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An Exploration of Cohesion and Coherence Skills in Neuropsychiatric Disorder: Speech Language Pathologist Perspective

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Abstract

Discourse task is assumed to unveil the dyssynchrony between thought and language in an Individual with Schizophrenia (IWS). We investigated the narrative discourse abilities of a schizophrenia participant using qualitative and quantitative methods of discourse analysis. Discourse samples of picture description and narration were video recorded and transcribed using International Phonetic Alphabet (IPA). The transcribed samples were subjected to two methods of analysis such as qualitative and quantitative discourse analysis to see the pattern of discourse production. The qualitative analysis of discourse was carried out using a standardized "Discourse Analysis Scale" (DAS) and the quantitative analysis was done using Thematic-Unit Analysis (T-unit analysis) for narration and picture description task. The qualitative analysis of discourse revealed deficits at the level of propositional and non-propositional aspects of communication for narration and picture description task. Quantitative analysis revealed a higher proportion of T-units for picture description task. In conclusion, it is important to establish both qualitative and quantitative analysis of discourse to document the presence of deficits at propositional and non-propositional aspects of communication. Using both the method of analysis would help the clinician to profile the cognitive-linguistic impairment in an IWS, which will further facilitate the clinician to device and deliver better treatment for IWS.

Keywords: Discourse analysis; Qualitative analysis; Quantitative analysis; Thematic unit analysis; Discourse analysis scale

Introduction

Schizophrenia is a neuropsychiatric disorder, characterized by a constellation of clinical signs and symptoms along with some degree of functional impairment. The deficits would lie in the domains of thought, language and communication aspects of an individual [1]. The characteristic symptoms of schizophrenia include delusions, disorganized speech, hallucinations, and catatonic behaviour. All these symptoms would result in functional limitations in effective communication, social participation, social relationships, academic achievement, or occupational performance, individually or in combination. Individuals with Schizophrenia (IWS) lack goal-oriented language behaviour. The clinical features in Schizophrenia are classified as being 'positive' or 'negative. The features that are considered as positive symptoms of schizophrenia include hallucinations, delusions and thought disorders. Delusion is a strong belief, which has no basis and interrupts a normal flow of language. Some of the psychotic conditions such as mania, depression, organic syndromes, and drug overuse are accompanied by delusional thoughts [2]. However, delusions are extremely common in schizophrenia and the content of schizophrenic delusion is as rich and diverse as the human imaginations.

Hallucinations are associated with the senses and can be olfactory, tactile, visual, gustatory and auditory in nature. The external misattribution of internally generated events can result in verbal hallucinations and other positive symptoms [3]. Cognitive model of Frith [4] describes three hypotheses for hallucination such as intentional deficit (weak intention of speech act), trouble in planning (careless and neglect of the environment due to intensification of automatic action) and trouble of agentivity (The patients believe that their acts are influenced by an internal force and they are not the initiators of their activities). IWS exhibit trouble in agentivity which results from the impairment at action monitoring (a subcategory of source memory) [3,5]. As a result, IWS attribute their self-generated perceptions to an external source. Hence, the origin of speech problems in schizophrenic patients lies in the "Theory of Mind" (ToM) [6,7].

The ToM deficits in IWS has been widely investigated by Frith and his colleagues. According to Frith [3], the cognitive impairment in schizophrenia can be related onto three abnormalities of schizophrenia such as disorder of willed action, disorder of self-monitoring, and disorder of ToM. Frith explains that the disorder of ToM develops after the first episode of illness and is responsible for the emergence of hallucinations, incoherent speech and delusions of reference in IWS. Therefore, much of the potential work done on schizophrenia support the contention that incoherency of speech in IWS is due to the deficit in ToM [6,8]. Moreover, Abu-Akel [9] reported hyper-theory of mind in IWS, to which the psychopathological symptoms of hallucinations, delusions of reference and incoherent speech can be attributed.

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Discourse Deficits in Individuals with Schizophrenia

Discourse is defined as "continuous stretches of language or a series of connected sentences or related linguistic units that convey a message" [10]. This discourse does not have a strict set of rules, which specifies grammaticality as seen in sentence formation, nor specified length. A complex system of cognitive and linguistic processes is required for the performance of discourse, any deficits at this system level can impair the use of language. Studies have shown the impaired performance of discourse for different brain pathologies. Therefore, discourse studies facilitate the understanding of brain-behavior relationships. Specifically, the pattern of behavioral disruption associated with focal and diffused brain injuries can be explored through the analysis of discourse grammar [11].

Findings regarding the discourse impairment in schizophrenia merely reflects an underlying thought process disturbance. The analysis of discourse in schizophrenia has documented globally spared syntax within sentences [12], with deficits at local coherence [13]. Though the patients with schizophrenia demonstrate preserved semantic knowledge, they exhibit disorganization of the semantic system [14,15]. Discourse task is assumed to unveil the dyssynchrony between thought and language in IWS. Discourse in IWS is characterized by deficits such as poverty of content, clang association, and word salad. The most striking feature of schizophrenia is that the patient can talk fluently and excessively with correct grammatical elements in it but lacks insight about the topic, coherence, clear content, and direction due to loosened association of ideas, resulting entirely of neologistic jargon. This results in a discourse that has no content or adequate message in it termed as poverty of content. Disordered discourse is considered as the central feature of schizophrenia. However, not all patients with schizophrenia present disorganized discourse and the features are heterogeneous in nature. Elucidating the cause of disordered discourse in schizophrenia remains uncertain among researchers. Some theories postulate a language-specific interpretation [12,16,17]. This theory states that the disordered discourse in schizophrenia is due to the impaired language specific processes. Moreover, this theory does not contemplate the breakdown at general cognitive processes. Schwartz [18] has claimed that disordered discourse in schizophrenia is not due to the deficit in language processes but rather an impairment in cognitive processing and selective attention. Similar findings were reported by Lanin-Kettering and Harrow [19], they hypothesized that the discourse disturbance in schizophrenia is not the result of the language-specific deficit but is due to the underlying deficit in cognitive processing and conceptual thinking which are manifested as a behavioural deviation. Some of the cognitive process such as attention and memory [20], executive function [21] are reported to be impaired in schizophrenia.

Berenbaum et al., [22] investigated whether poverty of speech and FTD are associated with a variety of cognitive variables. The authors claim that all the cognitive variables have been associated with at least one of the two forms of verbal communication disturbance such as alogia and FTD (disturbance in coherence of speech). The study reported disturbances in executive process such as planning as responsible for diminished verbosity and syntactic complexity, and poor discourse coherence in IWS. Disturbed discourse coherence was strongly associated with working memory than attention/concentration. In contrast, diminished verbosity was strongly associated with fluency than with working memory performance. The findings of this study add on to the literature that poverty of speech/diminished verbosity is not associated with word finding difficulties but due to the poor fluency and planning abilities. This link between fluency and poverty of speech reflects underlying impairment in planning and generating ideas for discourse in IWS.

Momeni and Raghibdoust [8] investigated the relationship between incoherency of speech, delusions and hallucinations in 18 Persian speaking schizophrenics with positive symptoms. To analyze the discourse characteristics of coherence and cohesion, a spontaneous speech of the patients was recorded and transcribed. Speech cohesion was analyzed by looking into the improper deletion of surface nodes and speech coherence was observed based on the Grice [23] principles. The degree of incoherency was rated using 1-4 scale, and the relationship between the constant incoherency of speech and delusions was determined. The results revealed two types of delusions such as Invariable Delusion (ID; a type which has invariable theme) and Variable Delusion (VD; a type with variable themes and stories). The speech characteristics of ID was more coherent, whereas VD was incoherent in nature. The results revealed relationship between these delusions and two types of hallucinations. The study reported an experience of previous Hallucinations (DH; diachronic hallucination) for patients presented with ID and their delusions were based on it. The participants with VD seemed to have a Simultaneous Hallucination (SH; synchronic hallucination). To conclude, different types of incoherency were reported depending on the type of delusions (ID and VD). The speech of the patients exhibiting VD was reported to be completely vague and incoherency of speech was more severe and endures, whereas in ID was slight. A significant and strong correlation was found between VD and SH, and between speech incoherency and VD in the patients. There is a relationship between hallucination and source memory [3,5,24]. A deficiency in corollary discharge networks leads to an impairment in self attributing process [25] and the authors of this study attributes that the speech incoherency seen in the participants can be due to the deficiency in the corollary discharge network function [8]. This deficiency results in self-misattribution and thus provokes the substitution of the mental addressee with the real one. As a result of the deficiency in the corollary discharge, the patients continue the discourse by substituting the mental addressee with the real one. Hence, the speech can be coherent in the patient's mind, but it may be incoherent contextually. The authors propose that "the incoherency of speech in schizophrenic patients can be explained as a deficit in the ToM".

Schizophrenia: Language Analysis Tools

Oh et al., [26] reported that the formal thought disorder in schizophrenia cannot be assessed using standard aphasia test batteries. Andreasen [27] introduced Thought, Language, and Communication (TLC) scale, which is the standard tool for analysing schizophrenic language. Andreasen's TLC index was later simplified into a Thought and Language Index consisting of 8 symptoms, which further divided into 3 groups following factor analysis. Chen et al. [28] introduced a Clinical Language Scale (CLANG), consisting of 17-symptom

classification according to levels of linguistic structure. In addition to Andreasen's and Liddle's scale, Chen added components such as fluency, voice quality, and articulation disturbance. Vast amount of research on language in schizophrenia has been studied using qualitative method wherein, language is transcribed and then coded using linguistic framework (such as Andreasen's Thought, Language and Communication Scale or Chaika's intensive linguistic case study) [17,27]. However, Deutsch-Link [29] points out that the information gathered using these methods is invaluable in understanding and characterizing the language deficits in schizophrenia and she suggests the use of quantitative approaches to language analysis in schizophrenia. Deutsch-Link [29] employed a quantitative method for language analysis in schizophrenia using Linguistic Inquiry Word Count (LIWC) software. The study compared the word use in patients with schizophrenia to that of mood disorder patients, schizophrenia family members and a healthy control group by examining the essays written by these participants. The study reported decreased use of the pronoun in schizophrenia and family members indicating a degree of social isolation or withdrawal. Schizophrenia participants exhibited increased external referential language reflecting a loss of agency/power in schizophrenia.

From this review of literature, it is evident that discourse impairment is significantly seen in IWS. Furthermore, studies have focused discourse assessment at micro-linguistic and macro-linguistic levels using different method of analysis such as measure of verbosity, syntactic complexity, discourse coherence and cohesion etc. Some researchers attributed the discourse impairment to underlying cognitive system [19,22], while other demonstrated the deficit at ToM [6,8], or Hyper theory of mind [9]. However, there are key problems with much of the literature on ToM deficit in IWS. There is still considerable uncertainty regarding the heterogeneity of ToM test, their neurocognitive demand, psychometric properties of ToM tests, and the influence of clinical and demographic characteristics on ToM performance [30]. In addition, heterogeneity of methods used to assess ToM abilities (such as false-belief tasks, hinting tasks, eye test, and character intention inference tasks etc.) contributes to the inconsistencies in the reported findings. Conversely, despite extensive research on cognitive processes associated with FTD, it is still unclear as which cognitive system is associated with FTD. However, Kerns and Berenbaum [21] in their meta-analysis study reported strong association of FTD with impaired executive function and impaired processing of semantic information in IWS, while cognitive impairment such as increase in spreading activation and impairment with language production system were not strongly associated with FTD. Moreover, it is important to establish a measure with best psychometric properties to assess the discourse coherence in IWS.

The major flaw in literature regarding discourse coherence in IWS is that they make no attempt to discuss psychometric properties of the discourse measure used in their analysis, and the communication limitation in IWS due to impairment at non-propositional aspects such as topic management, turn-taking, and other pragmatic functions. Impairment at this level would be readily apparent in social interaction resulting in communication breakdown. Hence, these deficits should be addressed and incorporated during the language assessment and intervention program. Furthermore, apart from the coherence analysis measures such as discourse structure, communication intent, message adequacy & accuracy, and fluency would also offer valuable insight into the communication abilities of IWS, which are not discussed extensively in literature [11]. Besides, there is a lack of literature documenting both the qualitative and quantitative analysis of discourse in IWS. Analyses of discourse samples using both the qualitative and quantitative approach would provide ideal information about the impaired discourse pattern in IWS at micro and macro-linguistic levels. Much work on the quantitative analysis of discourse in IWS reported low complexity (frequency, depth and locus of embedded propositions), low integrity (syntactic and semantic errors) and dysfluency (false starts, neologisms, pause fillers and repeated word) in schizophrenia speech [13,31]. However, most of the studies were done based on the computer assisted grammatical analysis and statistical procedures (by counting the occurrence of specific items) which neglects the temporal dimension of speech. Hence, it is important to utilize the quantitative methods like T-unit analysis which would help us to profile and quantify the presence of derailment & tangentiality in discourse. Though it is time consuming as it is done manually, this method of analysis would provide optimum information about individually specific characteristics of discourse in schizophrenia. Since, schizophrenia is a heterogenous condition, a patient centered treatment approach should be directed to improve their discourse. Using, both the method of analysis such as qualitative and quantitative analysis would help the clinician to profile the cognitive-linguistic impairment in IWS, which will further facilitate the clinician to device and deliver better treatment for IWS. Furthermore, qualitative analysis of discourse using standardized "Discourse Analysis Scale" (DAS) would provide accurate and comprehensive information about propositional and non-propositional aspects of discourse in IWS.

A smaller but nonetheless rapidly growing body of research has been done to understand the discourse abilities in IWS. However, most of the analysis methods did not provide relevant information on both the qualitative and quantitative aspects of discourse. Considering the above notes, the present study was carried out with the purpose of understanding the various measures of propositional and non-propositional aspects of communication that are affected in IWS using both qualitative and quantitative measures of discourse analysis.

Aims and Objectives

The present study aimed to investigate the discourse abilities of an IWS using qualitative and quantitative methods of discourse analysis.

Method

General description of the patient

The participant (Ms. LC) was a 45-year-old Christian lady diagnosed with schizophrenia; paranoid type was taken for the present study. Ms. LC was a bilingual speaker of Kannada (L1) and English (L2) language. Ms. LC was admitted to a day-care center and was undergoing medication. Probing further into the case, we found that Ms. LC holds a bachelor's degree and has a family consisting of father and sister living in Mysore (State in South India). She has completed her 12th standard and was reported to be poor in hygiene and social interaction. Probing further into her history revealed, no

family history of psychiatric condition. Ms. LC was brought to the psychiatrist at the age of 20 with the complaints of self-talk and false thoughts. She was reported to be religious and started exhibiting some of the positive psychiatric symptoms such as delusions and hallucinations. Over the course, her concentration declined and started collecting flowers saying that those are from heaven and presented to her by god. She started to see and hear things that do not exist, speak in confusing ways and believed that others are trying to harm her and spying on her.

Special investigation

Mental state examination for appearance, mood, and behavior was carried out. Ms. LC was observed to be poor in hygiene and preferred wearing clothes, which is blue in color and avoids wearing other colors. She exhibited poor oral hygiene and scraggly hair. She preferred sitting in blue colored chair. Ms. LC was recruited for this case study by considering her ability to understand the task instruction and good cooperation.

Medical history: Ms. LC has been treated with Sizopin 200 mg, Risdone 3 ml, and R-zep 4 mg for the psychiatric symptoms.

Positive and Negative Symptoms Scale (PANSS) was administered: Ms. LC obtained a score of 17 indicating positive symptoms. She exhibited delusion, hallucinations and disorganized behavior. Though she was able to talk allot, there was no meaningful content in her speech reflecting disorganized speech.

Stimulus material and procedure

Discourse samples of picture description and narration were video recorded and transcribed using IPA. The transcribed samples were subjected to two method of analysis such as qualitative and quantitative discourse analysis to see the pattern of discourse production. The qualitative analysis of discourse was carried out using a standardized "Discourse Analysis Scale" (DAS) [32] and the quantitative analysis was done using Thematic-Unit Analysis (T-unit analysis) [33] for narration and picture description task. Written informed consent was obtained from the participant. Informed consent proposed by institute ethical committee was used to obtain the consent from the participant. In addition to this, the ethical guidelines of the institute where the study was carried out was also followed.

Qualitative analysis using discourse analysis scale for narration and picture description task

To obtain discourse samples of narration, a neutral topic like "Journey to a place" was given to the participant and was instructed 'to imagine his/her past/future journey to a place and narrate the same in past or future tense. For the picture description task, we provided a simple black and white "Cat Rescue" picture (Figure 1) [34]. To add on, the picture was 6 x 4 inches in dimension. The participant was instructed to tell the gist of information and then describe the events happening in the picture. She was asked to name all the contents in the picture and describe the same.

The discourse samples were video-recorded using Handy cam (Sony digital recorder H302233). The samples were transcribed verbatim after obtaining the video-recorded sample. The transcribed material was subjected to qualitative analysis using "DAS" (Appendix A). Hema and Shyamala [35], introduced "Discourse Analysis Scale" as a qualitative method for analyzing discourse samples, this scale provides a quantitative score based on a perceptual rating scale. It consists of a set of parameters and a list of skills under each parameter. Each skill was rated separately, and a final index was obtained for them. The scale has separate ratings for picture description, narration and conversation task. It measures the propositional and non-propositional aspects of discourse. The propositional aspects of discourse include discourse structure, communication intent, coherence, information adequacy, information content, message accuracy, temporal and causal relationship, topic management, vocabulary specificity, linguistic fluency, speech styles, intonation, gaze efficiency and response time. The non-propositional (interactional) aspect of communication includes turn-taking, revision behaviours and conversational repair/repair strategy. The (three-point perceptual) rating scale consisted of a uniform rating of 0, 1 and 2 where '0' represented the behaviours that were poor, '1' represented behaviours that were fair (at least 50% of the time there is a positive response) and '2' when the behaviours were good. The rating scale was used for scoring. Thus, total scores of the DAS for picture description and narration task were obtained. The total scores of DAS for these tasks have been further divided into two sub-levels, the propositional total, non-propositional total and discourse quotient.

Quantitative analysis using T-unit based analysis

For the T-unit based analysis, the video-recorded data were transcribed verbatim with verification for accuracy. The basic unit for segmenting the data was the T-unit, which is defined as one independent clause plus the dependent modifiers of that clause [33]. A clause is a part of a sentence. There are two main types of clauses such as independent (main clauses) and dependent (subordinate clauses). An independent clause is a complete sentence. It contains a subject and verb and expresses a complete thought in both context and meaning (e. g., the police said). Independent clauses can be joined by coordinating conjunction to form complex or compound sentences. A dependent (subordinate) clause is part of a sentence. It contains a subject and verb but does not express a complete thought. They can make sense on their own, but they are dependent on the rest of the sentence for context and meaning. The discourse tasks in the present case study were analyzed in terms of discourse grammar. The variables and analyses pertaining to this consisted of Number of T-units (NTU), Number of Words per T-unit (NWPTU), Number of Clauses (NC) and Number of Words per Clause (NWPC).

Furthermore, the psychometric properties of the measures used in our study could be explained based on Pritchard et al. [36] findings on measures with the best psychometric properties into consideration. Pritchard et al. [36] reported that measures such as story grammar, topic coherence, reference chains, and predicate argument structure holds very good psychometric properties compared to other measures. These measures are included as a part of DAS with some modifications. Interestingly, the parameters in DAS such as "information adequacy" and "information content" are collectively equivalent to the measure "story grammar". The information adequacy in our scale is operationally defined as adequate narration (with reference to the meaning) at word level/ single sentence level/ multiple sentence level. Furthermore, information content is defined as a completely correct description of people, locations, objects,

activities and attributes that played a role in the events being narrated about. The measure "topic coherence" parallels the parameter "coherence" in the DAS, which analyses local and global coherence. The measure "predicate- argument structure" is consistent with the "T- unit" based quantitative analysis used in our study. Which involves a sequential discourse episode counts and proportion of utterances in an individual episode. The measure "reference chain" is more identical to the parameter "topic management" in DAS. We define the reference chain as linguistic marker indicating a topic shift or a topic continuation in the discourse. Specifically, our analysis of the parameter "topic management" included identification of the various referential expressions (e.g., pronouns, definite noun phrases, possessives) referring to the same discourse entity. This was one of the criteria considered during the analysis of the parameter topic management. Hence, we believe that some of the parameters in DAS is practically the same as that described by Pritchard et al. [36] with some modifications [11].

Narration sample of Ms. LC

The following example illustrates the discourse of a schizophrenic who was classified as having positive disordered discourse; these utterances were responses to the interviewer's question of "narrate about your experience on journey to a place". (Discourse elicitation task: Narration) 1[/I was a staff nurse at PG children's hospital/1] 2[/One incident happened ah / We were friends full of friends on Sunday/ We planned to go the church/Pentecost church/ We were gathered near the bus stand/ The bus was too fast /they don't see us/ just minute they started driving the bus/ that time I climbed the bus/ My friends were left out/ Bus started running/ Looking at my friends the bus started/ In spite of this I jumped out of the moving bus/ Then I fell down/2] 3[/It must have come in the paper/ you may not know /because you are not born at that time/ it was 30 years ago/3] 4 [/The bus I fell down// I was behind the bus my saree was nothing happened/ One bus came behind me/ people shouted at the guy/ I walked away/ my friends sochke../acha hogaya../4]

The following example illustrates the discourse of a schizophrenic in response to the interviewer's presentation of cat rescue picture. (Discourse elicitation task: Picture Description) 1[/A man is sitting on a tree /looking for Jesus coming under the tree/so he can be blessed/ Jesus is coming to him through the ladder/1] 2[/ She is looking for a cat / but she can expect a hit on her head / so she can get a gravity halfso earth/2] 3[/Bicycle is not looking for the ladies/ Ladies children may like kaima// For that they have to be careful for their riding the cycle/3]4[/ Ladder is good sign according to bible/ ladder shows climbing up to heaven/4]5[/Bus is also good/ and we are travelling to heaven/Any danger animal comes in the obstruction/5]6[/Bird is good/ because god sees look at the birds flying on the sky/ God provides food/ When god gives birds so much/ why not the man/6]

Results and Discussion

Qualitative analysis of narrative and picture description task using discourse analysis scale qualitative analysis revealed poor performance at propositional and non-propositional aspects for both the tasks indicating micro & macro-linguistic impairment. Ms. LC obtained a score of 12 out of 42 under propositional aspects and 0 out of 10 under non-propositional aspects of narrative discourse with the discourse quotient of 23 as seen in Table 1.

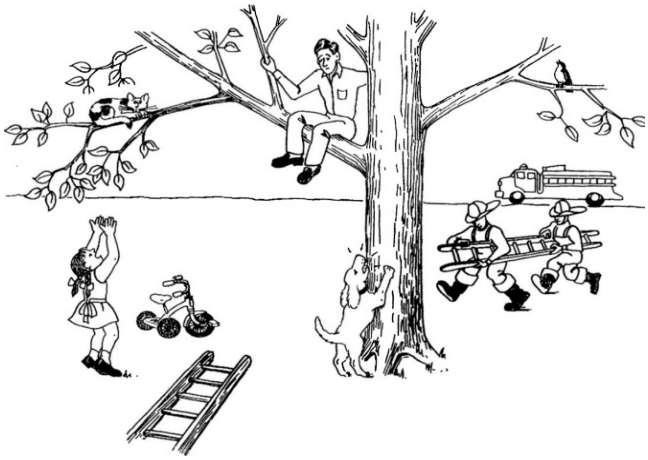

Figure 1: Cat Rescue Picture [34].

Table 1: Scores obtained for Narrative Discourse task using DAS.

Parameters of Narrative Discourse	Scores Obtained
Propositional aspects	
Discourse structure	1
Communication Intent	3
Coherence	1
Topic Management	5
Other discourse parameters	0
Speech related parameters	2
Propositional aspects Total	12/42
Non-propositional aspects	
Revision behavior	0
Repair Strategy	0
Non-propositional aspects Total	0/10
Discourse Quotient	23

Qualitative analysis of the narrative discourse sample

For the narration task, Ms. LC obtained a score of '1' for the parameter discourse structure, indicating partially confusing disorganized discourse with respect to overall plan, and theme of the topic. Her discourse structure was not confusing logically and chronologically. Through a close analysis of narrative discourse sample of Ms. LC, one can see that she provided clear information required for the topic. The first part of the narration - I was a staff nurse at PG children's hospital -was perfectly satisfactory. Furthermore, analysis of her discourse structure demonstrated appropriate discourse forethought and organizational planning. The narrative events were logically and chronologically appropriate to the context. Linguistic and syntactic errors such as neologism, incoherence, irrelevant propositions and associative loosening were not observed in her sample, and her discourse was free of any delusional statements. This clearly demonstrates that Ms. LC has awareness of self-generated actions and unimpaired monitoring of intended speech. Hence, we can say that the macro-structure of discourse is relatively unimpaired in Ms. LC as she was able to generate an organized discourse plan. This indicates her ability to maintain the task instruction and

response content in working memory. Our findings are consistent with the previous findings by Leroy et al. [37], the study reported similar number of macro-propositions in neurotypical individuals and IWS, and schizophrenic patients in their study did not display any deficit in generating the overall structure of a discourse plan. Similarly, Rochester and Martin [12] reported globally spared syntax within sentences.

Furthermore, results of the cohesion analysis indicate satisfactory cohesion at global coherence and violations at local coherence. Ms. LC exhibited limited use of local cohesive devices such as causal connectives (because, therefore, and however), spatial cohesion (use of location nouns and motion prepositions), conjunctions, and ellipsis. However, she maintained local cohesive devices such as pronominal anaphoric resolution at some instance as seen in the excerpt- We were friends full of friends on Sunday/We planned to go the church- here "we" refers to the referent "friend". Whereas, in the excerpt -One bus came behind me/ people shouted at the guy/- considering that the narration is unfolding in real time, the identity of the referent "guy" is unclear and lacks antecedent. There is a lack of clarity on referential candidate which challenges the interlocutor's interpretive skills. Although, she exhibited restricted use of local cohesive devices, her discourse narration on the topic "journey to a place" maintained an acceptable quality because of the global cohesive cues and logical connectives. Our results on cohesion analysis share similarities with Rochester and Martin [12] findings, reported globally spared syntax within sentences, but impaired cohesion between sentences [13,38]. Besides, her discourse was characterized by syntactically lesser complex sentences with fewer subordinate clauses. Moreover, closer analysis of her discourse sample demonstrates preserved ToM. This can be appreciated from the following excerpt- /In spite of this I jumped out of the moving bus/ Then I fell down//It must have come in the paper/ you may not know /because you are not born at that time/ it was 30 years ago/. This clearly suggest that Ms. LC is aware of the interlocutor's knowledge and acted upon them. The sentence highlighted in bold clearly represent her ability to infer interlocutor's knowledge on an incident that happened years before. This substantiates previous findings in the literature by Abu-Akel [9,39], the study argues that the disorganized schizophrenics are unlikely to be characterized as lacking a ToM; rather they seem to have a hyper-theory of mind to which the psychopathological symptoms of hallucinations, delusions of reference and incoherent speech can be attributed. Furthermore, during our conversation with her, she requested us to buy one of her favourite books from a stall, which is located near the bus stand. The information provided was accurate and reliable. This indicate that Ms. LC has better memory and recall abilities which is not impaired to an extend that can affect her ToM. Therefore, the better ToM in our case could be attributed to better IQ, and memory in our case. This finding further supports the evidence reported by Bora, Yucel, and Pantelis [30], that IQ, executive functions and memory abilities seem to have better correlation with ToM.

Furthermore, Ms. LC exhibited good communication intent through appropriate initiation of narration, and imagination of events. Irrelevant propositions and neologisms were not observed in her narration. Analysis of her topic management skill showed better performance on all measures such as topic introduction, appropriate topic shift, and maintenance, however simplified syntax and syntactic rule violations were observed along with poor grammatical markers. This substantiates previous findings in the literature that, at the level of syntactic processing, IWS demonstrate speech, which is usually normal, with no relevant aberrations [27,40]. However, their sentences may appear somehow simplified, characterized by reduced syntactic complexity [13,41,42].

Analysis of narrative discourse for other discourse parameters like 'information adequacy', 'message accuracy' and 'information content', revealed a reduced amount and complexity of information in addition to the reduced information content. The narrative discourse task of this study involved the verbal sequential arrangement of events in an organized manner. She obtained a score of zero in this parameter. Though she presented a lengthy narration, her discourse was not adequate at multiple sentence level. She initiated her narration on "Journey to a place", with the description of a place, where she intended to go but provided inadequate information on this. Her narration was concentrated more on an incident that happened to her while she was travelling to the church, rather than focusing on journey itself. She used simple syntactic structures with fewer subordinate clauses, embedding by the conjunction of time and causal connectives, and relative clauses. Though her narration lacked information content and adequacy, she maintained adequate global coherence for the theme in her thought/mental state. Our finding favourably supports the study reported by Pinard and Lecours [43], that schizophasic discourse often has a preferred theme or preoccupation.

Analysis of the speech-related parameters comprised of measures such as 'temporal causal relation', 'vocabulary specificity', 'linguistic fluency', 'speech style' and 'intonation'. we observed use of simple but meaningful vocabulary in our case. Errors such as repetition, perseverations and neologistic errors were not observed in her narration thus preserving fluency of the speech. She obtained a score of one in vocabulary specificity (here, the score one corresponds to "partially using specific vocabulary when specific information is required") and linguistic fluency (partially fluent discourse with very few repetitions, unusual pauses or hesitations). Furthermore, she demonstrated flat intonation with few pauses and hesitations. Here, pauses and hesitations clearly indicates her effort to build a coherent narration through recalling the past events. Similar results have been reported by Covington et al. (2005) [40], the study reported flat intonation; and pauses and hesitations in schizophrenic speech. Chaika [17] reported normal at the segmental phonology and morphological organization; Cutting, [44] added that their speech is characterized by flattened intonation and word finding difficulties. Marini et al. [45] reported preserved articulation skills and morphological competence in IWS. Furthermore, their speech is characterized by correct suprasegmental pragmatic prosodic contour [45]. Moreover, her speech was abnormal in terms of inappropriate dialectal structural forms and code-switching (between English and Kannada), which further resulted in an inappropriate interference in transition, and smoothness between segments. Her narration lacked use of temporal and causal terms thus violating local coherence.

Qualitative analysis of the picture description sample

As shown in table 2 for the picture description task, she obtained a score of 12 out of 46 for propositional task and a score of 0 out of 10

Table 2: Scores obtained for Picture Descriptive Discourse task using DAS.

Parameters of Picture Descriptive Discourse	Scores obtained
Propositional aspects	
Discourse structure	0
Communication Intent	1
Coherence	0
Topic Management	0
Other discourse parameters	0
Speech related parameters	3
Propositional aspects Total	4/46
Non-propositional aspects	
Revision behavior	0
Repair Strategy	0
Non-propositional aspects Total	0/10
Discourse Quotient	7

for non-propositional task. Discourse quotient obtained for picture description task was 21 (Table 2).

For picture description task, she presented a lengthy narration but did not have any meaningful utterance related to the picture provided. Her narration on the cat rescue picture lacked concepts and inferences related to the picture suggesting difficulties in identifying relationships between individual concepts & foregrounding concepts. She started her narration by explaining the events present in the picture and gradually her theme was completely taken away with delusional statements. Most of the delusional statements were related to god and heaven. For the parameter "discourse structure", she obtained a score of "zero". The verbal output contained delusional statements and lacked discourse forethought & organizational planning. Her narrative discourse was characterized by irrelevant propositions, neologistic paraphasias, tangentiality, violations at local and global coherence, idiosyncratic ideas, and frequent derailments. Her discourse was completely vague and ambiguous. This supports previous findings in the literature by Marini et al. [45], the study reported barely informative speech in IWS for picture description task. Their narration was characterized by empty speech, filled with semantic paraphasias, errors at local coherence such as the frequent use of pronouns without antecedents, deictic terms with no clear referents and frequent derailments. The vague discourse with severe and constant incoherence observed in our case could be attributed to the presence of underlying synchronic hallucination which influenced her performance simultaneously during narration. Momeni and Raghibdoust [8] reported completely vague discourse in IWS who has variable delusion. This delusion is responsible for severe incoherency of speech that have been found to be associated with synchronic hallucination. There exists a significant correlation between variable delusion and synchronic hallucination, and between speech incoherency and delusion. According to Frith [3,5], and Keefe et al. [24], there is a relationship between hallucination and source memory, and we assume that the speech incoherency in our case is due to the underlying deficiency in the function of corollary discharge networks [25]. A deficiency in this network would result in self-misattribution and frequently provokes the substitution of the mental addressee with the real one. As a result, she continued her narration by substituting the real interlocutor with the mental one as a consequence of the deficiency in the corollary discharge network [8].

She obtained a score of "zero" for other discourse parameters. Derailment and tangentiality accounted for her poorer scores on "linguistic content," message accuracy" and "information adequacy". Coherence measures were poor at "local and global level", this violation could be attributed to information gaps, irrelevant propositions, idiosyncratic words, referential failures, poverty of content, grammatical unclarity and delusional statements. The central theme of the topic was not reflected in her narrative discourse. She obtained a score of "zero" for the topic management. She introduced the topic irrelevantly, and exhibited rapid shift from the given topic, and non-coherent topic changes reflecting disorganized discourse pattern. Minimal elaborations such as simple yes or no responses were not present. However, her lengthy discourse did not facilitate listeners comprehension of her ideas. Her thoughts and ideas were frequently shifted from one to another. She made poor association between ideas while narrating. Docherty et al. [46] reported lack of conceptual sequencing and inability to structure discourse in IWS. Furthermore, the structural language disturbances such as confused reference, missing information reference and ambiguous word meaning indicate an impairment in the ability to conceptualize and organize information sequentially in accord with the concepts [46]. As a result of such deficits, discourse organization in IWS would result in thematic shifts to idiosyncratic ideas [47] and high semantic priming effects [48]. Because of these characteristics, incoherent and erratic discourse deficit in IWS is attributed to the impairment at the overall organization of discourse rather than an elementary linguistic problem.

Analysis of the speech related parameters comprised of linguistic fluency, vocabulary specificity, speech style, intonation, response time, and gist of information. She was fluent in her narration without any hesitations or blocks thus preserving linguistic fluency to some extent. Though she did not exhibit any circumlocutory behavior, her narration was filled with idiosyncratic and neologistic words demonstrating poor vocabulary specificity. She exhibited flat intonation. Inappropriate dialectal structural forms, or code switching were not observed in her narration. For the parameter "response time" she obtained a score of "zero" indicating a delay of 6 seconds to initiate the narration. For the parameter "gist of information", she secured a score of "zero" indicating completely wrong depiction with poor local and global coherence.

Furthermore, non-propositional parameters such as "repair" and "revision" strategy were observed to be affected for both narration and picture description task. She obtained a score of "zero" for "repair" and "revision" strategy signifying communication breakdown. During instances of neologistic paraphasias and vague references, she did not use self-correction and repair through repetition/ revision indicating underlying comprehension, auditory feedback, and self-monitoring skill deficit. However, for narration task the proportion of delusionary statements were lesser compared to picture description task.

Table 3: Performance in Narrative and Picture Description Task using quantitative analysis.

Discourse Tasks	Parameters of T-unit	Scores obtained
Picture Description Task	Number of T-units	6
	Number of words/T-unit	22
	Number of Clauses	20
	Number of words/Clauses	7
Narrative Discourse Task	Number of T-units	4
	Number of words/T-unit	36
	Number of Clauses	26
	Number of words/Clauses	6

Quantitative analysis of the narrative and picture description discourse sample

Quantitative analysis would facilitate the clinician's comprehension of patient's response with respect to flow of themes, organization of ideas and density of words used Table 3. Quantitative parameters such as NTU, NWPTU, NC and NWPC were higher in proportion for both the task. NTU were relatively less for narrative discourse task when compared to picture description task. The increase in thematic units for picture description task could be attributed to tangential diversion, idiosyncratic ideas and derailment. The lesser number of thematic units for narrative discourse task correlates well with her performance in qualitative analysis which demonstrated relatively better discourse forethought and organizational planning. In addition to this, Linguistic and syntactic errors such as neologism, irrelevant propositions and associative loosening were not observed in her sample, and her discourse was free of any delusional statements.

Furthermore, the parameters NWPTU and NC were relatively higher for narration task when compared to picture description task. This could be attributed to the barely informative speech in picture description task, which is characterized by poor vocabulary specificity, neologistic paraphasias, errors at local coherence (which was comparatively more at picture description task) such as the frequent use of pronouns without antecedents, and frequent derailments. Relatively lesser proportion of NC in picture description task could be attributed to the reduced use of clausal embedding, and inter-sentential connectivity in their narration.

To sum up, the qualitative analysis of the thematic units revealed syntactically simple sentences with fewer embeddings, and dependent clauses, which accounted for her reduced quantity of language and information content in her narration. Furthermore, these findings of qualitative analysis correlated well with the quantitative analysis by showing lesser number of clauses and words per clauses.

Conclusion

The present case study aimed to investigate the narrative discourse abilities of an individual with schizophrenia using qualitative and quantitative methods of discourse analysis. These two-analysis yielded interesting findings. Qualitative analysis revealed deficits at the level of propositional and non-propositional aspects of communication. The qualitative analysis of the discourse sample revealed higher proportion of irrelevant propositions and delusional statements for picture description task when compared with the narration task. Furthermore, poor performance at non-propositional aspect indicates a lack of self-monitoring skills resulting in a communication breakdown. Quantitative analysis revealed higher proportion of T-units for picture description task. This indicates her inability to maintain the connected theme of narration due to tangential diversion and delusions. Therefore, it is important to establish both qualitative and quantitative analysis of discourse to document the presence of deficits at propositional and non-propositional aspects of communication. Using both the method of analysis would help the clinician to profile the cognitive-linguistic impairment in IWS, which will further facilitate the clinician to device and deliver better treatment for IWS.

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