappropriate topic changes, it is seen that it is difficult to demarcate between these three parameters in a flow of conversation. There is very subtle difference in the definition of these features in terms of topic management. An irrelevant topic can be coherent and related to some previous context. Non-coherent topic changes will be difficult to understand for the converser to make any sense out of the topic shift and many a times it might be related to the context. Inappropriate topics are totally out of context but can be coherent. In the subgroup of TBI, all the subjects showed irrelevant and non-coherent topic changes. But only one BHD subject showed inappropriate topic change.

5. *Rapid topic shift*

It is reported in literature that some TBI patients change topics rapidly within few seconds. As seen from Table 7, although there was a mean difference between normal and TBI speakers for this feature, the difference was not statistically significant. This finding does not support the findings by Ehrlich and Barry (1989) where they report of

rapid topic shifts in TBI subjects. This could probably be due to individual differences in the subjects. Among the eight subjects, three of them did not show any rapid topic shifts, four of them showed minimal topic shifts and only two showed remarkable topic shifts. This behaviour was seen more in RHD subjects and one of the BHD subject whose characteristics matched with that of RHD. In the following example we can see a rapid shift of topic within few seconds.

I: *So right now are you attending classes or not?*

S: *ya ya I have to attend the classes but like one day Jayaram sir told ...one of the person from..between he told like ... if you have some problem then don't come ...no need like ... even if we put round you don't have to come if you are not well, so I don't go ..ok. .sometimes teachers are different, .. problems come, they might teach you different thing.., we somebody else taught in the beginning, ..two courses wiil become different ...and my first sem copy was lost*

6. Perseveration

Perseveration in speech is reported in TBI subjects. Here, an attempt was made to see if perseveration in terms of topic maintenance was observed even when the conversation partner changed the topic. Results show a significant difference at 0.01 level between the two groups in terms of perseveration. Control group did not show any perseveration behaviour but many TBI subjects showed this feature. Most of the times preservation for topic was seen for a shorter time, which faded after two to three turns and few times it persisted for a longer time. That is, the subjects kept talking about the same topic for a long time.

Within subgroups of experimental group, perseveration was seen in all RHD subjects. One subject from LHD group showed perseveration and one did not show. One subject of BHD group showed perseveration and the other two did not show any perseveration. Following example shows the perseveration feature in one of the TBI subject.

S: *Ramkrishnaparmhansa. . . . yavaglu..nim..nimage...avaru annaa koDtaare. Appaa avaru ...ammaa...avaru...yella avaru. avre illa andare yaaru illa. (Ramakrishnaparamahamsa ...always you..to you ...he gives rice. He is father and mother...he ..he is everything. If he is not there nobody is there)*

I: *sari ...matte nimma appaa enu kelasa maDtaare?(OK..what does your father work as?)*

S: *avru heLidaare, devaru sikke siktare...illa andare illa, matte naanu heLtiini...nanna frenD heLtini...avaru paTtii maaDtaare...(if they say, God will be available .. otherwise no... and I tell you... my friend tell you .. they make party....)*

In the above example, in spite of change in the topic by investigator (I), the subject continued to speak on the same topic.

7. *Responses that expand topics*

In a particular topic out of total responses how many responses were elaborated by the subjects were counted. Results showed significant difference at 0.01 level between the TBI subjects and the normal subjects for the given parameter. Normals are seen to expand almost all the turns unlike TBI subjects where they expand very few turns. The present findings are in support of earlier study reported by Coelho, Liles and Duffy

(1991) where they found that individuals with TBI contribute less elaboration to the topics, more often leaving it to the communication partner to develop and extend. Following two examples show how responses were expanded in normal subjects (Eg 1) and in TBI subject (Eg 2).

Example 1: (normal subject)

I: *So what are your favorite hangouts?*

S: *ok...for me if I have to eat chicken I prefer chicken hut. If I have to eat veg then we go to khana khajana jewel rock, viceroy and if I don't have any money then we go to Bihari mess.*

I: *talking about food, tell me what all dishes do you like?*

S: / *basically like nonveg, then in veg I like paneer, pizzas and burgers.*

Example 2: (TBI subject)

I: What do you like in food?

S: *m.... m... mm. .in food ... nothing special.*

I: *nothing special?*

S: *Ok...chapatis.*

I: That's it?

S: *Chapatti and rice.*

Example 1 which is of a normal subject shows that all the turns are elaborated unlike in example 2 of a TBI subject, where the turns are not elaborated.

Individual scores of TBI subgroups showed that RHD group expanded more responses, LHD group elaborated very few turns in the topic and BHD group showed a mixed pattern wherein one subject resembled RHD group with more expansion and two subjects resembled LHD group with minimal expansion of turns in a topic.

8. Minimal responses

Normal individuals produced very few minimal responses and most of the time they elaborated the turn. According to Coelho et al., (1991a), individuals with brain injury provide shorter, less elaborated contributions to a topic. The result in table 7 indicate no significant difference between TBI and normal group for the given feature, but mean scores showed that TBI subjects had more minimal responses than normal subjects. Coelho (1991b) in his study had observed that more minimal responses are seen in TBI patients. The reason for no significant difference can be the fact that out of eight subjects five subjects were verbose and showed less minimal responses and rest of the three subjects showed more of minimal responses. The raw scores indicate that RHD and BHD group produced less minimal responses than the LHD group. One of the subjects in BHD group was seen to produce more of minimal responses.

It was observed that due to minimal responses, higher percentage of obliges were produced by the investigator. Obliges are utterances which summon or demand a response (Coelho, Liles, Duffy, 1991). Following example shows how a TBI subject showed more of minimal responses and subsequently how this has lead to more obliges on the part of investigator.

Example:

I: *So did you meet sir that day ?*

S : *ya*

I: *What did he say?*

S : *Nothing*

I: *You had a regular check up there ?*

S : *ya, that's it!*

I: *Do you go for regular checkup now also*

S : *No ... I have stopped.*

I: *So everything is fine now*

S : *yaa (ya)*

I: *You don't have any other problem like giddiness or ...*

S: *no no.*

I: *So, how was your meeting*

S:ok.

9. Extra elaboration

Usually, normal speakers give adequate elaboration to topics. They do not give more or less information. According to Hartley and Jensen, (1992), some individuals with brain injury provide too much details and speak longer than required, while other individuals provide only short utterances and then give drastically reduced information. The corpus of data was analysed to look into this feature.

In the present study an effort was made to find if a similar trait is found for the factor "extra elaboration of topic" and also "minimal elaboration of the topic" (which will be dealt in the next section). No significant difference was found between the control group and TBI group for the present feature of excessive elaboration. The results suggest that elaboration in the TBI subjects were similar to that of normal subjects. Careful observation of the raw data however showed that out of eight patients, three RHD subjects exhibited extra elaboration and two LHD subjects exhibited minimal elaboration. One BHD subjects neither showed more nor less elaboration, but had adequate elaboration. Rest of the two subjects showed both the behaviors (mixed pattern). Hence the mean score did not reflect the true scatter that was present in the data. Following example shows excessive elaboration shown by one of the TBI subject.

Example:

I: *How did the accident happen?*

S *:No no ... when I started second year after few days ... seminar was there ... I... was most the slides sir had written ... I just had to arrange the slides ... I had to see which one to put ... ok ... so I had to arrange ... so I wanted to know, how to do it ... so I asked one of the classmate, so he told ya ... and then evening he had called me ... my guide ... so he had called me. So some of the seniors had come ... so I told ...ok sir I will come .. but, I have to come back early ... that that I was going ...I had gone to him just to make slides and just to give mock in front of him ... so I did not know this will happen ... and I don't remember the thing ...I don 't remember that I sat on the bike ... that's all I remember ... after that I remember the person locked the room ... that's all I remember.*

10. Minimal elaborations

Cohelo, Liles and Duffy (1991), found that TBI subjects provide shorter, less elaboration to a topic, more often leaving it to the communication partner to introduce and develop. The results of the present study do not support this observation as minimal elaboration of topic was observed in the group. However, significant difference was not found between the TBI subjects and normal subjects indicating that minimal elaboration is not significant in the TBI group. Reason for this can be attributed to the difference in the characteristics exhibited by TBI subgroups. Out of the three subgroups, RHD subjects showed extra elaboration and LHD subjects showed minimal elaboration. BHD subjects exhibited mixed pattern where one subject showed excessive elaboration and two subjects showed minimal elaboration. Hence the scatter of the features in the subgroups failed to show any significant difference between the TBI subjects and normal group. Following example explains the minimal elaboration in one of the TBI subject.

Example:

I: *Do you like cars?*

S:ya

I: *Do you have some information on that?*

S: *What kind of information?*

I: *Anything on that... its accessories, speed ...*

I: *Do you like cars or bikes*

S:ya both

I: *But in that?*

S: *bikes*

I: *bikes ... Ok! so tell me something about bikes*

S: *Bikes what bikes?*

In conclusion it is seen that, out of ten parameters under topic management four parameters showed significant difference between TBI subjects and the normal subjects. They were 1) Introduction of topic 2) Relevancy of topic changes 3) Non-coherent topics 4) Inappropriate topic changes. Some parameters failed to show significant difference, but the mean scores indicated that TBI group was more affected than normal.

B. Information content

A five point rating scale was used to rate the information content of the experimental subjects in conversation sample of 20 minutes. The rating scale adopted is as shown in Table 8.

Table 8 : C-values for information content for TBI group and Normal group.

Scale	Description	T	C	Total	C Value	Significance
4	Present Always	25.0%	100%	62.5%		
3	Present Most of the times	62.5%		31.3%		
2	Present Some times only	12.5%		6.3%	0.612	0.008**
1	Present rarely					
0	Never present.					

T = TBI group, C = control group, ** = significant at 0.01 level,
C value = contingency value.

Speech of TBI subjects is often considered to be redundant. They take longer time to convey a message. This is reportedly because of incoherence, disfluencies, ambiguity and redundancy (Ehrlich 1988). To support this fact, contingency coefficient is calculated to compare the feature of information content between the two groups as shown in table 5. An association is not seen in the "information content" between the two groups. This suggests that information content is not meaningful and coherent with excessive redundancies, disfluencies and parenthetical remarks in TBI subjects. This is in accordance with the findings of Ehrlich (1988) who reported that in head injured subjects, decreased communicative efficiency was noted as a result of increasing length and slower rate of spoken language. These individuals use more number of words to convey the same message as compared to normal subjects. As per the rating scale in Table 8, information was considered meaningful when the speaker did not show any redundancy, disfluencies or incoherence and had obtained a score of 4 on the rating scale. When the information was meaningful most of the times, it was rated as a score of 3. Score of 2 on the rating scale was given when the information was meaningful sometimes. Score of 1 was given when the information was meaningful rarely and 0 score was given when it was never meaningful. All subjects in the control group (100%) obtained a rating of 4 indicating no coherence, no redundancy and no disfluencies. But in TBI group, out of eight, two patients (25.0%) obtained a score of 4, five patients (62.5%) obtained a score of 3, and one patient (12.5%) obtained a score of 2, indicating that information was always meaningful in two patients, not meaningful most of the times in five patients and meaningful sometimes only in one patient.

Within the subgroups of TBI it was seen that information content was more affected in RHD group and was less affected in LHD and BHD group. Following example shows how information content is affected in one of the TBI subject

Example 1

I: *matte alli yaake swimming maaD beku neevu. (then why do you want to swim there?)*

S: *a..adu..nanna heDkoc Ravindra anta .. avare .. nivu.. a .. a .. jaast ... van squaralli maatra swimming maaDbeku...ii swimmingpuul alii swimming maaDak aagalla ante. (a...my...headcoach ravindra....he....you..a..a...more..you should swim in one square...you cannot swim in this pool)* .

Example 2

I: *TV noDtira nivu ? (do you watch T. V.)*

S: TV modalu noDtide ... naanu ... a ... idu ... puuje maDu maDu noDalla. munce maaDtidde ... chikkavunna aagide ... ivaaga ... ivaaga TV noDbeku ... a ... TV sumaar filam andare hiro aatara tumbaa ishTaa.(before I used to watch TV. ..but because of puja i. am not watching...before I did... when I was young...a...I want to watch a... TV now. many films.. means I like heroes and all).

C. Information adequacy

A five point rating scale was utilized to rate for information adequacy in the conversation samples of experimental and control subjects. The scale is as shown in the table.

Table 9 : C values for information adequacy in the conversation of the two groups

Rating scale	Information adequacy	T	C	Total	Value	Approx sig
4	Always		100%	50%	0.707	0.001 **
3	Most of the times	50%		25.0%		
2	Sometimes	12.5%		6.3%		
1	Rarely	37.5%		18.8%		
0	Never					

T = TBI group, C = Control group,
** = Significance at 0.01 level, C value = contingency value

A five point perceptual rating scale was used to rate for information adequacy in the speech of the subjects. Information is said to be adequate when it satisfies the question asked by the conversation partner. A rating of 4 is given when the information given is always adequate. A rating of 3 is given when the information is adequate most of the times. A rating of 2 is given when information given is adequate sometimes. A rating of 1 and 0 is given respectively when the information given is rarely or never adequate.

A contingency table was obtained for the two groups to compare the four point rating scale as shown in Table 9. It is observed that there is no association between the two groups in terms of information adequacy. Information adequacy is 100% for all the normal subjects and is less than that in TBI subjects. All the normals are rated as 4 on the rating scale suggesting that the information was adequate. In TBI group, none of the patients scored a rating of 4. Four scored a rating of 3, one scored a rating of two and rest of the three scored a rating of 1, indicating inadequate information. The present finding

supports the observation of Hartley and Jensen (1991), who reported that subjects with closed head injury produce only one half or two-thirds the amount of accurate content produced by normal subjects and have drastically reduced information. This was quoted in reference to the narrative discourse but same findings are seen in the study in conversation discourse. The following example shows the difference in information adequacy of a TBI patient and a normal control subject.

Example 1 (normal subject)

I: *matte viikenDalli eenu maDtiraa ? (what do you do on weekends?)*

S: viikenDs alii criket aaDke hogtini alii ... a ... jimkhana anta iide alli ... sayankalanu alli hogutini ... baDminTan matte aaTa aaDake ... matte hostelalli iidre alli frenDs jote maataaDirtini ... horagaDe evaning yarjote enaadru hogutene sumne oDaaDake. (I go to play cricket.. .a.. .there is a gymkhana..there.. .evening also I go there.. .to play badminton....if I am in the hostel then I chat with my friends....evening I go out.. .just for a walk.)

Example 2 (TBI patient)

I: *viikenDs ... satarDe, sanDe yenu maaDtira. (weekends....what do you do on Saturday and Sunday)*

S: TV noDtini, nidre maaDtini asTe. (I watch TV, I sleep ..that's all).

E.AsTe na? (That's all?)

C: dog jote aaTa aaDtini.(l play with dog).

In the first example for the question asked, normal subjects give adequate elaboration, but in example 2, TBI subjects give very less information. Because of this, the investigator had to ask more questions. Togher (2000), in his experiment concluded that adequacy of information differs according to the context. TBI subjects give adequate information when they are in a powerful role. Example, customer seeking information regarding the bus time table. TBI subjects were reported to give less information in other informal conversational situations. In the present study the situation in which they were present was a non-dominating situation so it is likely that the information given was inadequate.

D. Coherence

Coherence is analysed under two features, local coherence and global coherence. A rating scale of 5 was utilized to rate the experimental subjects for given features. Ehrlich and Barry (1989), Glosser and Deser (1990), Hough and Barrow (2003) indicated that global coherence is affected more than local coherence in TBI subjects. Local coherence is the relationship of meaning or context of verbalization with that of the immediate preceding utterances produced by the speaker. Global coherence is the relationship of meaning of content of verbalization with respect to the general topic of conversation.

Table 10: C values for local coherence in the conversation of experimental subjects for a five point rating scale.

Rating Scale	Local coherence	T	C	Total	C Value	Approx sig
4	Always	12.5%	100%	56.3%	0.661	0.006 **
3	Most of the times	62.5%		31.3%		
2	Sometimes	12.5%		6.3%		
1	Rarely	12.5%		6.3%		
0	Never					

T: TBI group, C: Control group, C value: contingency value,
** = Significance at 0.01 level

Table 11 : C values for global coherence in the conversation of experimental subjects on a five point rating scale.

Rating Scale	Global coherence	T	C	Total	Value	Approx sig
4	Always	25.0%	100%	62.5%	0.612	0.022 *
3	Most of the times	25.0%		12.5%		
2	Sometimes	37.5%		18.8%		
1	Rarely	12.5%		6.3%		
0	Never					

T: TBI group, C: Control group, CV: contingency value, * = Significance at 0.05 level

As seen in Table 10 and l l a contingency coefficient was obtained for local coherence and global coherence on the basis of five point rating scale and a comparison between the two groups was made. Rating 4 denotes that the local or global coherence is always present. A rating of 3 denotes that the coherence is present most of the times but

not always. Rating of 2, 1 and 0 denotes that coherence was meaningful sometimes, rarely or never respectively.

The contingency table 10 and 11 shows no significant association between the TBI and control group for both local as well as for global coherence. All the normal subjects scored a rating of 4 indicating a good local as well as global coherence. In TBI group, 12.5% of subjects had a rating of four, 62.5% had a rating of three, 12.5% had rating of 2 and 12.5% had rating of 1 for local coherence. Descriptively most of the subjects were seen to show a good local coherence except two subjects. All normal subjects (100%) obtained a rating of four for global coherence. In TBI group, two of them (25.0%) obtained rating of 4, two (25.0%) obtained rating of 2, three (37.5%) obtained a rating of 3 and only one (12.5%) obtained a rating of 1. In short, half of the subjects showed poor scores and half of them showed better scores.

In summary, both local and global coherence are affected in TBI subjects as compared to normals and from the total percentage it is seen that global coherence is affected more than the local coherence. Within the subgroups of TBI, none of the sub groups showed particular trait in terms of coherence. Local as well as global coherence was affected equally in all the three subgroups viz LHD, RHD and BHD.

E. Communication intent

The communication intent in terms of presence or absence of the features in the speech of TBI subjects was compared with that of the normal subjects.

Table 12 : C values for communication intent of the two groups for presence or absence of the feature.

Parameters	Yes \ No	TBI	CTRL	C value	Approx sig.
1) Greets others a) By themselves b) In response to others	N	50%	50%	0.000	1.00
	Y	50%	50%		
2) Introduces self	N	100%	100%	0.559	0.9
	Y				
3) Starts a conversation.	N	37.5%		0.433	0.055
	Y	62.5%	100%		
4) Asks for information	N	37.5%		0.433	0.055
	Y	62.5%	100%		
5) Asks for assistance in understanding conversation	N	12.5%		0.250	0.302
	Y	67.5%	100%		
6) Criticize the conversation	N	75.0%	12.5%	0.533	0.012
	Y	25.0%	87.5%		
7) Agrees to a part in the conversation.	N	37.5%		0.433	0.055
	Y	62.5%	100%		
8) Disagrees to a part in the conversation.	N	37.5%		0.433	0.055
	Y	62.5%	100%		
9) Fabricates \ imagine events.	N	37.5%		0.433	0.055
	Y	62.5%	100%		
10) Understands advancers in the conversation	N	12.5%	100%	0.250	0.302
	Y	87.5%	100%		
11) Understands blockers in the conversation	N	75.0%	12.5%	0.533	0.012
	Y	25.0%	87.5%		

As shown in Table 12, contingency values were calculated for the feature of communication intent for TBI group and normal group. Contingency value is used to

observe for association between any two given features. This is indicated as present (Y) or absent (N) in the two groups for 11 sub features.

1. Greets others

Table 12 shows that 50% of TBI subjects and 50% of normal subjects greeted by themselves. 50% of TBI and 50% of normal subjects greeted in response to the examiners greetings. So there is an association found between the normal subjects and the TBI subjects for this feature.

2. Introduces self

None of the subjects in TBI and control group spontaneously introduced themselves. An association is seen between the two groups as both the groups exhibited this behavior.

3. Initiates conversation

There is an association seen between normal and TBI subjects for the given feature. The percentage scores indicate that initiation of conversation was seen to be more in normal subjects than in TBI subjects.

4. Asks for information

An association is seen between normal and TBI subjects for this feature. Both the groups sought for information, but the percentage occurrence of such instances was lesser in TBI group than normal subjects.

5. Asks for assistance in understanding conversation.

An association is seen between normal and TBI subjects in this feature. Both the groups asked for assistance in understanding the conversation. However, in terms of occurrence percentage, it was less in TBI subjects than normal.

6. ***Makes critical comments in conversation.***

There is no association seen between normal and TBI subjects for this feature. The control group was seen to use more of critical comments in their conversation than the TBI subjects.

7. ***Agrees to a part in the conversation.***

Association is seen between normal and TBI subjects for this feature. Although the difference was not significant, normal subjects showed higher percentage of agreement to a part of the conversation than the TBI group.

8. Disagrees to a part in the conversation.

An association is seen between the normal and TBI subjects for this feature. The percentage scores however indicate that more number of normal subjects exhibited this feature than TBI group.

9. Fabricate events \ imagines events.

An association is seen between the normal and TBI subjects for this feature. The percentage scores were more in normals than the TBI subjects.

10. Understands advancers in the communication.

There is an association seen between the normal and the TBI subjects, that is, both the groups did not have difficulty in understanding the advancers in the communication. But more number of normal subjects exhibited this feature than the TBI subjects.

11. Understands the blockers in communication.

There is no association seen between normal and TBI subjects for the feature. More number of normal subjects could understand the blockers than the TBI group.

In summary, an association was found between the TBI subjects and normal subjects for almost all the parameters under communication intent except in two parameters, "critical comments" and "to understand the blockers in the conversation". TBI subjects performed similar to that of normal subjects in all the parameters except the two. Based on the results, a conclusion cannot be made with respect to the extent of deviations in terms of communication intent in the TBI individuals. One of the major reasons for the similarity found between the two groups is that, only an excellent converser will follow all the manners in conversation. Especially when the conversation is an informal one. If the same speech acts would have been tested in a very formal situation like enquiry in an office, then may be a difference would have been obvious. In an enquiry situation, a person would have "initiated the conversation" by "greetings". Second reason can be the personality factor. If a person does not like to contradict others, then he will not show the feelings by disagreement or criticism to the other person. In the study, more subjects from the control group adopted critical stand in their conversation

than the TBI subjects. There is no literature available to support the finding. TBI group did not have any problem in understanding the advancers in communication but they had problems in understanding the blockers in conversation. This fact is very well supported by literature. According to Rehar (1992), RHD patients have problem in understanding blockers in communication. Within the subgroups of TBI, no clear pattern emerged with regard to the site of lesion. LHD, RHD and BHD groups showed almost equal scores. One important point noticed here was that in addition to RHD patients, LHD subjects also showed difficulty in understanding blockers in the communication.

Finally it can be concluded that communication intent was not affected in the TBI subjects as compared to normal subjects.

F. Turn taking

Turn taking is another important feature of conversation, which is affected in TBI individuals. Under "turn taking" five features are considered. Frequency of occurrence of each feature was counted and considered as raw data. Performance of TBI subjects and normal subjects on these features was compared and, each one of them is listed separately and discussed.

Table 13 : T- Scores for the feature of "turn taking" for TBI and normal subjects

Sl. No.	Parameters	Gp	Mean	SD	t value	Significance
1.	Non contingent turns	T	13.12	5.41	0.018	0.00 **
		C	0.62	1.40		
2.	Unable to take prosodic cues	T	15.75	9.01	0.005	0.00 **
		C	2.87	3.19		
3.	Rapid shift in the mode	T	10.12	6.77	0.024	0.02*
		C	3.25	3.19		
4.	Persistence in listeners or speakers mode	T	3.87	5.08	0.013	0.098 (NS)
		C	0.62	1.06		
5.	Initiation of turn	T	15.37	9.34	0.054	0.227 (NS)
		C	20.12	5.05		

T: TBI group, C: Control group, SD: Standard Deviation
*: Significance at 0.05, ** = Significance at 0.01, NS = Non significant

Results in Table 13 shows the comparison of performance of experimental and control group.

*1. **Non contingent turns***

According to literature, normal individuals are reported to take contingent turns in conversation (Schegloff, 1987). A comparison was made between the TBI subjects and normal subjects for the given feature. Results suggest that there is a significant difference between the TBI group and normals at 0.01 level. TBI subjects tend to take more of non contingent turns than normal subjects. This is supported by literature where, according to Milton et al., (1984) and Hartley (1994) three out of five adults in their study presented problem in taking contingent turns.

In the study, all the 8 experimental subjects exhibited problems in taking contingent rums compared to their control group. The non-contingent turns can be attributed to lack of perception of flow of conversation. It seemed like they could not perceive the meaning of the preceding turn because of lack of concentration, consequent to which they concentrated on one particular word and started speaking in relation to that word in a non-coherent way. For example:

Example 1

I: *How do you go to college?*

S: *By vehicle*

I: *OK... so you have not stopped driving your vehicle*

S: *Sorry (!) I am not going (0.2) means I didn 't attend the semester.*

In the above example the investigator (I) puts a question about not driving the vehicle. But the subject answered it as not going to the college.

Example 2

I: *So how do you find the place?*

S: *Mysore?*

I: *Ya Mysore....got some friends?*

S: *Like where I study they have comparative system. There ... if one person is getting ninety he will be the topper with A grade... three out three and one person who is getting seventy... seventy is not bad marks... but if people are getting above you, you will get B and C grade. Thank god mine is B grade.*

2. Difficulty in understanding prosodic cues to take over the turn

Prosodic cues are necessary in conversation to take over the turn from the other partner. A normal converser is able to understand the prosodic cues in a sentence to take over the turn. Results from Table 13 show that there is a significant difference at 0.01 level between the two groups indicating that TBI subjects fail to take prosodic cues from the conversation partner in order to take over the turn. This observation supports the proposition by Milton (1984) and Hartley (1995) who reported that TBI subjects had problem in understanding prosodic cues to take over the turn.

Example 1:

I: *But you have nice opportunities in your institute right?*

S:( )

I: *Its nothing like that... there are some people who will be getting 9000-10,000....I don't want to earn more ... between 10,000-15,000 is more than enough...I don't want to earn some 50,000 or so. . . . on...*

Here the subject (S) has not started the turn even when the investigator (I) has ended the question and instead has started the next turn even before the examiner could complete his turn.

3. ***Rapid shift from listeners mode to speakers mode without letting the speaker finish his turn***

This feature was considered to see if the subject could swiftly change the turn. In normal conversation, it is expected that only when one communication partner stops, the other partner initiate the turn. Results from table (2) suggest that there is a significant

difference at 0.01 level, between the groups indicating that TB1 subjects had problem in persisting the conversation adequately in either of the mode. They start speaking abruptly without letting the other person finish his turn.

According to McTear and Conti-Ramesden (1992), normal converser shifts easily from speaker to listener's role without remaining too long in either mode. That is they stay adequately in the respective role. The data on the experimental TB1 subjects in general indicated that these patients stayed in either listener's mode or speaker's mode for a lesser duration and would jump to speak before the partner finishes his turn. This conversation behavior can probably be attributed to "shifting attention" seen in TBI individuals. 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.

Example:

S: *Do you have a television in your hostel?*

I: Ya we have. We have television, we have CD players.... So whenever we want we can watch movies or can

S: *Hey I am only asking questions to you.*

4. Persisting too long in either speaker or listeners mode

This feature is often seen in TBI population where in they persist longer in either speaking or listening mode (Mc Tear and Conti Ramsden, 1992). The result in the present

study however does not reveal a statistically significant difference between the two groups.

According to Mc Tear and Conti-Ramsden (1992), a skilled participant shifts easily from speaker to listener roles without remaining too long in either mode. Ideally speaking, this behavior should be affected in TBI subjects i.e., they should persist longer in one of the modes. However the results do not support such a supposition. This can be attributed to many reasons. TBI group was a mixed group having BHD, LHD and RHD. Observation of raw data revealed that RHD subjects stayed longer in speakers mode. LHD subjects stayed more in listener's mode and in BHD one subject stayed more in listeners mode, one was more in speakers mode and one was adequate in terms of speaking and listening. Because of the scattered nature of group performance, the difference was not significant. Here a set pattern is not seen but it was noticed that five out of eight subjects showed this behavior many times.

Example:

I: *Do you drive vehicle now?*

S: *I... as such... after coming here, doctor told me not to swim, not to drive, not to stand in front of T.V... I told sir please can I drive... that also he told not now, may be after two to three years... if someone who knows driving should sit with you then you can drive. In my home, everyone knows driving .... except my father... he is learnt but he doesn 't drive and my mother knows even my sister knows.... I am the only one....I have got swimming costume for me.... But before going there I had this brain injury so....*

In the above example it is seen that the subject has continued speaking for a longer time for a simple question.

5. *Initiation of turns*

Normal subjects are seen to initiate many turns in a conversation. In contrast, TBI subjects are reported to take less initiation of turns. They initiate very few turns in conversation (Milton, Prutting and Binder, 1984). As seen from Table 13, there is no statistical difference between the performance of control and TBI group. The result does not support the findings of Milton, Prutting and Binder (1984). The reason can be attributed to the fact that, in TBI group, RHD subjects showed a lot of verbosity and maximum initiation of speech. Two of the subjects in BHD also showed similar results. Only LHD group and one subject from BHD group failed to exhibit this feature. i.e., they were very reluctant to initiate the turns. Because of the scattered nature of the features among the subgroups of TBI, significant difference was not seen in initiation of turns. The standard deviation scores are also highly variable and variation is present in the TBI group when compared to that of normal group. Following example shows initiation of turns taken by one of the subject from control group.

Example:

I: *who's your favorite actor?*

S: *Amir Khan.*

S: *And who's your favorite actor?*

I: *Akshay khanna.*

6. Time taken to start the turn

Milton Prutting and Binder (1984) stated that TBI individuals take time to start a turn. To confirm this finding, reaction time taken by the subjects to start a turn, was calculated with the help of a digital clock in seconds. Following table gives the contingency value for the feature by the two groups.

Table 14 : C values for "time taken to start the turn" by TBI group and normal group

Sl. No.	Time taken	TBI	Control	Total mean	C value	Approx sig
1	0.5-1 sec	50.0%	100%	75.0%	0.500	0.149
2	0.5-4sec	12.5		6.3%		
3	0.5-6sec	12.5		6.3%		
4	0.5-7sec	25.0		12.5%		

From Table 14, an association is seen between the two groups, which indicates that both the groups took equal time to start the turn. But from the percentage score, it is seen that TBI subjects took more time to start the turn than normal subjects. 100% of the control group took 0.5 to 1.00 seconds to start the turn. In TBI group, 12.5% subjects took time between 0.5 to 4.00 seconds, 12.5% took 0.5 to 6.00 seconds and 25.0% took 0.5 to 7.00 seconds.

G. Conversational repair

Conversation repair is a necessary strategy present in the conversation to convey a message in an effective manner. In the study, frequency of occurrence of repair was calculated in the conversation of experimental subjects.

Table 15 : T scores of Control and Experimental group for conversation repair strategies

Sl. No.	Parameters		Mean	SD	t value	Significance
1.	Self correction	T	26.62	17.62	0.003	0.063 (NS)
		C	13.75	3.95		
2.	Repair through repetition	T	4.50	4.00	0.019	0.030 *
		C	0.87	1.457		
3.	Repair through clarification	T	7.75	6.45	0.121	0.80 (NS)
		C	8.37	2.32		
4.	Repair through revision	T	14.37	9.51	0.004	0.013 **
		C	4.50	2.32		
5.	Other initiated correction	T	8.12	4.67	0.22	0.00 **
		C	1.75	0.88		
6.	Request for clarification	T	4.62	4.43	0.020	0.082 (NS)
		C	1.62	0.91		

Gp: group, SD: standard deviation, T: experimental group,
C: control group, NS = Non significant

In this section, an attempt was made to find the pattern of "self correction" and "other initiated correction" in the conversation of the subjects. In self correction, it was further attempted to see if corrections were through repetition, clarification or revision was seen.

1. Self repair

Results suggest no significant difference in the mean performance of TBI group and normals. Scores indicate that self-correction strategies were more in TBI subjects than normal subjects. This further suggests that TBI subjects had made similar efforts in initiating the repair as in case of normal subjects.

Further, in the self correction strategy, no significant difference is seen for correction through "clarification" between the TBI group and the normal group. But a highly significant difference is noticed for "repetitions" and "revision" at 0.05 level between the two groups. This shows that normal subjects used more of clarification as repair strategy and TBI group used more of repetitions and revisions as a repair strategy. However there is no available literature to support above findings.

The possible reasons for use of repetitions and revisions as a repair strategy could be as follows:

a. More number self correction strategies were seen in TBI subjects than normal subjects and this could be the result of variability in terms of group features. Five of the eight subjects were verbose with lot of disfluencies because of which there were many self corrections observed in TBI subjects.

b. Many disfluencies were observed in TBI subjects. These disfluencies were mainly in terms of phrase repetitions, word repetitions filled pauses, and false starts.

c. The reason for observation of more revisions can be reasoned on the basis of their inability to add on further information in speech in terms of giving clarification. Using the intact syntax or semantic abilities, TBI subjects tended to revise the sentence rather than clarifying the same. On the other hand, normal subjects gave more of clarifications than revisions.

Example I- Repetition

iigluu gohati ... gohati iide..... gohati iide. . . .ad ....adake hoogtini.(eve *now Gohati.. Gohati ....is there... Gohati is there.... that's why I am going.)*

Example 2 - Revision

S: Actually for our previous batch., one....one of the paper was tough... math paper was more.... This one.... Physics was tough. Math paper was damn easy and chemistry was easy.

Example 3 - Clarification

I: You didn't want to go into law?

S: */ did not.... Its not like I did not want to ... but its not so good in Mysore Its good in Bangalore.*

Within the TBI group, RHD subjects showed more of self-repair than LHD subjects. In BHD group one subject showed more of self-repair and the other two subjects showed very few self-repairs.

2. Other initiated repair

Other initiated repair is seen when the subject fails to convey the message and the partner asks for the clarification. Results indicate that there is a significant difference at 0.01 level between the TBI group and normal group for the feature of other initiated repair, indicating that other initiated repair is more in case of TBI subjects than in case of normal subjects.

Other initiated repairs were more in case of TBI subjects because of increased redundancy, incoherence, disfluency, reduced information, fast rate of speech and unintelligibility in their speech leading to inability of the conversation partner to understand the message conveyed by the subject. In addition to this, they have less perception of their own speech and they do not try to self-initiate the repair. In total, all these factors lead to more of other initiated repair.

According to Schegloff, Jefferson and Sack (1977), self-initiated repair should always be more over the other initiated repair in a normal conversation. Observations in the present study are not in accordance with the findings. It is seen that self initiated repairs are more than the other initiated repairs in both the groups which indicate that the repair parameter is not affected in TBI subjects. But individually, the mean scores show a significant difference in the other initiated repair between the two groups. Normal subjects showed less number of other initiated repairs compared to TBI group. Also they showed less number of self-initiated repairs as compared to normal subjects. Within the TBI subgroup, no set pattern was observed in each group.

3. Request for clarification by the TBI group.

In normal conversation, if the partner in the listener's mode does not understand a part of speaker's speech then he tends to ask for clarification. This feature is affected in TBI individuals, where they do not ask for clarification even if they do not understand the conversation (Marsh and Knight, 1991). Results indicate that there is no significant difference between the groups for the parameter, thus contradicting the findings in literature. It may be reasoned that TBI individuals did not acknowledge the communication partner or showed less interest in the conversation of the partner because of which they did not ask for repetitions or clarification but choose to respond in a way word manner. And in case of normal subjects, because they understood the speaker they did not ask for clarification.

Summary

In summary, out of 10 parameters considered under topic management of the conversation, TBI group and control group differed significantly with respect to four parameters. These were (a) Relevancy of topics, (b) Non coherent topic changes, (c) Perseveration and (d) Responses which expand the topics. Under turn taking in conversation, out of 6 parameters, TBI group and control group differed significantly in terms of non-contingent turn taking, inability to understand prosodic cues to take over turns, and rapid topic shifts. For the feature of conversation repair, TBI subjects were seen to use more of self corrections than control group. But frequency of other initiated repairs was also more in them as compared to normals. They were seen to use more of revisions and repetitions as a strategy for self correction. Control group was seen to use more of clarification as a self repair strategy.

Results from the qualitative analysis of information content reveals that in terms of information adequacy and coherence, a significant difference was observed between the control and experimental group. For the parameter of communication intent, there was no significant difference seen between the two groups. Both were seen to perform equally well on all the tasks except, for use of critic markers and understanding blockers in the conversation, where the control group performed better than the experimental group.

Within the subgroup of TBI a pattern was seen where, RHD group exhibited excessive elaboration and difficulty in almost all the parameters given. LHD group in contrast showed less conversation output with more of minimal responses and less information adequacy. LHD group is observed to be less affected than RHD group.

BHD group showed mixed results where one subject exactly resembled characteristics of RHD group and one group resembled characteristics of LHD group.

Based on the observations and results obtained in the study, a severity rating scale for screening and identifying communication impairment in conversation mode in TBI individuals is proposed. The scale and other details are enclosed in Appendix B.

SUMMARY AND CONCLUSION

The past decade has seen an enormous shift in the study of verbal deficits following traumatic brain injury. There is a strong agreement that discourse skills, rather than performance on the tests of discrete linguistic functioning should be the focus of assessment of speech in TBI subjects. Most of the TBI subjects, who pass traditional aphasia batteries, show persisting discourse impairments. So it is not justifiable to administer language tests on TBI individuals and to declare them as having no impairment. Keeping this need in mind, an effort was made to formulate a severity scale which will help to assess discourse impairment even if they pass in aphasia batteries.

For the study, experimental group comprised of 8 TBI subjects with moderate to severe injury according to Glassgow Coma Scale, without any aphasia (confirmed by Western Aphasia Battery). Within TBI group there were 3 subgroups-viz Left Hemisphere Damage (LHD), Right Hemisphere Damage (RHD), and Bilateral hemisphere damage (BHD). Age, sex and education matched normal subjects were selected as control group. A conversation sample was elicited between the investigator and the subjects on preset topics for two to three sessions. A 20 minutes sample of the third session was considered for analysis. Transcription of recorded sample using Romans transcription was done. Various speech discourse parameters under the propositional and non propositional aspects of conversation was analysed. The details are given in the table below.

Table 16 : Propositional aspects of conversation.

Parameter	Features
A. Topic management*	1. Introduction of topic 2. Relevancy of topic 3. Rapid topic shift 4. Non coherent topic changes 5. Inappropriate topic changes 6. Perseveration 7. Responses which expand topics 8. Minimal responses 9. Extra elaboration to topics 10. Minimal elaboration
B. Information adequacy	
C. Information content	
D. Coherence	1. Local coherence 2. Global coherence
E. Communication intent	1. Greets others a. By themselves b. In response to others 2. Introduces self 3. Starts a conversation. 4. Asks for information 5. Asks for assistance in understanding conversation 6. Criticize the conversation 7. Agrees to a part in the conversation. 8. Disagrees to a part in the conversation. 9. Fabricates \ imagine events. 10. Understands advancers in the conversation 11. Understands blockers in the conversation

Table 17 : Non propositional aspect of conversation

Parameter	Feature
A. Turn taking*	1. Non contingent turns 2. Unable to take prosodic cues 3. Rapid shift in the mode 4. Persistence in listeners or speakers mode 5. Initiation of turn 6. time taken to start a turn
B. Conversation repair*	1. Self correction 2. Repair through repetition 3. Repair through clarification 4. Repair through revision 5. Other initiated correction 6. Request for clarification

Frequency of occurrence of each parameter was counted with the help of transcribed data. Frequency count was done for 3 parameters. (* mark in the table) and a five point rating scale was used to assess the remaining parameters.

The results were statistically verified for significant difference in performance between the TBI individuals and normal subjects. Following parameters showed a significant difference between the TBI group and normal group.

- Propositional aspects of conversation.

  A. Topic management

     1. Irrelevant topic shifts

Based on these parameters a rating scale was developed (enclosed in Appendix B) which will help the clinicians to tap the severity of conversational impairment in TBI individuals.

It is concluded that TBI individuals have impairment in discourse when compared to normal subjects because of the sustained nature of injury. Also a variation in the discourse pattern was evident for subgroups of TBI viz RHD subjects showed a verbose pattern with extra elaboration and inability to maintain topics of conversation. Whereas LHD group showed less conversational output with minimal responses and reduced informativeness. Even though a difference in the conversation traits was seen in various subgroups, the data is not sufficient to generalize the obtained findings.

Future recommendations

1. Discourse impairment in a informal situation should be studied
2. More number of TBI subjects in terms of site of lesion and severity should be studied to establish a definitive trait in conversation of these subgroups.

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2. Non coherent topic changes

3. Peseverstion in topics

4. Elaboration of responses to expand topics.

B. Informativeness

1. Information content

2. Information adequacy

C. Coherence

1. Local coherence

2. Global coherence.

D. Communicative intent.

1. Criticizing the conversation

2. Understanding blockers in conversation.

- Non propositional aspects of convrastion.

A. Turn taking

1. Non contingent turns

2. Inability to understand prosodic cues to take over the turn.

3. Rapid shifts in turns.

B. Conversation repair

1. Self repair through repetition

2. Self repair through revisions

3. Other initiated repair.

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APPENDIX-A

The parameters of propositional and non-propositional aspect of conversation were quantified as follows. The scoring procedure adopted for each of the parameter is shown below.

A. Topic management

1 .Introduction of topics

The total number of topics introduced by the subject in twenty minutes sample was calculated.

2. Relevancy of topics

Out of totally introduced topics how many were relevant to the present context or preceding topics of conversation was calculated.

3.Non coherent topic shifts

The total number of non coherent topic shifts were calculated.

4.1n appropriate topic changes

Number of totally "inappropriate topic" shifts were calculated.

5. Rapid topic shifts

The number of times a subject shifted the topics rapidly within few seconds was calculated.

6. Perseveration

Perseveration was identified as present if the subjects were seen to continue with the same topic even when the conversation partner change the topic. Instances of observed behavior was calculated.

7. Responses which expand the topics

In a particular topic, the number of times a subject actually elaborated or added information to expand the topic was calculated i.e. number of responses which showed elaboration was counted. Minimal responses and non-elaborative responses were excluded. Counter questions like "do you mean to say" or "what does that mean" were taken as elaborative responses.

8. Minimal responses

Responses like "yes", "no", "I don't know" or any other responses where the investigator felt that more elaboration could have been made but was not given by the subject was considered as minimal response. The total number of such occurrences was counted.

9. Extra elaboration of topics

If one particular topic or turn was excessively explained, it was considered as extra elaboration of the topic. Total number of such occurrence was calculated.

10. Minimal elaboration of topic

If any topic was explained minimally and more elaboration could have been possible, it was considered as minimal elaboration of topic. Total number of such occurrences was calculated.

B. Information content

A five point perceptual rating scale was formed to rate the information content in the speech of the subjects.

The information content can be reduced because of redundancies, disfluencies, parenthetical remarks, beating around the bush etc. The rating scale for information content was as follows:

4 - Meaningful always

3 - Meaningful most of the times

2 - Meaningful some times only

1 - Very rarely meaningful

0 - Never meaningful.

C. Information Adequacy

A five point perceptual rating scale was formed to rate the information adequacy in the speech of the subjects during conversation.

4 - Adequate always

3 - Adequate most of the times

2 - Adequate some times

1 - Adequate rarely

0 - Never adequate

D. Coherence

a. Local coherence

Local coherence is the relationship of meaning or content of verbalization with that of the immediately preceding utterance produced by the subject was seen. This feature was perceptually rated on five point rating scale as follows:

4 - Local coherence present always

3 - Local coherence present most of the times

2 - Local coherence present some times

1 - Local coherence present rarely

0 - Lack of local coherence

b. Global coherence

It is the relationship of meaning or content of verbalization with respect to general topic of conversation. This was perceptually rated on a four point rating scale by the examiner

4 - Global coherence present always

3 - Global coherence present most of the times

2 - Global coherence present some times

1 - Global coherence present rarely.

0 - Lack of global coherence.

E. Communicative intent

Purpose of each turn is analysed for following factors.

1. Greeting others

Subjects greet the investigator by himself or greets in response to the investigators greetings.

2. Introduces self

Subjects spontaneously introduced themselves such behavior was observed.

3. Starts a conversation

Subjects start the conversation by themselves or they wait for the investigator to start the turn.

4. Asks for information.

Subject asks the investigator about some information.

5. Asks for assistance in understanding the conversation

Subject makes an effort to understand the investigators conversation by counter questioning or by other verbal cues.

6. Makes critical comments in the conversation

When the subject did not like any part of the investigators speech, he \ she passes any critical comment.

7. Agrees to a part in conversation

Subject expresses agreement in a conversation over the investigators speech.

8. Disagrees to a part in the conversation

Subjects expresses disagreement in verbal form over the investigators speech.

9. *Fabricates events / imagine events*

Subjects fabricates events or describes certain events by imagination.

10. Understands advances and blockers

Subjects understands "advancers" or "blockers" in the conversation as a strategy to expand communication or consider it in a negative way.

All the above parameters under communication intent were noted for presence (if the feature was present) or absence (if the feature was absent) in conversation of each subject.

F. Turn taking

1. Non contingent turns

The responses on the turns which the patient took and which were not in relation to the preceding turn of the conversation partner was counted as non contingent turns.Number of non contingent turns in a 20 minutes conversation was counted.

2. Difficulty in understanding the prosodic cues to take over the turn

A conversation partner can cue for termination of his\her turn in conversation through alteration in prosody or a pause. It is normally understood that the other partner should understand such cues and take over the turn. The number of times subject failed to take the prosodic cues was counted.

3. Rapid shifts of turns from listeners to speakers mode

Sometimes a person starts speaking without letting the speaker finish the turn. Frequency of occurrence of such behavior in subjects was counted.

4. Persisting too long either in speakers or listeners mode

In a skilled conversation, both partners should take turns without staying longer in a particular mode for a longer time. The number of times subjects elaborated a turn excessively or avoided speaking when turn had to be taken was counted.

5. Initiation of turn

The frequency of occurrence of self-initiation of turns by the subjects were counted.

6. Longer time to start the turn

With the help of a digital clock, the time taken by a subject to start the turn after the preceding turn was over was seen. The range of time was plotted for all the subjects.

G. Conservation repair

1. Self initiated repair

The number of times the person tried to correct his own speech was calculated. Such self-repairs could be in the forms of

a. Repetitions - Its good! Its good!
b. Clarifications - I am going I mean I am going to the temple first and then to the market.
c. Revisions -I am going … I want to go to the school.

Frequency of each repetition, classification and revision was calculated. Total of this was calculated as self repair strategies used.

2. Other initiated repair

During conversation if the conversation partner asks for clarifications in the form of questions like, "can you please say it again", " I didn't get it", "what do you mean by that" to the speaker then it is called as other initiated repair. Occurrence of such behavior was counted.

If the listener asks for repetition because he was not able to hear properly, was not considered as other initiated repair..

3. Request for clarification

When subjects ask for clarification from the investigator when he is in listeners mode it is called as request for clarification. The frequency of occurrence was of such clarifications were counted.

APPENDIX-B

Scale For Assessment Of Conversation Impairment In Individuals With Traumatic Brain Injury

Preface : The scale for assessment of conversation impairment in individuals with traumatic brain injury is developed based on the outcome of the study. The study was conducted on 8 TBI individuals wherein a descriptive analysis of various parameters of speech in conversation was carried out and compared with that of normals. The grossly impaired features in TBI group, as compared to their normal counterparts were extracted using statistical applications. These features are included in the scale with the assumption that they are significantly deviant in TBI individuals with either the left, right or both hemisphere damages.

How to use the scale

1) Audio record a free conversation speech sample of the TBI individual in a natural or semi structured conversation set up for a minimum duration of 30 minutes. If the sample is insufficient or if it is not truly representative, the examiner may choose to collect more speech samples.
2) Transcribe the speech samples using standard IPA symbols for the phonetic units and various symbols to indicate various features in conversation as given below.

Symbols	*Where to use them*
1) [[	Overlapping of two sentences
2) =	Continuation of two lines.
3) -	Abrupt pause
4)	Small pause between words
5) (2) meaning a pause of duration 2 seconds	A long pause without any audible sound with time in seconds indicated within brackets.

What is assessed in the scale?

Conversation impairment is assessed under two major categories and sub features as listed below.

Category	*Features* *
I. Propositional aspects of conversation.	A. Topic management B. Informativeness C. Coherence D. Communicative intent.
II. Non propositional aspects of conversation	A. Turn taking B. Conversational repair

The sub features are listed in the scale

Key for assessment of features

A binary marking system is adopted. The presence of a deviant behavior is scored as '1', and absence of a deviant behavior or normal behavior is scored as '0'. The total scores obtained for 16 features on the scale is divided by 16 and multiplied by 100 to obtain the **conversation quotient.** That is

$$\text{Conversation quotient} = \frac{X}{16} \text{ multiplied by } 100 \text{ (X= total score obtained)}$$

Cut off for assessment of severity of the disorder

Range of Scores	*Category*
0-25	Normal
26-50	Mild
51-75	Moderate
76 - 100	Severe

Scale

Feature assessed	Score
A. Topic management 1. Irrelevantly introduced topics. 2. Non coherent topic changes 3. Perseveration in the topics 4. Inadequate elaboration of responses to expand topics.	**1)**_____ **2)**_____ **3)**_____ **4)**_____
Total	
B. Informativeness 1. Non-meaningful information content 2. Inadequate information content	**1)**_____ **2)**_____
Total	
C. Coherence 1. Absence of local coherence 2. Absence of global coherence.	**1)**_____ **2)**_____
Total	
D. Communication intent 1. Inability to criticize in the conversation. 2. Inability to understand blockers in the conversation.	**1)**_____ **2)**
Total	
E. Turn taking 1. Non contingent turns in the conversation. 2. Inability to understand prosodic cues in the conversation to take over the turn 3. Rapid turn shift from the listeners mode to speakers mode.	**1)**_____ **2)**_____ **3)**_____
Total	
F. Conversation repair. 1. Too much of self repair through repetition 2. Too much of revisions through revisions. 3. Too much of other initiated repair.	**1)**_____ **2)**_____ **2)**_____
Total	
Total score	
Conversation quotient	

Guidelines for scoring the various parameters

1.Irrelevantly introduced topics

If the topic introduced by the subjects is not relevant to the context of the conversation or to the previous responses then it is said to be affected and score this as 1. If the topics are relevant then score it as 0.

Eg: I: What is your dissertation topic ?
S : It is related to the nutrocity properties of food colorants.
I: So which colour is the best.
S : According to me, light blue color and light… and navy blue color is the best.
I: But we don't put these colours in food ?
S : No - we don't put there colours in food ... there are some ... like ... somethings are there in which are add those colours.
I: hu…
S : But I like these two colours in clothes and all its ... so tempting.
I: So you like these colours in food, but you are studying the colours in food no ?
S : Food *me aaise kuch nahi hai...* it should be tasty that's it!
I: ha?
S : *Muze accha tasty khana chahiye hota hai aur kuch nahi. (I only want tasty food that's it.)*

This conversation sample can be taken as irrelevant topic shift. Irrelevant topics are coherent but are not related to the previous response or context.

2. Non coherent topic changes

Topic changed should be totally non coherent. Non coherent topic changes are usually incomprehensible but has distant relation to the previous topics.

Eg: I: matte bere yenu madutira nivu? *(What else do you do?)*
S: ha allaa ...bramhanawaru gottiratte andare bereawarage. ...avaru ammaa appaa helkodtare… adu.....naavu...frend, nannaa frends keladre naanu helalla. awaru appaa heltare.. .idu…naanu…. avaru...naanu helbaarado.. .awaru kivige heltare. *(ha no ....bramhavanavaru will know that is for others ... they mother father teach them...that...we...they...I...shouldnot tell ...they ears tell)*

This conversation topic can be considered as non coherent because it is not related to the question but is related to the general theme of conversation.

If the topics are non coherent then score this as 1. If they are coherent then score it as 0.

3. *Peseveration in the topic*

If the converser persists in one topic and does not change even if the other conversation partner changes the topic then it is considered as perseveration. If perseveration is present, score it as 1 and if absent then score it as 0.

Eg: S: Ramkrishnaparmhansa . . . yavaglu..nim..nimage...avaru annaa kodtare. Appaa avaru ...ammaa...avaru...yella avaru. avre ilia andare yaaru illa. *(Ramakrishnaparamahamsa ...always you..to you ...he gives rice. He is father and mother...he ..he is everything. If he is not there nobody is there)*

I: sari ... matte nimma appaa *enu kelasa madatare? (OK..what does your father work as?)*

S: avru helidare, devaru sikke siktare...illa andare ilia, matte naanu heltini...nanna frend heltini...avaru partii madtare...*(if they say, God will be available . .otherwise no...and I tell you... my friend tell you .. they make party....)*

In the above example, there is topic change made by the investigator (I), still subject continued to speak on the same topic.

4. *Inadequate responses to elaborate the topics.*

In a particular topic, out of total responses adequate number of responses should be elaborated to expand the topic. In TBI individuals very few responses are elaborated. If it is inadequate elaboration then score it as 1 and if adequate then score it as 0.

Eg:l

I: so what are your favorite hangouts?

S: ok. ..for me if I have to eat chicken I prefer chicken hut. If I have to eat veg then we go to khana khajana, jewel rock, viceroy. And if I don't have any money then we go to Bihari mess.

I: talking about food, tell me what all dishesh do you like?
S: I basically like nonveg, then in veg I like paneer, pizzas and burgers.

Eg: 2

I: what do you like in food?
S :m....m.. .mm in food ...nothing special.
I: nothing special?
S: Ok...chapatis.
I: That's it?
S: chapatti and rice.

Example number 1 is of a subject from normal subject and example 2 is of a TBI subject. In example 1 all the turns are elaborated unlike in example 2 where the turns are not elaborated.

5. *Information content is not meaningful*

The information is considered nonmeaningful when the speaker exhibits redundancy, disfluencies, or incoherence in the speech. If the information provided by the subject is non meaningful then score it as 1 and if meaningful then score it as 0.

Eg: I: matte alli yaake swimming maad beku neevu. (then why do you want to swim there?)
S: a..adu..nanna hedkoc Ravindra anta .. avare .. nivu.. a .. a .. jaast ... van squaralli maatra swimming maadbeku...ii swimming puul alli swimming maadak aagalla ante. (a...my...headcoach ravindra....he.... you..a..a... moreyou should swim in one square.. .you cannot swim in this pool).

6. *Information is inadequate.*

If the clinician feels that the information given by the subjects is not adequate then score it as 1 and if it is adequate score it as 0.

Eg: I: *matte viikendalli eenu madtiraa ? (what do you do on weekends?)*
S: viikends alli criket aadke hogtini alli ... a ... jimkhana anta iide alli ... sayankalanu alli hogutini ... badmintan matte aata aadake ... matte hostelalli iidre alli frends jote maataadirtini ... horagade evaning yarzote enaadru hugutene sumne odaadake. (I go to play cricket...a...there is a

gymkhana..there...evening also I go there...to play badminton....if I am in the hostel then I chat with my friends.. ..evening I go out.. Just for a walk.)

Example 2 (TBI patient)

I: V*iikends ... satarde, sande yenu maadtira. (weekends....what do you do on Saturday and Sunday)*
S: *TV nodtini, nidre maadtini aste. (I watch TV, 1 sleep ..that's all).*
I: *Aste na ? (That's all?)*
S: *dogj zote aata aadtini.(I* play with dog).

In the first example adequate elaboration for the asked question is given but in example two very less information is given. Because of this the investigator had to ask more questions. The first sample is obtained from normal subjects and second one is obtained from one of the TBI individual.

7. Local coherence

Local coherence is the relationship of meaning or context of verbalization with that in the immediate preceding utterances produced by the speaker. It is affected in TBI individuals. If local coherence is absent then score it as 1 and if present then score it as 0.

Eg:

a..adu..nanna headcoach Raniradzu anta .. aware .. nivu.. a .. a .. dzust ... one squaralli matra swimming ma:dodu... I: swimming pool… a be : kache swimming madak agalla ante.

Above example shows affected local coherence in TBI subjects. There is less relation between the adjacent words.

8. *Global coherence.*

Global coherence is the relationship of meaning of content of verbalization with respect to the general topic of conversation. If global coherence is absent then score it as 1 and if it is present then mark it as 0.

9. *Inability to criticize in the conversation.*

A normal speaker can criticize in the conversation but TBI subjects fail to show the feature. If it is absent then score it as 1 and if it is present then score it as 0.

10. Inability to understand blockers in the conversation.

Blockers are the statements used by the converser to turn the conversation away from another participant's goal. If a conversation partner blocks the conversation the other partner must find a way to make a repair in order to advance the conversation. TBI subjects fails to understand the blockers and do not try to repair it.

Eg: S: *that is there...I am too emotional...but after coming here what has happened to me is...I just don't want to stay here...I can work anywhere.. Bangalore... anywhere... even abroad...but I don't know where will I get the job...*

I: *But you have nice opportunities in your institute right ?*

S:( )

I : *Once you are postgraduate from .... this*

S : *Its nothing like that... there are some people who will be getting 9000-10,000....I Don't want to earn more ... between 10,000-15,000 is more than enough...I Don't want to earn some 50,000 or so.....on...*

In the above example the investigator has blocked the conversation by asking *"But you have nice opportunities in your institute right ? "*, but the subject could not understand the sudden block and investigator had to explain it to her in the next turn.

If the subject is poor in understanding the blockers, score this as 1 and if the subject is good at understanding the blockers, then score this as 0.

11. *Non contingent turns*

TBI subjects present problem in taking contingent turns in a conversation. If turns are not contingent then score this as 1 and if contingent score it as 0.

Eg: I: How do you go to the college
S : By vehicle
I: OK... so you have not stopped driving your vehicle
S : Sorry (!) I am not going (0.2) means I didn't attend the semester.

In the above example the investigator (I) put a question about not driving the vehicle. But the subject answered it as not going to the college.

12. Inability to understand prosodic cues to take over the turn.

Prosodic cues are necessary in conversation to take over the turn from the other partner. A normal converser is able to understand the prosodic cues in a sentence to take over the turn. Prosodic cues include change in intonation pattern or pauses. If subject is unable to understand prosodic cues to take over the turn score it as 1 and if able to then score it as 0.

I: But you have nice opportunities in your institute right ?
S:( )
I : Once you are postgraduate from …. this
S : Its nothing like that… there are some people who will be getting 9000-10,000....I Don't want to earn more ... between 10,000-15,000 is more than enough.. .I Don't want to earn some 50,000 or so. . . .on…

Here the subject (S) has not started the turn even when the investigator (I) has ended the question and instead has started the next turn even before the examiner could complete his turn.

13. Rapid shifts in turns.

In normal conversation, it is expected that only when one communication partner stops, the other partner initiates the turn. TBI group has problem in persisting the conversation adequately in either of the mode. They start speaking abruptly without

letting the other person finish his turn. Such behavior should be noted in the conversation of the subject. Presence of the feature gets score of 1 and absence of it gets score of 0.

Eg. S: Do you have a television in your hostel?
I: Ya we have. We have television, we have CD players.... So whenever we want we can watch movies or can
S: [Hey I am only asking questions to your

14. Self repair through repetition.

TBI subjects use more of repetition as a repair strategy in conversation, which is not seen in case of normal subjects. If too much of repetitions are seen then score it as l,if not then score it as 0.

Eg: Iglu Gohati... Gohati i:de.... Gohati ide ..... ad ....adake hogtini.

15. Self repair through revisions:

TBI subjects also use more of revisions as a repair strategy in conversation.

Eg: Actually for our previous batch one . . . .one of the paper was tough... math paper was more.... This one.... Physics was tough. Math paper was damn easy and chemistry was easy.

16. Other initiated repair.

Other initiated repair is seen when the subject fails to convey the message and the partner asks for clarification in terms of question, or requests for clarification.

Eg. I: what business are you doing ?
S fabrication
I: fabrication ?
S .welding & all
I: ok so welding workshop
S :ya

Here subject did not convey the information about fabrication so investigator had to ask about it in terms of question.