

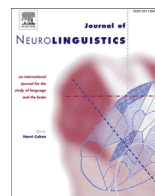


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## Patterns of impairment of narrative language in mild traumatic brain injury



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### ABSTRACT

Mild traumatic brain injury (mTBI) represents a condition whose cognitive and behavioral sequelae are often underestimated, even when it exerts a profound impact on the patients' every-day life. The present study aimed to analyze the features of narrative discourse impairment in a group of adults with mTBI. 10 mTBI non-aphasic speakers (GCS > 13) and 13 neurologically intact participants were recruited for the experiment. Their cognitive, linguistic and narrative skills were thoroughly assessed. The group of mTBIs exhibited normal phonological, lexical and grammatical skills. However, their narratives were characterized by the presence of frequent interruptions of ongoing utterances, derailments and extraneous utterances that at times made their discourse vague and ambiguous. They produced more errors of global coherence [ $F(1; 21) = 24.242$ ;  $p = .000$ ;  $\eta_p^2 = 0.536$ ] and fewer Lexical Information Units [ $F(1; 21) = 7.068$ ;  $p = .015$ ;  $\eta_p^2 = .252$ ]. The errors of global coherence correlated negatively with non-perseverative errors on the WCST ( $r = -.755$ ;  $p < .012$ ). The macro-linguistic problems made their narrative samples less informative than those produced by the group of control participants. These disturbances may reflect a deficit at the interface between cognitive and linguistic processing rather than a specific linguistic

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disturbance. These findings suggest that also persons with mild forms of TBI may experience linguistic disturbances that may hamper the quality of their every-day life.

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## 1. Introduction

Individuals with traumatic brain injury (TBI) usually experience communicative impairments, which may vary in severity from subtle word-finding difficulties to frank aphasic symptoms. The ability to produce informative narratives, central to communicative success, poses a major challenge to them. Indeed, even those patients who do not exhibit evident microlinguistic (i.e., lexical or grammatical) difficulties may be communicatively inadequate and unable to deal with the macrolinguistic aspects of language processing (e.g., *Glosser & Deser, 1991; Marini, Andreetta, Del Tin, & Carlomagno, 2011*). These include pragmatic difficulties (e.g., in the production/comprehension of non literal expressions; *Angeleri et al., 2008*) and inefficacy in producing well-structured informative messages (e.g., *Davis & Coelho, 2004*). As a result, their contributions in conversation are usually described as confused and impoverished (e.g., *Carlomagno, Giannotti, Vorano, & Marini, 2011*).

The vast majority of the studies that analyzed discourse abilities in these persons have focused on severe and moderate forms of brain injury. These investigations have consistently reported poor topic management, tangentiality, difficulties in the use of cohesive markers and in dealing with the superstructural organization of their narratives (*Body & Perkins, 2004; Coelho, 2002; Coelho, Liles, & Duffy, 1991, 1994; Groher, 1997; Marini, Galetto, et al., 2011; McDonald, 1993, 2000; Snow & Douglas, 2000; Turkstra, McDonald, & Kaufmann, 1996*). For example, *Coelho (2002)* studied a cohort of fifty-five consecutive participants with TBI who were not aphasic on a story generation and a story retelling task. These individuals did not differ from a group of healthy participants in terms of sentence complexity and cohesive adequacy (i.e., proportion of complete cohesive ties) but introduced in their narratives more extraneous propositional content, suggesting problems in the organization of information at intersentential level. More recently, *Carlomagno et al. (2011)* on a narrative discourse production task found in 10 non-aphasic TBI adults normal microlinguistic abilities but impaired macrolinguistic processing in terms of errors of cohesion, local and global coherence. Interestingly, the occurrence of macrolinguistic errors correlated with the rating of language inaccuracy by naïve judges. These results further suggest that the impression of confused and impoverished language from non-aphasic individuals with TBI may depend on the reduced ability to organize information at the macrolinguistic level of processing rather than on difficulties in dealing with lexical and syntactic (i.e., microlinguistic) aspects of language production. The possibility of a problem in the global organization of information at the text level is supported by findings from studies focusing on story grammars. These refer to “the internal structure of stories which guide an individual’s comprehension and production of logical relationships, both temporal and causal, between agents and events” (*Cannizzaro & Coelho, 2002, p. 1065*). Indeed, these studies have highlighted the presence of problems in using story grammar knowledge to guide narrative discourse formulation (e.g., *Body & Perkins, 2004; Brookshire, Chapman, Song, & Levin, 2000; Coelho, 2002; Le, Coelho, Mozeiko, Krueger, & Grafman, 2011a*). This wide range of difficulties is likely linked to the diffuse nature of the injury (*Adamovich, 1997; Davis, 2000; Stierwalt & Murray, 2002*). Indeed, the available evidence from both structural and functional neuroimaging studies clearly shows that persons who have sustained a TBI may experience diffuse axonal damage and show frontal and/or temporal hypometabolism when engaged in highly-demanding tasks such as those assessing working memory, attention, and response inhibition (e.g., *Graham, 1999; Mendez, Hurley, & Lassonde, 2005; Silver, McAllister, & Arciniegas, 2009; Stierwalt & Murray, 2002*). Noteworthy, growing evidence highlights the importance of these areas also in discourse processing (e.g., *Coelho, Le, Mozeiko, Krueger, & Grafman, 2012; Marini & Urgesi, 2012*).

To the best of our knowledge, only few studies have focused on the communicative skills of individuals with mild TBI (mTBI; *Stout, Yorkston, & Pimental, 2000; Tucker & Hanlon, 1998*). This is

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