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Narrative after traumatic brain injury: A comparison of monologic and jointly-produced discourse

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Abstract

Primary objective: To investigate the effects of a familiar communication partner on the production of narrative after traumatic brain injury (TBI).

Method: Ten participants with TBI were matched with 10 control participants for sex, age, and education. Participants independently retold a story from a picture sequence and also retold a video segment with a friend to a researcher. The resulting discourse was analyzed for productivity, cohesion, story grammar, informational content and exchange structure.

Results: There was a significant difference between participants with and without TBI for all measures in the monologic narrative. In the jointly-produced narrative, there was no significant difference in performance and participation between individuals with TBI and control participants. Participants with TBI demonstrated a significant improvement between the monologic and the jointly-produced task in story grammar and informational content.

Conclusions: The natural scaffolding provided by the friends of participants with TBI in a meaningful narrative task facilitated competent participation in and production of narrative. These findings indicate an avenue for training everyday communication partners in supporting narrative skills after TBI, and for the use of jointly-produced narrative as an additional assessment tool to create a holistic view of everyday skills.

Keywords: *Traumatic brain injury, communication, discourse, narrative, jointly-produced, participation, friends*

Introduction

Traumatic brain injury (TBI) can produce widespread and significant disabilities in the lives of those affected. Physical difficulties are well-documented [1], however for most survivors of TBI the primary disabling factors involve a wide range of cognitive, emotional, psychosocial, and communicative difficulties [2].

Communication and narrative after TBI

Problems with communication appear to be a barrier in major areas of living for people with TBI. Communicative difficulties can compromise interpersonal relationships, leading to social isolation and decreased quality of life [3, 4]. Impaired conversational skills have also been identified as a major predictor of failure to return to work after severe TBI [5].

Individuals with TBI have presented a challenge when assessing communication difficulties. Following the early stages of recovery, people with TBI often perform within the normal range on traditional clause level language assessments [3]. However, individuals with TBI experience difficulty with communication across a number of discourse production genres [6]. The conversations of people with TBI have been rated as less interesting, less appropriate, and more effortful than conversations with non-brain-injured controls [7]. Their discourse has also been described as 'disorganized,' 'tangential,' 'confused,' 'inefficient' and 'self-focused' [8–10]. While grammatical errors [11] and increased pause time [12] have been observed in clause level

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analyses, the degree to which these difficulties affect the everyday communicative interactions of people with TBI is unclear.

Narrative is often used as a tool for the assessment of discourse of people with TBI. The complex interaction of cognitive, linguistic and psychosocial skills required to produce narrative appears to place a sufficient communicative load to enable individual difficulties to be highlighted [13, 14]. Evaluating the narratives of those with TBI also has social validity. Narratives are very common in everyday conversation [15, 16] and serve an important function in nearly all societies by helping people make sense of their experiences and represent themselves to others [17].

Jointly-produced narrative

Narrative is commonly assessed as a monologue, both in clinical practice and research. While this has valuable implications for identifying deficits in particular linguistic parameters, it fails to acknowledge the bigger picture of narrative in communication and everyday interaction. Narrative with multiple active co-tellers is much more frequent in conversation [18] and storytelling by a single individual naturally differs from the polyphonic storytelling typical of conversation [19]. Co-tellers, and even active listeners, can have a big influence on production of narrative through differential interest and competence in details [19]. Jointly-produced narrative also requires the ability to observe subtle conventions pertaining to turn-taking rules [20], and the ability to work in unison to create a coherent text through negotiating perspective and the 'point' of the story [19].

Socially co-constructed or jointly-produced narratives have been studied in other patient groups. Ylvisaker, Sellars and Edelman (1998) recommend that rehabilitation professionals work collaboratively with everyday communication partners to transform the narratives and conversations of children with TBI through the use of scaffolding procedures for memory and organization of ideas [21]. The training of communication partners has also been used successfully for people with aphasia and their partners [22, 23]. Similarly, a training program which aimed to improve police officers' responsiveness to people with TBI was found to have a significant impact on the communicative effectiveness of people with TBI [24]. Since cognitive deficits in those with TBI also often limit the extent to which they are able to compensate for their impairments or learn and apply new skills [25], the training of communication partners for the purposes of narrative may be indicated.

Jointly-produced or 'co-constructed' narratives have also been examined among the typical population. Stemming from the narrative work of Labov and Waletsky (1967), there has been a recent ideological shift towards understanding and describing the co-construction of narrative as an interactive process between narrator and listener [26]. However, there does not appear to be a common rhetoric or tools for the analysis of co-constructed narratives, perhaps due to the natural variability in performance across the typical population [19, 27]. The impact of power and familiarity on participation in narrative construction has also been explored in this literature [18], as well as in clinical practice. In ordinary conversation the roles of vulnerable narrator and responsible listener are shared and traded back and forth, however there is a fixed imbalance in clinical practice with the client as the perpetual vulnerable narrator [26].

The impact of communication partners

Systemic functional linguistics (SFL) has been used to study the participation in conversation of people with TBI. SFL suggests that the linguistic choices we make depend on who we are speaking to and the situation we are in [28]. The exchange of information is examined in SFL using exchange structure analysis, which demonstrates who is in charge of the information in the interaction and how this information is transferred. The dominant partner in an information exchange is more likely to be the primary knower (KI), or the person who has the information that the secondary knower (K2) wants to access. Exchange structure analysis examines how often a person is given the opportunity to be a primary knower, or information-giver, in different interactions. SFL provides a framework to analyze the discourse of people with TBI in a way that acknowledges the increasing belief of the impact of communication partners on discourse production.

While important advances have been made over the past decade with respect to the refinement of conversational measurement tools and sampling techniques [29–31], too frequently the other person in the interaction is a researcher or therapist. Consequently, Togher and colleagues (1997) examined conversations of participants both with and without TBI during telephone interactions with a range of everyday communication partners of varying familiarity and power relations [32]. Using exchange structure analysis, it was found that the participants with TBI were potentially disempowered by their communication partners compared to matched controls. Participants with TBI were given less information than control participants, were more frequently asked questions regarding the

accuracy of their contributions and understanding, and were sometimes asked for information that the communication partner already had. When placed in a community education information-giving role however, participants with TBI were able to give amounts of information comparable with those given by control participants [33]. These findings demonstrate the need for evaluation of people with TBI in situations with different goals and roles to gain a representative view of their skills.

Aim

Given the gap in research, the aim of this project is to investigate the effects of a familiar communication partner on the production of narrative after TBI.

Two questions will be specifically addressed:

(1) Are participants with TBI as equally able to jointly-produce a narrative as control participants?
(2) Does a familiar partner facilitate the production of narrative in those with TBI?

Method

Participants

This study included two groups of participants: a clinical group of ten participants with severe TBI, each paired with a friend, and a matched control group of ten participants without TBI, each paired with a friend. The data presented in this study form part of a larger study addressing discourse and psychosocial outcomes of individuals with TBI. All participants and their friends provided oral and written consent prior to participating in this study. The project was passed by the University of Sydney Human Ethics Committee.

Selection and description of participants with TBI (clinical group). Ten participants with severe TBI were recruited through brain injury rehabilitation units in Sydney, Australia. The selection criteria were based upon the participants having:

(1) provided consent to participate in the study
(2) sustained a severe TBI as indicated by the duration of their post traumatic amnesia (PTA) (>24 hours) and/or loss of consciousness of >6 hours [34]
(3) no PTA, a state of confusion which may occur after a TBI [35]
(4) a time post TBI of ≥4 years
(5) a social communication disorder on the Pragmatic Protocol [36]
(6) a cognitive communication disorder based on a severity score below 17 obtained in the Scales of Cognitive Abilities for Traumatic Brain Injury (SCATBI) [37, 38]
(7) no presentation of aphasia (a specific impairment of basic language function consequent to brain damage [38]) as evaluated during the screening assessment. If there was doubt regarding the presence of aphasia, the Western Aphasia Battery was administered [39] and participants were required to score above the cut-off of 93.8 on the Aphasia Quotient
(8) adequate concentration and attention to complete research tasks
(9) a friend willing to participate in research tasks.

Most of this information was obtained from the participants' medical records. Participants were not excluded on the basis of their socio-economic, employment or relationship status.

All participants with TBI were male, most of whom had sustained a severe TBI consequent to a motor vehicle accident (MVA). Their ages ranged from 24.00 to 67.00 years (mean = 39.4 ± 13.3 years), and their education ranged from high school to tertiary education. The mean length of PTA was approximately 17.8 weeks, ranging from 1.5 days to 40 weeks. All participants with TBI were in the latter stages of rehabilitation, with a mean time of 13.05 years post-injury (range = 4.10–28.00 years). Their SCATBI severity scores ranged from 8–12 (mean = 10.1 ± 1.60). Table I contains a summary of the demographics of participants with TBI.

Description of friends of participants with TBI. Each participant with TBI attended with a friend willing to participate in the study. Of the ten friends that participated, three were females and seven were males. Their ages ranged from 33.00 to 68.00 years (mean = 44.00 ± 12.11 years). The lengths of friendships with participants with TBI ranged from 0.04 to 41.00 years (mean = 14.20 ± 14.19 years). Table II contains a summary of the demographics of friends of participants with TBI.

Selection and description of participants without TBI (control group). Ten participants without TBI were matched according to sex, age and education to the participants with TBI. Participants in the control group were not excluded on the basis of their socio-economic, employment or relationship status. All control participants were male, spoke English, and had a friend willing to participate in the study. Their ages ranged from 22.00 to 67.00 years (mean = 38.40 ± 13.79 years), which was not significantly different from the ages of participants with

Table I. Demographics of participants with TBI (S).

ID Code	Sex	Age (years)	Type TBI	Duration of PTA (weeks)	Time Post TBI (years)	Frontal injury on CT scan (Yes/ No)	SCATBI Severity Score	Education
S1	M	38.00	MVA	24	16.00	Yes	9	High School, TAFE
S2	M	41.00	Pedestrian	16	20.00	Yes	12	High School
S3	M	24.00	Assault	13	4.10	Yes	11	High School
S4	M	38.00	MVA	40	22.00	Yes	8	High School
S5	M	58.00	MVA	12	28.00	No	12	High School, University
S6	M	30.00	MVA	20	>10.00	No	10	High School
S7	M	32.00	Fall	>24	6.00	Yes	10	High School,Course
S8	M	35.00	MVA	1.5 days	5.50	No	12	High School, TAFE
S9	M	31.00	Pedestrian	>20	7.10	No	9	High School, TAFE
S10	M	67.00	Fall	9	7.80	No	8	High School, University, Rep Training

PTA = Post Traumatic Amnesia; (L) = Left; (R) = Right.
Severity score ranges: 3–6 = Severe, 7–9 = Moderate, 10–13 = Mild, 14–16 = Borderline, ≥ 17 = Average Normal.
TAFE = Technical And Further Education.

Table II. Demographics of friends of participants with TBI (SF).

ID code	Sex	Age	Education	Length of friendship with TBI participant (years)	Type of friendship	Knew prior to TBI (Yes/ No)
SF1	F	34.00	High school, TAFE	0.50	Girlfriend, best friends	No
SF2	F	41.00	University	41.00	Close friends	Yes
SF3	M	42.00	High school	4.50	Good mates	Yes
SF4	M	46.00	University	5.00	Professional/ personal friends	No
SF5	M	62.00	University	9.00	Good friends	No
SF6	M	45.00	High school	6.00	Carer, friend, neighbour	No
SF7	M	33.00	High school	25.00	Best friends	Yes
SF8	F	35.00	High school, TAFE	0.04	Girlfriend	No
SF9	M	34.00	High school, TAFE	20.00	Best mates	Yes
SF10	M	68.00	High school, University	31.00	Close friends	Yes

TBI ($t = 0.15$, $df = 9$, $p = 0.89$). Control participants had education levels ranging from high school to tertiary education. Table III contains a summary of the demographics of participants without TBI.

Description of friends in the control group. Each control participant had a friend willing to participate in the study (Table III). Of these friends, one was female and nine were male. Ages ranged from 29.00 to 67.00 years (mean = 39.50 ± 11.57 years) and friendships ranged between 3.00 and 35.00 years (mean = 16.45 ± 12.84 years).

Procedure

Participants with TBI and control participants were asked to complete two narrative tasks: a monologic narrative on their own and a jointly-produced narrative with their friend. Tasks were video recorded and then orthographically transcribed.

Description of monologic narrative task. Participants were asked to produce a narrative based on a series of six black and white line drawings depicting a novel sequence of events. This comic strip, entitled 'The Flowerpot Incident' has been used in previous investigations of narrative abilities following TBI [4, 40].

Description of jointly-produced narrative task. Participants were asked to retell a segment from a holidays/home improvement video with a friend [41]. The researcher told participants she had not seen the video and wanted to know what it was about, in order to decide whether it would be useful for other clients. So as to present as a naÿve listener, the researcher left the room during the showing of the video.

Analysis measures

Discourse transcripts included the entire discourse produced after the time of the initial instruction.

Table III. Demographics of the participants without TBI (control participants) (C) and their friends (CF).

Participant ID code	Sex	Age	Education	Friend ID code	Sex	Age	Education	Friendship	
								Type	Length (years)
C1	M	38.00	TAFE	CF1	M	34.00	University	Neighbours, 'good mates'	3.00
C2	M	36.00	TAFE	CF2	M	38.00	TAFE, University	'same wavelength'	4.00
C3	M	26.00	High school	CF3	M	29.00	High school, University	Cousin, 'good friends'	29.00
C4	M	36.00	TAFE	CF4	M	35.00	High school, TAFE	'good friends'	27.00
C5	M	38.00	High school, TAFE	CF5	F	45.00	High school, TAFE, University	'good friends'	10.00
C6	M	57.00	High school, University	CF6	M	49.00	High school, University	'good friends'	3.50
C7	M	36.00	High school, TAFE	CF7	M	36.00	High school, University	'close friends'	20.00
C8	M	22.00	High school, TAFE, University	CF8	M	33.00	High school, University	close mates	4.00
C9	M	67.00	University	CF9	M	67.00	High school, University	'strong male friend'	35.00
C10	M	28.00	High school	CF10	M	29.00	High school, University	'good mates'	29.00

Table IV. Summary of discourse measures.

Measures	Description
Productivity	
Total number of C-units	Total number of communication units (C-units) produced by the speaker
Words per C-unit	Average length of C-units calculated by dividing the number of words by the number of C-units
Cohesion	
Percentage of complete cohesive ties	Total number of complete cohesive ties divided by the total number of cohesive ties × 100
Content	
Percentage of story grammar elements	Number of story grammar elements present divided by the number of expected elements × 100
Percentage of essential units of information	Number of essential information units divided by the total number of information units × 100
Exchange structure	
Percentage of K1 moves	Number of K1 (information-giving) moves contributed by the target participant divided by the total number of moves × 100

The transcriptions were distributed into communication units, or C-units, before any further analyses were applied. A C-unit is defined as an independent clause plus any subordinate clauses associated with it [42]. C-units are similar to sentences but are more reliably identified as they solve the problem of delineating sentence boundaries in speakers who tend to continuously conjoin clauses with coordinating conjunctions [43]. Mazes, which include false starts, revisions, filled pauses and sound, syllable or word repetitions [42], were bracketed and not included in analysis unless they included a cohesive referent. Each of the measures used to analyse the transcripts are described below and summarized in Table IV.

Productivity. SALT for Windows Standard Version 7.0 (2002) was used to calculate the following productivity measures for the target participants [44]:

(1) Total number of C-units: the total number of C-units produced in each of the discourse tasks.
(2) Words per C-unit: the average number of words per C-unit over the discourse produced in each of the tasks.

Table V. Example of story grammar elements from control two.

Story grammar element	Example
Setting	'(Um) the man and the dog are walking along the street –'
Initiating event	'– when a pot plant falls from an apartment building.'
Internal response	'The man's angry, he looks up and yells (abu) abuse to the particular apartment –'
Attempt	'– and then proceeds to go inside the apartment building, up the stairs and knocks on the door.'
Direct consequence	'(Ah) the lady comes out and pats the dog, giving him a bone'
Reaction	'and (thanks the la) the gentleman then thanks the lady and the dog runs off all happy.'
Missing element	
Plan	'so he decides to go in and confront the person.' [taken from control one]

Cohesion. As in Halliday and Hasan (1976) [45], cohesive markers or ties were judged as either complete (the information referred to by the cohesive marker was easily found and defined with no ambiguity) or incomplete/error (the information referred to by the cohesive marker was not provided in the text or the listener was guided to ambiguous information). The number of complete ties were tallied and compared to the number of total ties to produce the percentage of complete cohesive ties for the target participants in both narrative tasks.

Content. Two measures of content were examined:

(1) Percentage of story grammar elements: the number of story grammar elements present in the participants' narrative as a percentage of the number of expected elements. Monologic narratives were marked for the presence or absence of seven story grammar elements (setting, initiating event, internal response, plan, attempt, consequence, reaction) [46]. Table V contains an example. Jointly-produced narratives were marked for three story grammar elements (initiating event, action, direct consequence), as in Coelho (2002) [47].
(2) Percentage of essential units of information: both narrative tasks were coded according to Informational Content Analysis [48]. Each information unit was marked as either essential (relevant information consistent with major details selected for the task) or non-meaningful (irrelevant, redundant, off-topic or incorrect). The number of essential units of information was tallied and recorded as a percentage of the total units of information provided.

Exchange structure. This measure was used in the jointly-produced narratives, as a measure of discourse participation. Discourse transcripts were divided into moves using a systemic functional linguistic (SFL) approach so that each move could be considered as a unit of information [49]. K1 (information-giving) moves contributed by the target participant were tallied and reported as a percentage of total moves to produce the percentage of K1 moves [50].

Data analysis

Non-parametric statistical analyses were performed on SPSS Version 14.0 for Windows [51]. A significance level of $p < 0.05$ was set as an appropriate level for all analyses in this study. All of the above measures were compared across tasks and between groups.

Reliability of analysis measures. The narratives were analyzed by the first author. To assess inter-judge reliability, a sample of 20% of discourse transcripts from both clinical and control groups were randomly selected for re-analysis by the second author and a third judge. Judges consulted with one another in the event of discrepancies between judgments, and aimed to reach 80% for reliability measures [52]. Inter-judge reliability for productivity measures was 85%, for cohesion was 80%, for content was 89% and for exchange structure analysis was 87%.

Results

Mann Whitney U and Wilcoxon W were applied to determine if the discourse was different between and within clinical and control groups. Descriptive statistics were also used. Tables VI and VII contain a summary of descriptive statistics for all measures.

Comparison of discourse performance between groups

Productivity. Productivity was measured by the total number of C-units and words per C-unit. Participants with TBI used significantly *more* C-units but significantly *fewer* words per C-unit than control participants to produce a monologic narrative ($U = 6.500$, $p = 0.0365$ and $U = 6.000$, $p = 0.0365$ respectively). However, there was no significant difference in productivity between participants with TBI and control participants for jointly-producing a

Table VI. Results for all measures across groups in monologic narrative task.

		Monologic narrative measures				
		Total C-units	Words per C-unit	% complete cohesive ties	% story grammar elements	% essential units of information
Control group	Mean	11.60	11.28	91.42	88.57	86.29
	SD	8.62	1.97	4.91	11.95	14.80
	Min	5.00	9.40	86.36	71.43	70.00
	Max	22.00	14.00	98.73	100.00	100.00
TBI group	Mean	19.57	8.72	82.20	59.18	31.19
	SD	5.91	1.63	9.41	25.32	20.11
	Min	9.00	5.56	64.29	28.57	7.14
	Max	26.00	10.23	95.00	85.71	64.71

Table VII. Results for all measures across groups in jointly-produced narrative task.

		Jointly-produced narrative measures					
		Total C-units	Words per C-unit	% complete cohesive ties	% story grammar elements	% essential units of information	% K1 moves
Control group	Mean	15.60	8.55	93.19	93.33	60.64	34.82
	SD	6.58	0.68	3.21	14.91	18.57	15.50
	Min	10.00	8.00	88.46	66.67	28.57	19.47
	Max	26.00	9.60	96.23	100.00	76.00	61.54
TBI group	Mean	17.00	7.56	86.61	90.48	72.61	32.62
	SD	9.29	3.56	9.72	16.26	11.00	13.45
	Min	6.00	3.60	66.67	66.67	61.11	19.56
	Max	30.00	13.76	95.74	100.00	88.46	55.95

narrative ($U = 16.500$, $p = 0.876$ and $U = 12.000$, $p = 0.432$ respectively).

A graphical comparison of discourse performance across groups can be seen in Figures 1(a) and 1(b), which contain summaries of mean scores for productivity in both tasks.

Cohesion. Participants with TBI used significantly *fewer* complete cohesive ties than control participants when producing a monologic narrative ($U = 5.500$, $p = 0.024$). For the jointly-produced narrative, there was no significant difference between participants with TBI and control participants for percentage of complete cohesive ties ($U = 8.000$, $p = 0.149$).

Content. Content was measured by the percentage of story grammar elements and the percentage of essential units of information present. Participants with TBI used significantly *fewer* story grammar elements and significantly *fewer* essential units of information (more extraneous information) than control participants when producing a monologic narrative ($U = 5.000$, $p = 0.024$ and $U = 0.000$, $p = 0.0015$ respectively). There was no significant difference between the jointly-produced narratives of participants with TBI and those of control participants with respect to content measures ($U = 16.000$, $p = 0.876$ and $U = 12.000$, $p = 0.432$ respectively).

Exchange structure analysis. No significant difference was found between the percentage of K1 moves in the jointly-produced narrative of participants with TBI and that of control participants ($U = 44.000$, $p = 0.684$).

Summaries of mean percentages for cohesion, story grammar, information units, and exchange structure in both tasks can be seen in Figures 2(a) and 2(b), which compare discourse performance across groups.

Comparison of discourse performance between narrative tasks

Productivity. It was hypothesized that there would be a difference between narrative tasks for participants with TBI in the total number of C-units and words per C-unit. However, no significant difference was found between the monologic and jointly-produced narratives of participants with TBI using these productivity measures ($p = 0.345$ and $p = 0.310$ respectively). For control participants,

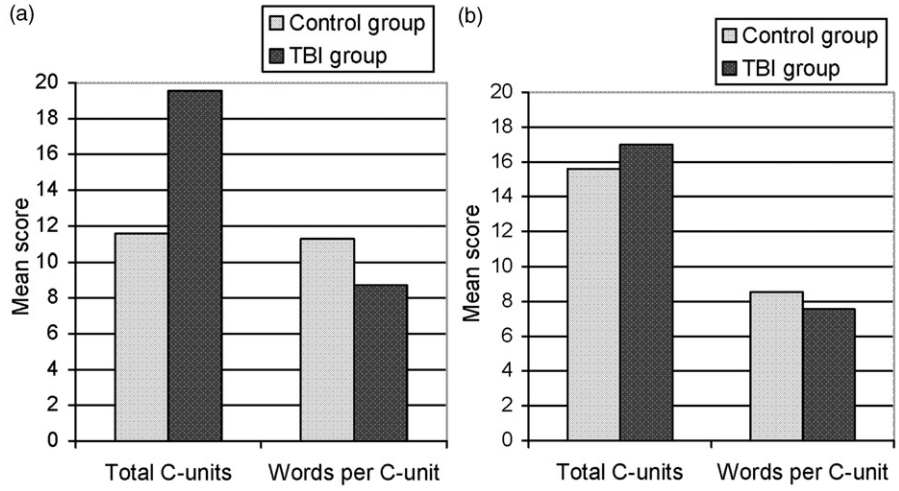

Figure 1. (a) Summary of mean scores for productivity across groups in monologic narrative; (b) Summary of mean scores for productivity across groups in jointly-produced narrative.

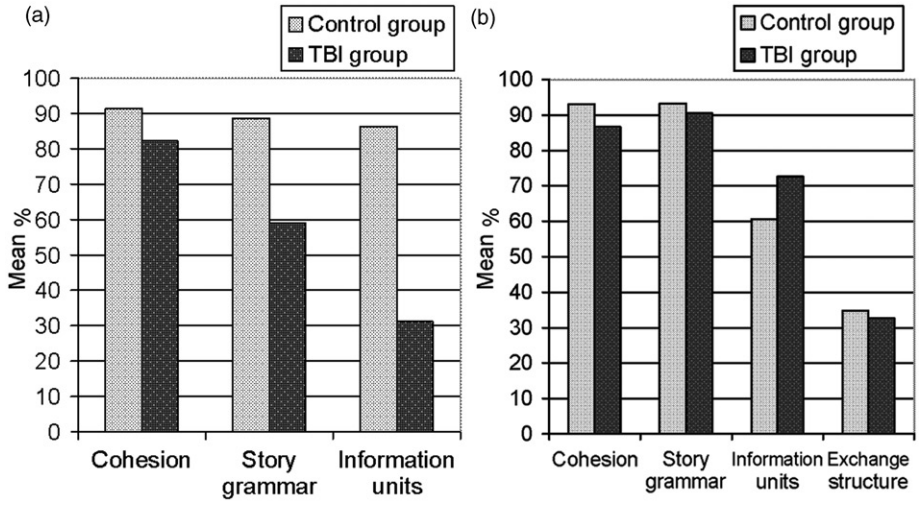

Figure 2. (a) Summary of mean percentages for cohesion, story grammar and information units across groups in monologic narrative; (b) Summary of mean percentages for cohesion, story grammar, information units, and exchange structure across groups in jointly-produced narrative. Legend: See Table IV.

there was also no significant difference between the total number of C-units in both narrative tasks ($p = 0.500$), but they did use significantly *fewer* words per C-unit to jointly-produce a narrative than to produce a monologic narrative ($p = 0.043$).

A graphical comparison of discourse performance across tasks can be seen in Figures 3(a) and 3(b), which contain a summary of mean scores for productivity for both groups.

Cohesion. There was no significant difference between the monologic and jointly-produced narratives of participants with TBI with respect to percentage of complete cohesive ties ($p = 0.176$). This was the same for control participants ($p = 0.465$).

Content. Results for the percentage of story grammar elements and the percentage of essential units of information were compared between narrative tasks. Participants with TBI used significantly *more* story grammar elements and significantly *more* essential units of information (less extraneous information) when jointly-producing a narrative than when producing a monologic narrative ($p = 0.0135$ and $p = 0.014$). No significant difference was found between the monologic and jointly-produced narratives of control participants for the percentage of story

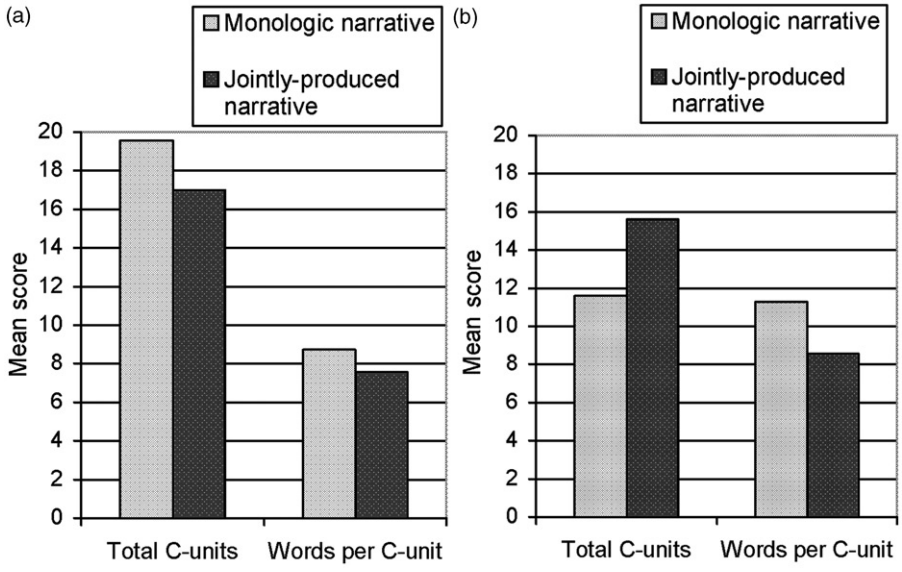

Figure 3. (a) Summary of mean scores for productivity across tasks for participants with TBI. (b) Summary of mean scores for productivity across tasks for control participants.

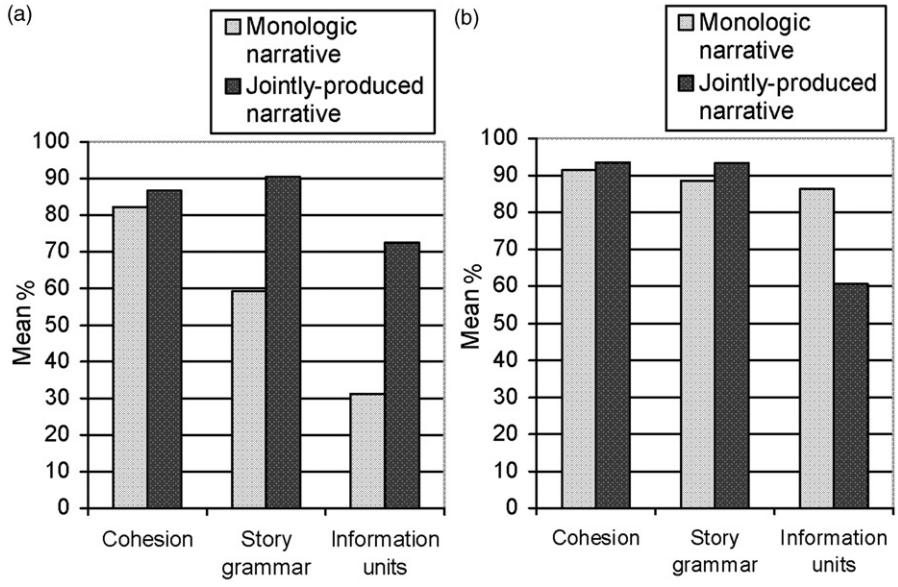

Figure 4. (a) Summary of mean percentages for cohesion, story grammar, and information units across tasks for participants with TBI. Legend: *Cohesion* = no. complete cohesive ties as a percentage of total cohesive ties, *Story grammar* = no. story grammar elements present as percentage of expected elements, *Information units* = no. essential info units as a percentage of total info units; (b) Summary of mean percentages for cohesion, story grammar, and information units across tasks for control participants. Legend: *Cohesion* = no. complete cohesive ties as a percentage of total cohesive ties, *Story grammar* = no. story grammar elements present as percentage of expected elements, *Information units* = no. essential info units as a percentage of total info units.

grammar elements present ($p = 0.713$). However, control participants used significantly *fewer* essential units of information (more extraneous information) when jointly-producing a narrative than when producing a monologic narrative ($p = 0.034$).

Summaries of mean percentages for cohesion, story grammar and information units for both groups can be seen in Figures 4(a) and 4(b), which compares discourse performance between tasks.

Discussion

Narrative discourse is perhaps the most frequently sampled genre by speech pathologists, however this is typically done as a monologue. While monologic discourse is clearly valuable as a diagnostic tool, it may not reflect typical everyday interactions of the person with TBI. The impact of communication partners on the production of narrative in everyday

conversational exchange has been recognized [20]. Despite this, there are no known studies to date which have addressed the jointly-produced narratives of adults with TBI.

Did participants with TBI perform as expected in the monologic narrative task?

Many studies have noted that people with TBI have difficulties with monologic narrative production. The present study sought to replicate these findings but also to compare performance with a more naturalistic jointly-produced narrative with a friend. The monologic narrative findings in this study were consistent with many of the major findings of previous narrative research, thus confirming the diagnostic value of asking people with TBI to complete these tasks.

Participants with TBI in this study used fewer words per C-unit than control participants in their monologic narrative, similar to other studies (e.g. [40, 47]). However, participants with TBI used a greater number of C-units than control participants to produce their monologic narrative. Lengthier oral narratives of people with TBI have been reported previously [7, 9, 14, 29]. While other studies note decreased productivity [40, 53], non-exclusion of participants with concomitant difficulties such as dyarthria may be a contributing factor [40]. In this study, participants with TBI used significantly fewer complete cohesive ties than control participants when producing a monologic narrative. This is similar to the findings of many studies [8, 10, 40], though not all [47]. Additionally, fewer story grammar elements were used by participants with TBI—the story grammar abilities of people with TBI in generation tasks are often seen to be reduced when compared to controls (e.g. [10, 17, 54]). Different study methods may be a cause where disparities exist in story grammar findings [4, 47].

Provision of sufficient and appropriate informational content is a frequently reported difficulty for people with TBI [8]. Participants with TBI in this study used significantly fewer essential units of information (or more non-essential or extraneous information) than control participants to produce a monologic narrative. Numerous repetitions of information were also seen in the narratives of the clinical group, similar to the 'information redundancy' reported by Snow and colleagues (1998) [5]. The following example demonstrates these features (TBI participant 1):

> Seems apparent that there is a person, upstairs obviously, and (they have the) they want to walk down the stairs. They start walking down the staircase and as they get near the bottom of the staircase they might notice someone else, and I'm unaware that they have a conversation, it doesn't look like they have as past, and the person that's walking down the stairs keeps walking down the stairs, and the other person (is on) is doing what they're doing, don't know just they just pass staircase, they're walking down the stairs.

The result for informational content was highly significant in this study (control group mean = 86.3, clinical group mean = 31.2). Many studies have noted a reduction in the amount of target content or a failure to include critical information [11, 17, 40], as well as the inclusion of inaccurate information and using more words to convey information [9, 40]. While this may appear to create a substantial listener burden, listeners often recognize incompleteness and incoherence in the narrative of typical speakers, and use questions to fill in information [19]. However in narrative assessment and research, the clinician or researcher usually participates minimally in the task to maintain a controlled environment. This creates a non-realistic setting for the demonstration of skills. Therefore, a jointly-produced narrative task was used in this study to provide a context where the effect of a familiar communication partner could be taken into account.

Are participants with TBI as equally able to jointly-produce a narrative as control participants?

There is growing literature on the impact of communication partners on discourse both in TBI and other populations. In particular, the previous studies in this series have demonstrated the impact of power and familiarity of different communication partners on the discourse of those with TBI [32, 33, 55, 56]. Here, as in a similar study of communication in a unique problem-solving task [56], people with TBI appeared to be empowered to participate in and produce narrative competently while engaging in a meaningful interaction with friends. Participants with TBI could not be statistically differentiated from control participants in *all* of the discourse measures in the jointly-produced task. Thus, in this study, participants with TBI appear as equally able to jointly-produce a narrative as control participants.

While there were no significant differences between participants with TBI and control participants for productivity, cohesion, content, or participation in the jointly-produced narrative, several 'trends' were evident. There was a trend for participants with TBI to produce a greater number of C-units than control participants and fewer words per C-unit, as well as fewer complete cohesive ties and fewer story grammar elements (see Table VII for further details). These trends, while not significant,

followed the same pattern as the differences between the groups in the monologic task.

The findings for informational content were surprising however. As stated, participants with TBI did not significantly differ from controls in amount of informational content, but there was a trend for the clinical group to provide *more* essential units of information than the control group in the jointly-produced narrative (control group mean = 60.6, clinical group mean = 72.6). That is, control participants tended to divert from the task with personal chat more often than participants with TBI. Kilov and colleagues also found that unrelated/personal talk occurred in a higher frequency in the control group [56]. This tangential language is often considered characteristic of communication in individuals with TBI. However, the prominence of tangential language in the discourse of the control group suggests that it is a typical conversational behavior, perhaps used to strengthen relationships between communicators [15]. It is hypothesized that participants with TBI had greater difficulty shifting between the task and social oriented talk due to a difficulty with cognitive flexibility, which is a common feature of TBI [57].

Does a familiar partner facilitate the production of narrative in participants with TBI?

While people with TBI appear as equally able to jointly-produce a narrative as control participants, further examination of results *between tasks* reveals some interesting findings.

Participants with TBI used significantly more story grammar elements and significantly more essential units of information when jointly-producing a narrative than when producing a monologic narrative. That is, people with TBI were facilitated to produce more appropriate content in their narratives when collaborating with friends. Communication partners appeared to have a significant facilitatory effect on informational content and story grammar due to their ability to scaffold the macrostructure of the discourse. However, no significant differences were found between the narrative tasks for productivity and cohesion. This indicates that it may be difficult for a communication partner to have an effect on measures that rely on the cognitive-linguistic skills of the individual with TBI (e.g. producing more words).

Participants with TBI appear unable to modify their language resources for productivity and cohesion measures between the tasks. Difficulty adapting language for the social situation has been noted by Galski and colleagues (1998) [3]. However, participants with TBI did follow some control trends across the discourse tasks. This is similar to the findings of Togher and colleagues (1997), where participants with TBI were able to vary their moves and types of requests between interactions although not as sensitively as the control group [32].

Control participants used significantly fewer words per C-unit in the jointly-produced task than in the monologic task, which is similar to findings in the typical population [18]. The participants with TBI also followed this trend, though it was not significant. The interrupting and overlapping of discourse in the jointly-produced task is likely responsible and easily observed in out data. For example, following is part of the transcript of control participant 2 (n.b. '=' means overlap):

> Friend: 'No no oh not a very='
> Participant: = (unintelligible)
> Friend: 'I'm not a very handy bloke that's–'
> Participant: 'I like that stuff so–'
> Friend: 'I'm not a handy man . . . you know, 'cause I'm so playstation = or anything like that.'
> Participant: '= (laugh) I wouldn't have a problem (laugh).'
> Friend: '(laugh) That's right.'

Participants with TBI tended to produce more cohesive narratives and used significantly more story grammar elements in the jointly-produced task than in the monologic task. These trends were also seen in the control group's performance, and may be due to the use of different elicitation tasks. Liles and colleagues (1989) found that both clinical and control groups had a higher frequency of complete episodes and greater levels of cohesion in a story retelling task than in a story generation task [10]. Davis and Coelho (2004) had a similar finding for cohesion [58]. While differences in elicitation tasks indicate the need for replication of this study with more controlled tasks, ultimately the clinical and control groups did not significantly differ from each other in their cohesive use and story grammar in the jointly-produced task. That is, participants with TBI performed more like control participants in the jointly-produced condition.

The jointly-produced narrative environment clearly provides insightful information about the potential for people with TBI to use their language resources in different situations. The results may indicate the use of jointly-produced narrative as an additional assessment tool for creating a more representative view of everyday language abilities in an empowering environment. Competent participation in and production of narrative appears possible for individuals with TBI when they engage in meaningful interactions with friends. Qualitatively, however, there still were some interesting differences in the discourse of TBI in the jointly-produced task.

For example, participants with TBI often focused on the recall of facts and details during the jointly-produced task, as apposed to relating the story as a whole. They appear to have believed it was a testing situation with a memory task expectation. For example, TBI participant 5 stated '(I, I, you) you're not going to ask some questions? I was looking at with a view to what questions you would ask.'

Additionally, some friends in the clinical group asked the participants with TBI questions to which they knew the answer. This can be seen in the following example from the jointly-produced narrative of TBI participant 4:

> Friend: 'Well, what sort of things did they use?'
> Participant: 'They use –'
> Friend: 'The sandstone, you said that.'

These 'teaching exchanges' potentially disempower people with TBI [32]. Ylvisaker and colleagues (1998) noted that using a directive, interrogational communicative style results in a large degree of failure and frustration for children with TBI [21]. If a communicative partner shifts to a more collaborative style, the rate of failure is easily reduced and the ability to organize and remember information is simultaneously increased [21]. This appeared to be the case in this study: participants with TBI who were involved in the teaching exchanges did not make as much improvement as other participants between discourse tasks. However, it must be noted that these subjects also had the greatest difficulties with the monologic task.

Two of the participants with TBI (participants 1 and 8) performed comparatively better than the other participants with TBI when they engaged in talk with their friends after watching the video, before the researcher re-entered the room. This 'practice' at the task before the researcher came back appeared to facilitate their jointly-produced narrative. For example, the clarification of facts can be observed in the discourse of TBI participant 1:

> Participant: 'What was the hotel at, Indonesia was it?'
> Friend: 'It's Fiji.'
> Participant: 'Fiji. Sounded good.'

Ylvisaker and colleagues (1998) note that greater reliance on antecedent supports and scaffolding sets the stage for communicative success [21]. Thus, there are implications for the training of friends in rehabilitation after TBI. Friends appear to have the potential to fill supportive and therapeutic roles in treatment, similar to the aforementioned aphasia programs, and rehabilitation for children with TBI.

Limitations

Despite these positive results, there are a number of issues pertaining to this study that need to be addressed. These issues, along with the small sample size and exploratory nature of this study, highlight the need to interpret the results with caution.

For example, the informational content of the control group varied considerably, which made the application of informational analysis to the clinical group difficult. Variability among control groups and overlap in the narrative performance of control and clinical groups is commonly reported (e.g. [13, 59]). In this study, there was large variation in the clinical groups' performance on many of the measures, and also an overlap between the groups in many of the measures on the monologic task. Whether this was due to the small participant numbers, the differences in the elicitation tasks, or the analysis tools is hard to determine. However, the variation and overlap limits the ability to extrapolate the findings.

The inclusion of other types of analyses may have been useful. For example, lay listener judgments are considered the most reliable measures of everyday discourse abilities [5], and their use alongside analytic quantitative measures helps to contribute to our understanding of the normal range of performance [60]. Analysis of story 'sparkle,' meaning linguistic features that make a story engaging or entertaining [61], or 'reported speech,' which is the quoting or paraphrasing of words from another time and place [62], may also have produced more apparent differences between groups. Hence, the need to maintain multiple levels or types of analyses in narrative research [8], and the usefulness of exchange structure analysis as a tool for assessing performance in interactional discourse.

This was a preliminary study of jointly-produced narrative, and the difficulties discussed imply the need for replication with a larger number of participants. However, the findings indicate an avenue for training everyday communication partners in supporting narrative skills after TBI, and for the use of jointly-produced narrative as an additional assessment tool to create a holistic view of everyday skills.

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