



THE EFFECT OF ELICITATION TASK ON DISCOURSE COHERENCE AND COHESION IN ADOLESCENTS WITH BRAIN INJURY

EVA VAN LEER and LYN TURKSTRA
University of Arizona

Six adolescents with traumatic brain injury and six adolescents who had been hospitalized for an illness or injury not affecting the brain were administered two narrative tasks designed to vary in their demand for spontaneous organization of information and minimize the requirement for new learning. The discourse topics—a description of each subject's injury and hospitalization, and a re-telling of a current event—were chosen to be representative of discourse in adolescent daily living. Narratives produced by subjects in each group were compared between the two tasks on measures of coherence and cohesion. Subjects in both groups produced significantly more coherent and cohesive narratives in the personal event task than in the current event task, and there was no significant difference between groups. The results are discussed in relation to face validity of language tasks for adolescents, and the multiple factors contributing to adolescent social discourse. © 1999 by Elsevier Science Inc.

Educational Objectives: Readers will be able to (a) identify the rationale for employing discourse analysis in the evaluation of adolescents with traumatic brain injury, (b) distinguish discourse cohesion from discourse coherence, (c) identify potential limitations in the application of research findings from children and adults to adolescents, (d) recognize the inherent variability in adolescent discourse production, (e) consider the effects of cognitive-linguistic demand on discourse production.

KEY WORDS: Narrative structure; Discourse analysis; Head injury; Communication assessment

INTRODUCTION

Over the past ten years, discourse analysis has gained popularity as a method for assessing communicative function after traumatic brain injury (TBI). For adolescents, who constitute the majority of TBI survivors, analysis of spoken

Address correspondence to Dr. L. Turkstra, Department of Communication Sciences, Case Western Reserve University, 11206 Euclid Avenue, Cleveland, OH 44106. Tel: (216) 368-2470; Fax: (216) 368-6078; E-mail: <lst2@po.cwru.edu>.

discourse has grown out of the need to better describe and identify communication impairments that are not revealed through traditional methods of language assessment. Aphasia tests, which assess lexicon and grammar, do not adequately identify or describe the language deficits of individuals with TBI (Sarno, Buonaguro, & Levita, 1986). TBI survivors have been shown to perform within normal limits on these tests (Chapman, Culhane, Levin, Harward, Mendelsohn, Ewing-Cobbs, Fletcher, & Bruce, 1992; Jordan, Murdoch, & Buttsworth, 1991) whereas deficits in spoken discourse are apparent (Holland, 1982; Sarno et al., 1986).

Production of narrative discourse is a typical and common activity of adolescents. Csikszentmihalyi, Larson, and Csikszenthi (1984) stated that adolescents spend one third of their day conversing with others. Discourse topics include experiences encountered in daily life, discussion of world events and politics, and personal opinions and values. Csikszentmihalyi et al. (1984) further stated that discourse is a common activity because it plays an essential role in adolescent development. The primary characteristic of adolescence is the creation and development of an individual and social identity. Through the use of discourse, adolescents define themselves as individuals and as a group (Csikszentmihalyi et al., 1984).

Narrative discourse has been examined in several studies of communication in children, adolescents, and adults with TBI (e.g. Chapman et al., 1992; Coelho, Liles, & Duffy, 1991; Hartley & Jensen, 1992; Liles, Coelho, Duffy, & Zalagens, 1989). In these studies, analysis of narratives at the word or sentence level typically has not differentiated individuals with TBI from their uninjured peers (e.g., Dennis & Barnes, 1990; Turkstra & Holland, 1998). As a result, attention has turned toward the analysis of structures and relations beyond the level of the sentence (Coelho, 1995), including the overall organization of a narrative discourse and the logical progression of ideas within it (Chapman et al., 1992; Hartley & Jensen, 1992; Jordan et al., 1991; Mentis & Prutting, 1987). In studies of discourse at this structural or *macrolinguistic* level, factors such as the cohesion and coherence of a narrative are measured.

Cohesion is the linking of meaning across sentences through the use of cohesive markers and information related to these markers (Halliday & Hasan, 1976). A cohesive marker is a word that leads the listener to information elsewhere in the text to complete its meaning (Coelho, 1995). As this information is found outside of the sentence in which the cohesive marker occurs, a meaning relationship, or cohesive tie, is formed across sentences. Thus, a cohesive tie consists of a cohesive marker and the information (i.e., word or words) outside that sentence that completes the marker's meaning.

If the information that completes a marker's meaning is not readily apparent, ambiguous intersentential meaning relations are created. When cohesion is disrupted in this way, functional communication is compromised, and the listener must increase effort to make sense of the discourse. In order to objec-

tively quantify how well a speaker maintains meaning across the discourse, cohesive adequacy is measured. Individual cohesive ties are labeled as being complete, incomplete, or erroneous (Liles et al., 1989). Taken together, the percentages of adequate and inadequate cohesive ties provide an index of the cohesive adequacy of a text.

Although Halliday and Hasan (1976) initially proposed that cohesion was the mechanism for establishing the thematic unity of a text, or its *coherence*, it has since been accepted that cohesion alone cannot account for the coherence of a discourse (Patry & Nespoulous, 1990). Whereas cohesion is established by the interdependence in content among parts of utterances, coherence is created by the relation of the whole utterance content to the topic. Local coherence is maintained by relating the content of an utterance to the content of the preceding utterance (Glosser & Deser, 1990; Kintsch & van Dijk, 1978). Global coherence is established by relating the content of each individual utterance to the general theme of the discourse (Glosser & Deser, 1990; Kintsch & van Dijk, 1978).

Previous research with individuals with TBI has focused largely on cohesion rather than coherence (Coelho et al., 1991; Glosser & Deser, 1990; Hartley & Jensen, 1992; Jordan et al., 1991; Liles et al., 1989; McDonald, 1993; Mentis & Prutting, 1987). The results of cohesion studies have been inconsistent, with some authors finding poorer cohesion in individuals with TBI compared to uninjured subjects (Hartley & Jensen, 1992; Mentis & Prutting, 1987), others finding no differences between injured and uninjured subjects (Glosser & Deser, 1990; Jordan et al., 1991; McDonald, 1993), and still others finding differences within TBI subject groups themselves (Coelho et al., 1991; Liles et al., 1989). Only two studies (Hartley & Jensen, 1992; Jordan et al., 1991) have included narrative data from adolescents as a distinct group.

Methodological aspects of previous research also limit the interpretation of results and their application to adolescents. Fictional story generation tasks (e.g., Coelho et al., 1991; Jordan et al., 1991; Liles et al., 1989) require creativity and abstraction in addition to planning and organization, one or more of which may be impaired after TBI (Hartley, 1995). Procedures such as story retelling (e.g., Hartley & Jensen, 1992; Liles et al., 1989) limit the demand for creativity, but require learning and immediate recall of new information. Thus, impaired cohesion on these tasks may reflect limitations in multiple cognitive domains. On-line procedures such as narration of a filmstrip may reduce the demand for short-term memory and creativity, but may not be representative of spontaneous daily discourse. Procedures such as fictional story generation also may not require the type of narrative abilities used in daily social communication (Biddle, McCabe, & Bliss, 1996).

In contrast to the inconsistency of results from cohesion studies, studies of coherence after TBI present a more uniform picture, though they are fewer in number (Biddle et al., 1996; Chapman et al., 1992; Glosser & Deser, 1990;

McDonald, 1993). The results of these studies have revealed impaired coherence in the discourse of children, adolescents, and adults with TBI. However, as in studies of cohesion, adolescent subject data have not been reported separately. Nonetheless, the finding of impaired coherence is interesting because it is consistent across a variety of discourse tasks that placed varying degrees of cognitive-linguistic demands on the subjects.

Given the limitations of previous research and the importance of narratives in adolescence, it was of interest to further explore the narrative ability of adolescents with TBI in comparison to that of their uninjured peers. Cohesion and coherence were measured in two narrative tasks, chosen to reflect the discourse of daily living and vary in their demands on cognitive-linguistic organization. The tasks were (a) a personal event narrative: a description of each subject's accident and hospitalization, and (b) a current event narrative: a description of the story of O.J. Simpson and the murders of Nicole Brown Simpson and Ronald Goldman, which had been in the news for 18 months at that time. Adolescents with TBI were compared to adolescents who had been hospitalized for injuries not affecting the brain.

The two discourse tasks involved spontaneous generation of an event narrative. The personal event narrative concerned information that subjects were likely to have spoken about frequently: the content was familiar to the subjects, and the episodes were temporally ordered. Thus, this task was thought to demand relatively little spontaneous organization and to minimize learning, memory, and creativity demands. In addition, the task had ecological validity, in that adolescent conversation tends to revolve around personal events.

The current event task involved information that subjects were exposed to over a prolonged period of time. Though individual subject exposure was not measured, in the 18 months preceding the study 230 stories about the murders and the trial had appeared in the local newspaper (E. Raines, personal communication, March 2, 1998), and 908 separate news stories were televised on the CNN Headline News Network (source: <http://www.CNN.com>). Like the personal event narrative, this task was not expected to require new learning or creativity, and drew on information from long-term memory stores. However, unlike the personal event narrative, this task demanded a considerable amount of spontaneous organization of information and, while the subject matter was likely to be familiar, the task of retelling the "O.J. story" to an uninformed listener was not. The task had ecological validity in that discussion of a current event reflects daily discourse.

The two narratives for each adolescent subject were analyzed in terms of their linguistic cohesion, local coherence, and global coherence. It was hypothesized that both TBI and uninjured groups would perform more poorly on the current event narrative than the personal event narrative. This effect was predicted due to the greater cognitive-linguistic organization demand thought to be associated with the current event narrative. As coherence reflects the or-

organizational aspects of discourse, a greater demand on spontaneous organization would be reflected in poorer coherence. In addition, cohesive adequacy in the current event narrative could be decreased, as completion of cohesive ties previously was found to decrease as a function of increased cognitive demand (Liles et al., 1989).

A second hypothesis was that there would be an interaction of group and narrative type such that individuals with TBI would be more vulnerable to the effects of increasing the demand for organization. Thus, it was predicted that in the personal event narrative, the coherence and cohesion of adolescents with brain injury would not differ from that of their non-injured peers, whereas in the current event narrative, coherence and cohesion of subjects with traumatic brain injury would be poorer than that of their non-injured peers. The lack of difference between groups on the personal event narratives was predicted because the task placed a relatively low demand on cognitive processes (i.e., short-term learning, recall, and spontaneous creativity) that might be impaired in the TBI group, and because the topic had personal relevance. The current event narrative was thought to place a greater burden on cognitive-linguistic organization and thus, as organization and planning ability reportedly are impaired in individuals with brain injury, was expected to be more challenging for individuals the TBI group.

METHOD

Subjects

Subjects were six individuals who had sustained a moderate to severe traumatic brain injury during adolescence (TBI Group) and six who had undergone emergency hospitalization for a condition not affecting the brain (Control Group). Individual subject characteristics are presented in Table 1 (TBI Group) and Table 2 (Control Group).

The subjects with brain injury had no history of previous neurological disorder or learning disability, and were between one and two years post-injury at the time of entry into this study. Four of the subjects in this group (Subjects 3, 4, 5, and 6) had sustained a severe traumatic brain injury, and two subjects (Subjects 1 and 2) had sustained a moderate traumatic brain injury. At the time of entry into the study, four subjects in the TBI Group had returned to school, one in regular classes with supplementary tutoring (Subject 5) and three with special education services (Subjects 1, 2, and 3). The remaining two subjects (Subjects 4 and 6) had dropped out of school and had obtained part-time competitive employment intermittently since the accident. All six subjects reported continued functional limitations in cognitive ability, including "poor memory."

Five of the subjects with brain injury were administered the Clinical Evaluation of Language Fundamentals (Semel, Wiig, & Secord, 1995) (see Table 3

Table 1. Characteristics of Subjects in the Traumatic Brain Injury (TBI) Group

Subject	Gender	Age at test (years: months)	Age at injury (years: months)	Months post-injury at time of test	Years of formal education completed	Cause of injury	Admission GCS Score	Admission CT Scan Findings
1	F	18:9	17:0	21	11	Fall from moving car	13 ^a	Nonhemorrhagic left temporal lobe contusion, bilateral frontal contusions, hairline fracture right orbital roof
2	F	18:7	17:3	16	11	MVA	13	Right frontal hemorrhagic contusion, bilateral orbital roof fractures with pneumocephalus, left temporal fracture
3	M	18:5	16:7	22	10	MVA	4	Right temporal lobe contusion and hematoma, ventricular bleeding, diffuse axonal injury, possible pontine hemorrhage
4	M	20:1	19:1	12	13	Fall from skateboard	7	Left parieto-occipital contusion
5	M	15:0	13:8	16	9	Bicycle- MVA	6	Diffuse axonal injury with corpus callosum shear injury, hematoma at left external capsule
6	M	19:6	17:11	19	8 ^b	MVA	6	Bilateral frontal shear injury, subarachnoid hemorrhage, intraventricular hematoma
	Mean	18:4	15:10	17.7	10.3			

^aDeteriorated to GCS 10 within 12 hours of admission.^bSubject was expelled from school after eighth grade and was in the process of obtaining high school equivalency diploma.
GCS = Glasgow Coma Scale (Jennett & Bond, 1975); CT = Computerized Tomography; MVA = Motor Vehicle Accident.

Table 2. Control Subject Characteristics

Subject	Gender	Age at test (years:months)	Age at hospitalization (years:months)	Months post-hospitalization at time of test	Years of formal education completed	Reason for hospitalization
1	F	19:4	17:3	25	10	Gunshot to face and back
2	F	20:3	20:2	1	14	Acute gastroenteritis
3	M	17:1	17:2	1	11	Mauled by dog
4	M	20:11	20:6	5	14	Elbow laceration
5	M	15:7	14:7	12	9	Dislocated knee
6	M	20:2	19:10	4	14	Traumatic hernia
	Mean	18:10	18:3	5.29	12	

Table 3. Brain-injured Subjects' Summary Scores for Clinical Evaluation of Language Fundamentals—Third Edition^a

Subject	Range of subtest standard scores ^b	Receptive language score (percentile)	Expressive language score (percentile)	Total language score (percentile)
1	6–2	98 (45)	94 (34)	95 (37)
2	3–10	75 (5)	84 (14)	78 (7)
3	3–8	53 (1)	63 (2)	59 (1)
5	7–14	94 (34)	104 (61)	98 (45)
6	4–9	69 (2)	82 (12)	74 (4)

^aSemel, Wiig & Secord, 1995^bPopulation average = 10; Standard Deviation = 3

for summary scores). Language test data were not available for Subject 4, who was lost to follow-up.

Control subjects had no prior history of neurological disorder or learning disability, and had been hospitalized between one month and two years prior to testing. They were matched to subjects with brain injury by age, estimated pre-injury aptitude (e.g., whether someone was an average versus a good student) and general interests (e.g., whether the individual enjoyed reading). The use of previously hospitalized individuals as controls permitted the use of the same elicitation procedure in both groups.

Subjects with brain injury did not differ from control subjects on measures of expressive syntax, as reported in a previous study (Turkstra & Holland, 1998). However, these subjects did show a significant impairment in working memory. Thus, they were considered representative of the type of individual for whom narrative data might provide diagnostic information: their language scores on many measures were within normal limits, yet they complained of functional cognitive impairments and were unable to return to full-time regular education without supports.

Story Elicitation Procedures

Two narratives were elicited from each subject: a personal event narrative and a current event narrative. For both narratives, interviewers were trained to respond only with continuation regulators (e.g., “Can you tell me anything else?”) and natural conversational feedback, so that there would be no difference between groups in the amount or nature of feedback provided.

For the personal event narrative, subjects were asked to describe their accident or hospitalization into a lapel microphone (Realistic) connected to a cassette tape recorder (SONY). For the current event narrative, subjects were asked to tell the story of O.J. Simpson and his murder trial. The interviewer elicited the current event narrative by asking the subject to describe what happened leading up to and during the trial, as if speaking to someone who knew little or nothing about the case.

Discourse Analysis Procedures

Transcription and segmentation. Audiotaped samples of all narratives were transcribed and divided into terminable units (T-units). A T-unit was defined as a main clause and all subordinate clauses and non-clausal structures attached or embedded within it (Scott, 1988). A main clause that began with a coordinating conjunction (e.g., and, but, or) was scored as a complete T-unit rather than a dependent clause of the preceding T-unit, unless the coordinated clause included a co-referential subject deletion. Utterances were categorized as incomplete analyzable T-units if they did not contain a subject, but did contain a main clause including a predicate.

The total number of T-units, and the percentage of complete, incomplete analyzable, and incomplete (not analyzable) T-units were calculated for each subject. The first fifty complete and incomplete analyzable T-units of each narrative were analyzed for cohesion and coherence. A T-unit that was a verbatim repetition of the preceding T-unit was excluded from the cohesion analysis, so that subjects were not penalized twice for an error. Repeated T-units were included in the coherence analysis.

Cohesion analysis. Cohesive markers within three categories, Reference, Lexical, and Conjunctive, were identified using Liles' (1985) procedure, which in turn is based on the system developed by Halliday and Hasan (1976). For details regarding the identification of cohesive ties see Appendix A. As found by Liles et al. (1989), the categories of Ellipsis and Substitution occurred too infrequently for statistical analysis. As in previous research (Coelho et al., 1991), the focus was on overall cohesive adequacy. Thus, subtypes of cohesive devices are not reported here.

After cohesive markers were identified, each marker was judged as to the adequacy of its cohesive tie using Liles' (1985) procedure. Cohesive ties were classified as complete, incomplete, or erroneous. A tie was judged to be complete if the referent for the marker could be located easily in the preceding discourse. A tie was judged incomplete if a referent was not supplied in the discourse or was not evident from the context. A tie was judged to be erroneous if more than one possible referent could be identified in the discourse, thus making the cohesive marker ambiguous. The number of ties in each of the three categories of adequacy was calculated as a percentage of the total number of cohesive ties in each narrative.

Coherence analysis. Coherence was defined by Glosser and Deser (1990) as the appropriate maintenance of some aspect of the topic within a discourse. Each narrative was rated on global and local coherence according to a rating scale adapted from the scale developed by Glosser and Deser (1990). This scale is summarized in Appendix B. Every T-unit was assigned a rating for both global and local coherence. Local and global coherence were rated on a five-point scale, with a higher score indicating a greater degree of coherence. Each point on the scale was operationally defined, as shown in Appendix B.

Global coherence. Global coherence was defined as the relation of the meaning or content of each T-unit to the established topic of conversation. In the current study, the topic of each narrative was determined by the interviewer. For instance, in the personal event narrative the determined topic of conversation was the subject's accident. All utterances within the subject's discourse should relate to this topic if global coherence is to be maintained. Likewise, in the current event narrative, the established topic of conversation was the story of O.J. Simpson and the murders of Nicole Brown Simpson and Ronald Goldman, and all utterances of the subject's discourse should relate to this topic if global coherence is to be maintained. The percentage of T-units receiving each rating from 1 to 5 was calculated for each subject for each narrative.

Local coherence. Local coherence characterizes the relation of the meaning of one T-unit to that of the immediately preceding T-unit. Local coherence is maintained through the development of related ideas progressing from one T-unit to the next. As described in Appendix B, higher local coherence scales are obtained if the topic of a T-unit is continued, elaborated, or coordinated with the topic of the immediately preceding T-unit. Lower scores were assigned if the topic was radically changed, or if comments on the discourse were provided. The percentage of T-units receiving each rating from 1 to 5 was calculated for each subject for each narrative.

Scoring Reliability

Inter-rater reliability for the transcription of each narrative was determined by having a second trained rater analyze 4 of the 24 audiotaped narratives. Agreement was 98.6%.

Inter-rater reliability for T-unit segmentation, cohesion analysis, cohesion adequacy analysis, and coherence rating was calculated on six randomly chosen narratives, constituting 25% of all language samples, for a total of 300 T-units. A second trained rater independently analyzed these transcripts. Reliability was calculated as percentages of agreement between the two raters, based on point-to-point comparisons of coding decisions. Agreement between raters was 95.2% for T-unit segmentation and completeness, 91% for identification of cohesive markers, 91% for classification of complete ties, 94% for classification of incomplete ties, 99% for classification of erroneous ties, 96% for global coherence, and 91% for local coherence. All disagreements were resolved by discussion.

Data Analysis

Coherence scale values of 2 and 4 were assigned rarely. Inspection of Appendix B will reveal that a score of 2 differed from a score of 1 only in the addi-

tion of a second clause, not in the degree to which the utterance was linked to the preceding utterance (local coherence) or the topic (global coherence). Likewise, a score of 4 differed from 5 only in the addition of a second clause. Thus, coherence ratings were collapsed into low coherence (1–2), medium coherence (3) or high coherence (4–5). A repeated-measures two-way analysis of variance was used to compare the following measures between groups and narrative types: (a) total number of T-units; (b) percentage of complete, incomplete analyzable and incomplete unanalyzable T-units; and (c) percentage of high, medium, and low local and global coherence ratings. In 3 cases, data passed equality of variance tests, but were skewed. As the ANOVA procedure is tolerant of such violations of normality, and because the associated error would underestimate rather than overestimate any effects, the ANOVA was applied in these cases as well.

A Bonferroni correction for alpha slippage was applied for each qualitatively different family of measures. Thus, the criterion p -values were $.05/4 = .013$ for T-unit and cohesion measures, and $.05/3 = .017$ for each of global and local coherence measures. In statistical terms, the specific hypotheses to be tested were a main effect of task on cohesion and coherence measures—favoring the personal event narrative—and an interaction of group by task, so that TBI subjects showed a disproportionate drop in cohesion and coherence on the current event narrative.

RESULTS

The means and standard deviations for all measures across the two groups and tasks are summarized in Table 4. Main and interaction effects are reported below. For ease of reading, only the F and p values of significant comparisons are reported.

Cohesion

Subjects in both groups produced significantly more T-units in personal event narratives than in current event narratives $F(1,1) = 15.93, p = .003$. There was no significant effect of task on any cohesion measure, though there was a trend for subjects to complete more ties in their personal event narratives. There was no significant interaction of group by narrative.

Coherence

There was no significant effect of group, or group by task interaction, on any local or global coherence measure. Subjects had significantly more high-coherence ratings in the personal event narrative, for both global coherence, $F(1,1) = 18.35, p = .002$; and local coherence, $F(1,1) = 22.32, p = .001$.

Table 4. Group Mean Values for t-Unit, Cohesion and Coherence Measures. Standard Deviations are in Parentheses

Measure	Current event narrative		Personal event narrative	
	TBI	Control	TBI	Control
<i>T-units</i>				
# T-units	26.00 (9.94)	26.17 (16.82)	50.50 (.55)	50.83 (.75)
% Complete	92.11 (4.33)	88.09 (21.03)	90.46 (8.43)	97.73 (1.92)
% Incomplete analysable	4.57 (6.46)	7.78 (19.05)	8.56 (8.09)	0.65 (1.01)
% Incomplete unanalysable	3.33 (2.83)	4.14 (5.67)	0.98 (1.07)	1.62 (1.45)
<i>Cohesion</i>				
Ties/t-unit	1.50 (1.32)	2.18 (1.48)	1.51 (0.33)	1.23 (0.16)
% Complete	87.44 (13.21)	85.54 (8.46)	92.08 (6.89)	91.01 (4.27)
% Erroneous	2.79 (4.88)	4.93 (6.34)	1.42 (1.39)	1.90 (4.67)
% Incomplete	9.77 (8.98)	11.53 (9.41)	6.66 (6.28)	7.09 (3.97)
<i>Coherence</i>				
% Global 4–5	57.18 (16.92)	46.82 (24.89)	83.33 (12.37)	87.33 (7.55)
% Global 3	28.19 (14.93)	41.91 (20.34)	15.67 (12.09)	11.0 (7.87)
% Global 1–2	14.17 (17.10)	10.83 (8.98)	1.0 (1.67)	1.33 (1.63)
% local 4–5	70.75 (7.79)	76.71 (5.92)	87.0 (7.87)	88.67 (5.75)
% local 3	21.55 (6.04)	16.35 (6.50)	12.33 (7.84)	10.0 (6.07)
% local 1–2	7.17 (6.49)	7.00 (6.90)	.67 (1.03)	1.33 (0.16)

Subjects had significantly lower coherence ratings in current event narratives than in personal event narratives, including more low global ratings $F(1,1) = 8.215, p = .017$; medium global ratings, $F(1,1) = 11.24, p = .007$; low local ratings, $F(1,1) = 11.54, p = .007$; and medium local ratings, $F(1,1) = 8.746, p = .014$.

DISCUSSION

The discourse elicitation tasks used in this study influenced the coherence and cohesion of narratives, in both adolescents with traumatic brain injury and in their uninjured peers. Group and narrative effects are discussed separately.

Group Effects

As expected, no differences between subject groups were found on any measure for the personal event narrative. Though the sample size was small, the data for cohesion and coherence were highly similar between groups. Thus, the lack of a significant difference between groups was considered meaningful. This task was designed to limit the demand for new learning and spontaneous organization, and focus on personally relevant information. The results

are interpreted to demonstrate that the task was successful, and is therefore a useful task for analysis of optimal narrative ability.

In contrast, the lack of differences between groups on the current event narrative was not predicted. Rather, it was hypothesized that subjects in the TBI group would perform more poorly than their peers, given the expected organizational demands of the task. In this case, the small sample size may have played a role, at least in regard to global coherence for the current event narrative. There were trends in the data (e.g., for subjects with TBI to produce more on-topic comments with poorer local coherence than their peers) that, given the large standard deviations in both groups, are unlikely to reflect a true tendency for group differences. Nonetheless, even in this small sample, the failure to find robust group differences was unexpected. Though several earlier studies had failed to find differences between TBI and comparison subjects in regard to cohesion (Coelho et al., 1991; Glosser & Deser, 1990; Hartley & Jensen, 1992; Jordan et al., 1991; Liles et al., 1989), the lack of group differences in coherence was inconsistent with earlier research (Biddle et al., 1996; Chapman et al., 1992; Glosser & Deser, 1990; McDonald, 1993).

There are several possible reasons for the inconsistency between the results reported here and those of previous research. As discussed earlier, previously described tasks may have been more demanding of memory and creativity, and many studies focused on individuals with severe communication impairments. Moreover, some of the reported group differences, particularly in the study of Biddle et al. (1996), were extremely small, albeit statistically significant. The lack of control for alpha slippage in the statistical analyses of such studies may have overestimated their statistical significance.

Yet the present study's findings do not rule out the possibility that discourse is impaired in adolescents with TBI. First, adolescents with TBI may be impaired on narrative discourse tasks such as these, but not in cohesion and coherence. A different method of analysis, such as story grammar analysis, or dependency analysis, may have been more sensitive to impairments in these narrative samples. Informal perusal of narrative samples of both groups did not reveal any obvious differences in episode integrity, hesitational phenomena, or implicit propositions, which are measured in story grammar and dependency analysis. Nonetheless, it would be of interest to explore such an analysis approach.

A second possibility is that a task other than monologic discourse may be more sensitive to impairments. Communication problems may have been more readily apparent in a conversational interaction, and might have included difficulties in topic management, turn taking, and other pragmatic functions. Coherence and cohesion problems also may have surfaced in conversation.

A third possibility is that impairments among subjects with TBI were masked by a floor effect for both groups, due to the on-line organizational de-

mands of the current event narrative. Unlike re-telling tasks, subjects here were required to both recall a series of events and reorder these events for narrative purposes (e.g., many of us heard about Mr. Simpson's attempted escape from the area before hearing about the murders, and details from the scene of the crime were presented much later during the trial). This explanation is unlikely in regard to T-unit completion and cohesion. Overall values for these measures were relatively high: subjects in both groups completed more than 85% of T-units and cohesive ties on the current event task. Local coherence values were also relatively high (more than 70% of utterances were given the highest coherence rating). A floor effect might be expected to produce lower values than that. Both groups also produced current event narratives which, though significantly shorter than the accident narratives, were substantially longer than narratives in previous studies that did report differences (e.g., Liles et al., 1989). Thus, problems in the TBI group do not appear to have been masked by a floor effect.

A fourth possibility is that the participants were not sufficiently impaired in communication skills to be distinguishable from their peers. They were also injured relatively late in regard to language development, and thus may have been able to call upon previously learned discourse skills. Perhaps the subjects' difficulties were too subtle to be revealed on discourse measures, and they were able to compensate using preserved pre-morbid skills. Though this explanation cannot be ruled out, participants in the present study did have communication impairments, as well as disabilities in social and academic settings. As discourse analysis evolved in part from a need to identify and describe communication problems not revealed on standard tests, the present subjects were considered to have the type of difficulties that would best be addressed at a discourse level.

Narrative Effects

In contrast to the similarity between groups, narrative performance was markedly different between tasks. The difference was manifested primarily in narrative length, global coherence, and local coherence. Subjects in both groups produced longer, more coherent narratives in generating a familiar personal event narrative than in spontaneous generation of a current event narrative. The difference in cohesion adequacy approached significance, with greater adequacy demonstrated in the accident narrative than in the current event narrative.

These findings support one of the study hypotheses, which predicted a decrease in cohesion and coherence in the narrative that placed greater cognitive-linguistic demands on the speaker. The findings also support the assertion of Liles et al. (1989) that cohesive adequacy varies as a function of textual complexity, or demand on creativity and spontaneous organization. In accord with Liles and colleagues, the findings are interpreted to suggest that a task re-

quiring a greater degree of cognitive organization and creativity is a more complex task, and will therefore be more likely to reveal weaknesses in discourse ability. A less complex task, such as the accident narrative, is likely to elicit optimal discourse ability.

The decrease in length for the current event narrative in comparison with the accident narrative may be due to several factors. First, the personal event narrative included descriptions of all events leading up to each subject's accident, the accident itself, rehabilitation, and the subject's current functional status. In addition, subjects frequently added a section about the effect of the accident on their life. For the current event narrative, subjects were asked to tell the story of the Simpson and Goldman murders, and thus this narrative also could have been composed of a number of episodes and descriptions. However, most subjects focused on their personal opinions, telling only the gist of the story in few T-units, noting few facts, and incorporating little detail. This tendency to dedicate several T-units to personal opinion is revealed in the measure of global cohesion, which shows that only half of the T-units were tightly related to the topic, while the remainder were related either loosely or not at all. The tendency to focus on personal opinions is typical of adolescents, who, as noted earlier, are in the process of developing a personal identity and values.

A second reason for short narrative length in the current event narratives may be the subjects' stated reluctance to talk about the subject matter. Perhaps this reflected the current adolescent generation's distance from the generation to which O.J. Simpson was relevant. A more appropriate current event topic might have related to a public figure of interest to adolescents, such as the suicide of singer Kurt Cobain. In choosing such a topic, it is important to ensure that it is relevant to all adolescents (the suicide of Kurt Cobain was not).

Third, several subjects claimed to know little about the event, though all subjects were able to provide at least five facts about the trial and events leading to it. Thus, brevity may have been based on a lack of domain knowledge. As this study did not separately test domain knowledge about either narrative topic, it is difficult to determine whether knowledge or social factors constrained length. Testing domain knowledge separately when analyzing a discourse is recommended by Frederiksen, Bracewell, Breuleux, and Renaud (1990) and would have been helpful here.

A final possible explanation is that the current event narrative did not focus on personally relevant information. While adolescents have been shown to discuss both personal and current events, discussion of personal stories may occur more frequently. Thus, a personal event narrative may be a more ecologically valid task eliciting longer, more detailed discourse.

It is important to keep in mind that domain knowledge and personal relevance can affect length without influencing cohesion and coherence. Thus, they may not account for the lack of differences on these measures between tasks. It is possible to construct a highly cohesive and coherent narrative with

few facts, and the opposite is true. This is illustrated in the following excerpts from two subjects (forward slashes indicate pauses):

Well after a while it got boring / they keep going over evidence / the gloves are his / the gloves aren't his / the blood's his / the blood's not his / you know / the knife / where's the knife come from / where'd the noise come from / how did Kato Kaelin come into this?

Basically, I think that the O.J. Simpson trials were a waste of time and I don't like talking about it because they wasted a bunch of commercial dollars and all kinds of valuable American time / and it was pretty ridiculous / um / a guy tried for the exact same crime in the exact same county on the exact same day who wasn't a superstar was convicted within three weeks and sentenced to death and O.J. Simpson got this special treatment 'cause he was a football player and it was really a big joke / and I think he was guilty.

The first response contains more facts related to the event, whereas in the second there are fewer facts and more opinions. Yet the first is less cohesive than the second and displays less local coherence. Thus, factors accounting for length cannot account for differences in cohesion and coherence between the two tasks. The level of cognitive-linguistic demand is a more likely explanation for the latter finding.

It was of interest to note the variability of normal subjects both within the group and between tasks. This finding confirms those reported by Liles et al. (1989), Hartley and Jensen (1992), Mentis and Prutting (1987), McDonald (1993), and Jordan et al. (1991), whose normal subjects' narratives varied greatly in length and cohesive adequacy.

Future Directions

Future research should advance knowledge about normal adolescent discourse, and further the development of techniques that represent performance in daily living. In regard to normal adolescent discourse, narrative skill in the present study varied considerably from person to person, independently of the presence of traumatic brain injury. This finding raises two clinical issues. First, in order to form a comprehensive picture of an individual's narrative ability, discourse must be sampled across contexts that differ in their cognitive-linguistic demands on the speaker. Second, more information about discourse variability in normal subjects must be gathered before making judgments about the discourse of individuals with TBI.

The topic of discourse may have a significant effect on performance in adolescence. An adolescent may communicate effectively on a topic of high familiarity and interest, yet be a poor communicator for unfamiliar or personally irrelevant materials. Since different individuals are likely to have different in-

terests, it may be problematic to identify topics that are relevant to all participants in a study. One solution may be to provide subjects with a list of current topics, and allow them to choose a topic of interest for their narrative sample. It also might be fruitful to develop a discourse "laboratory," offering multiple communication opportunities. This practical experience laboratory would place the subject in several situations requiring functional communication with different conversational partners. After these tasks were completed, the subject would be given an opportunity to talk about his or her experience, thereby providing a personally relevant unrehearsed event narrative. An approach such as this has been described for individuals with TBI (Flanagan, McDonald, & Togher, 1995; Marsh & Knight, 1991). Narratives also could be sampled in natural settings by asking subjects to carry a portable recorder and record ideas or events throughout the day. This approach was employed successfully by Csikszentmihalyi et al. (1984) in research on adolescent socialization.

In regard to typical versus optimal performance, the tasks used here appeared to elicit performance at opposite ends of the continuum: the personal event narrative may have elicited optimal performance, and the current event narrative may have been unusually demanding for the subjects. In addition, when discourse is sampled on only one occasion, as in this study, the clinician is unlikely to elicit typical performance. It may be beneficial to sample discourse over a period of several days. In this way, the subject can increase his or her familiarity and comfort with the examiner and protocol of the study. Subjects also may be evaluated in peer-pairs, on self-selected topics. A baseline of discourse skill can be established, and the chance that discourse reflects typical daily interactions will be increased.

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APPENDIX A

COHESION ANALYSIS

(abstracted with permission of the author from Liles, 1985)

Definition of a cohesive marker

An element is defined as a cohesive marker if its meaning is not recoverable within the sentence.

Categories of cohesive markers:

Reference. The identity of the thing or class of things referred to is found in the preceding or following text. Markers include *personal markers*, referring to the identity of persons, objects and events (e.g., his, them, it); and *demonstrative markers*, identifying the referent by place or time (e.g., that, this, then).

Conjunction. Devices that specify the relation of content between sentences, including additive conjunctions (e.g., and, furthermore); adversative conjunctions (e.g., but); causal conjunctions (e.g., because); and temporal conjunctions (e.g., then).

Lexical. Cohesion achieved through the use of vocabulary (e.g., “Jane” referring to “the athletic student”).

Identification of cohesive adequacy

Complete tie. A tie is judged complete if the referent can be found and defined with no ambiguity. For example: “The girl passed her exam. *She* was happy.”

Incomplete tie. A tie is judged incomplete if the referent is not provided in the text. For example: “The girl passed her exam. *They* congratulated her.”

Erroneous tie. A tie is judged erroneous if the listener is guided to ambiguous or erroneous information. For example: “Bob and Joe went to the gym. *He* played racquetball.”

APPENDIX B

GUIDELINES FOR RATING DISCOURSE COHERENCE

(adapted with permission of the authors from Glosser & Deser, 1987)

No Relationship	Possible Relationship	Definite Relationship
Score 1	2	3
	4	5

Global coherence. The relationship of the meaning or content of an utterance to the general topic of conversation. The general topic of conversation is determined by the examiner’s last question.

Score of 5

The utterance provides substantive information related to the general topic. For example, on the topic of the subject’s accident, “I was taken to the hospital by ambulance.”

Score of 4

The utterance contains multiple clauses, wherein one clause relates directly to the topic and the other relates indirectly. For example, “I was taken to the hospital, which was a first for me.”

Score of 3

The utterance provides information possibly related to the general topic or is an evaluative statement without providing substantive information, or the topic must be inferred from the statement. For example, “The hospital is a confusing place.”

Score of 2

The utterance contains multiple clauses, wherein one clause possibly relates to the general topic and one does not. For example, “The hospital is a confusing place, as usual.”

Score of 1

The utterance is unrelated to the general topic or is a comment on the discourse. For example, “That’s all I have to say.”

Local coherence. The relationship of the meaning or content of an utterance to that of the preceding utterance. The relationship may be achieved through continuation, elaboration, repetition, subordination or coordination of ideas from the preceding utterance.

Score of 5

The topic of the preceding utterance is continued by elaboration; temporal sequencing; enumeration of related examples; or maintaining the same actor, subject, action or argument as the focus. For example, “O.J. was a football star. *He was very famous.*”

Score of 4

The utterance contains multiple clauses, wherein one clause definitely relates to the content in the preceding utterance but another may not. For example, “O.J. was a football star. *I think that he was very famous.*”

Score of 3

The utterance topic generally relates to that of the preceding utterance, but with a shift in focus from the subject or activity of the preceding utterance; or the utterance is referentially vague or ambiguous so that the relation to the preceding utterance must be inferred. For example, “O.J. was a football star. *He had a lot of things going on.*”

Score of 2

The utterance contains multiple clauses, wherein one possibly relates to the content of the preceding utterance but the other(s) may not. For example, “O.J. was a football star. *I think he had a lot of things going on.*”

Score of 1

The utterance has no relationship to the content of the immediately preceding utterance. It may be a radical topic shift, a comment on the discourse, or

an unintelligible utterance. For example, "O.J. was a football star. *That's all I know.*"

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CONTINUING EDUCATION

The Effect of Elicitation Task on Discourse Coherence and Cohesion in Adolescents with Brain Injury

QUESTIONS

1. Discourse analysis at the macrolinguistic level may be helpful in evaluating adolescents with TBI because
 - a. standardized tests typically fail to address difficulties in connected conversation
 - b. discourse analysis does not require normative data or standardized administration
 - c. the impairments revealed on standardized tests will be masked in discourse
 - d. macrolinguistic analysis of discourse is focused at the word or sentence level
 - e. macrolinguistic analysis is more revealing of deficits than coherence or cohesion analysis

2. Cohesion and coherence
 - a. are synonymous
 - b. both measure the relation of utterances to the overall topic
 - c. have consistently been shown to be impaired after TBI
 - d. can vary somewhat independently of each other
 - e. are unrelated to the type or topic of a narrative

3. A discourse elicitation procedure that has *not* been used after TBI, but could be useful, is
 - a. story re-telling
 - b. fictional story generation
 - c. carrying a pocket recorder, to record comments during the day
 - d. narrative of an ongoing event, such as a film-strip
 - e. a discourse “laboratory” with multiple communication experiences

4. Global coherence may be defined as
 - a. the relation of meaning of each T-unit to that of the previous T-unit
 - b. the relation of meaning of each T-unit to the overall topic
 - c. the adequacy of reference to markers found in the preceding utterances
 - d. the number of complete referential ties in a conversation
 - e. the overall competence of a speaker in discourse

5. In this study, an increase in the spontaneous organizational demand in a discourse task was associated with
 - a. increased global coherence, only for subjects with TBI
 - b. decreased global coherence, only for subjects with TBI
 - c. decreased local cohesion, for subjects in both groups
 - d. increased global coherence, for subjects in both groups
 - e. decreased global coherence, for subjects in both groups