

Coherence, cohesion, and declarative memory: Discourse patterns in patients with hippocampal amnesia

Introduction

Everyday communication requires an ability to rapidly and accurately juggle cognitive, social, and linguistic capacities and to tie thoughts coherently into an organized narrative. With communication's heavy demand on multiple cognitive systems (e.g., linguistic, emotion, memory, executive functions) (Hartly & Jensen, 1991), discourse analysis is a useful tool for investigating breakdowns in the complex orchestration of these systems in individuals with cognitive-communication disorders associated with traumatic brain injury (TBI) and Alzheimer's disease (AD). Yet, while previous research has been helpful in identifying which discourse measures reliably differentiate patients with TBI or AD from their healthy counterparts, this work has been unable to form specific conclusions about which cognitive domains (e.g., memory, executive function) make critical contributions to a given behavior because of the diffuse nature of the pathology and the constellation of observed cognitive deficits (e.g., Hartley & Jensen, 1992; Coelho, 2002; Youse & Coelho, 2005). Taking advantage of a rare patient group with selective and severe declarative memory impairments, the current study is an attempt to isolate the contribution of a given cognitive system (declarative memory) to successful discourse performance. In addition to informing our basic understanding of the cognitive systems that support language, this novel approach promises to inform clinical decision-making.

Discursive Cohesion and Coherence

One area of research that has been particularly fruitful in identifying discourse level impairments in individuals with cognitive-communication impairments is investigations of discourse cohesion and coherence; our ability to seamlessly and flawlessly tie ideas together in connected speech and writing. Halliday and Hasan (1976) defined cohesion as surface indicators of relations within and between sentences. Cohesive elements or devices tie one part of a text to another and contribute to the discourse continuity (Ripich, Carpenter, & Zioli, 2000) (e.g., The husband and wife just moved to a new house, and *she* has been busy cleaning *it*.) and can take the form of references, conjunctions, and lexical markers (Dijkstra, Bourgeois, Allen, & Burgio, 2004; Liles & Coelho, 1998). Since the cohesive marker is a word that leads a listener to information outside of the sentence or utterance for meaning, a relationship is formed across sentences (Coelho, 1995). If a marker is ambiguous or misleading, cohesion and understanding is disrupted and communication is impeded (Van Leer & Turkstra, 1999). Coherence has been defined as the conceptual organization of discourse at the suprasentential level and depends on a speakers' ability to maintain thematic unity. Coherence is further defined as either "global" or "local," where global coherence is the overall organization in relation to the overall plan or theme and where local coherence is the conceptual link between individual sentences that maintain meaning in a text or discourse (Glosser & Deser, 1990; Agar & Hobbs, 1982). While patients with cognitive-communication impairments associated with TBI and dementia routinely

have discourse level impairments in cohesion and coherence, the source of the underlying impairment has been difficult to determine and deficits have been attributed to impairments in working memory (Dijkstra et al., 2004; Youse & Coelho, 2005), executive function (Coelho, 2002; Glosser & Deser, 1990), and broad cognitive dysfunction (Coelho, Liles, & Duffy, 1991, Davis & Coelho, 2004).

Cohesion, Coherence, and Declarative Memory

While the bulk of work directed at linking cohesion and coherence to memory has focused on a relationship with working memory, there are compelling reasons to investigate the contribution of declarative memory. First, the declarative memory system supports the creation of representations for successive events including information about the co-occurrences of people, places, and things, and the ability to link the spatial, temporal and interactional relations among them across time (Cohen & Banich, 2003). In discourse terms, successive events could be individual utterances or event structures within a narrative or a conversational topic that is repeated and returned to across time (e.g., picking up the thread of conversation a week later). Second, declarative memory impairment is a hallmark deficit in TBI and Alzheimer's disease (Bourgeois & Hickey, 2009; Murray, Ramage, & Hopper, 2001; Richardson, 2000) and disruptions in discursive cohesion and coherence are prevalent in these populations (e.g., Youse & Coelho, 2005; Dijkstra et al., 2004). Third, when correlating cohesive ties with a variety of memory measures in the discourse of individuals with TBI, Youse and Coelho (2005) reported a robust correlation with a measure of declarative memory (verbal paired associate learning) while all but one correlation with working memory measures were non-significant.

The current study is an initial attempt at understanding the specific and unique contribution of declarative memory to discursive cohesion and coherence by examining the discourse practices of individuals with selective and severe declarative memory impairments as a way to understanding the underlying impairment observed in patients with more widespread neuropsychological involvement. We hypothesize that patients with hippocampal amnesia will be impaired on measures of cohesion and coherence compared to healthy participants.

Methods

Participants

This study analyzes previously collected data for cohesion and coherence across conversational, narrative and procedural discourse using a mediated discourse elicitation protocol (Hengst & Duff, 2007). Participants are six individuals (2 females) with hippocampal amnesia and six healthy comparison participants. Participants with amnesia were between 40 and 51 years old, had profound declarative memory deficits (mean WMS-III = 68.6 WAIS-III = 100.7) and hippocampal system damage following an anoxic event or herpes simplex encephalitis. In order to make better contact with the existing literature (e.g., Coelho et al., 1991; Coelho, 2002; Coelho et al., 2005; Liles et al., 1989; Youse & Coelho, 2005), we also collected new data on the same six participants with amnesia and six new healthy comparison participants having each participant complete a picture description task and a story retelling condition. All

comparison participants are matched pair-wise to participants with amnesia on age, sex, handedness, and education.

Data Analysis

Analysis is completed in four phases. First, all discourse samples are transcribed using a consensus procedure (see Duff et al., 2008). Second, all transcripts are divided into T-units (Hunt, 1970). Third, following Liles (1985), transcripts are coded for cohesive markers across three categories: reference, lexical and conjunctive. Decisions regarding adequacy of each cohesive tie are made. Fourth, following Glosser and Deser (1990) each transcript is rated for global and local coherence.

Results

To date, training of coding procedures is complete, phases one and two are complete, and phases three and four have been initiated. Given our current level of progress we will have the full analysis completed by March 2010. Data from all phases and across all discourse genres will be presented with exemplars as well as a discussion of the results in the broader context of the literature on cohesion and coherence with special attention to the memory requisites of discursive cohesion and coherence.

Discussion

Our prediction is that patients with hippocampal amnesia will be impaired on measures of cohesion and coherence compared to healthy participants. Regardless of whether or not this hypothesis holds, the analysis of discursive cohesion and coherence in a rare group of patients with selective and severe declarative memory impairments promises to contribute in interesting ways to our understanding of the relationship between memory and language, to elucidating the memory requisites of distinct discourse forms, and to refining our interventions for individuals with more complex cognitive-communication disorders due to TBI and AD.

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