The Cognitive Basis for Microlinguistic Changes in Discourse After TBI

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Introduction

Traditional descriptions of the language problems following traumatic brain injury (TBI) have generally focused on patterns of deficient discourse production (e.g., reduced cohesion) while explaining the observed outcomes in terms of disruptions to nonlinguistic cognitive processes (attention, memory, organization/planning). However, recent reports suggest that the study of discourse using such global or macrolinguistic approaches may be limited by the influence of microlinguistic (lexical and syntactic) processes during discourse production (Coelho, 2005; Davis & Coelho, 2004). Unfortunately, no studies have been reported that examine this interaction.

The absence of such studies may be due, at least partially, to a reliance on “off-line” methods that emphasize overall (error) patterns rather than “on-line” methods that emphasize sentence processing as it unfolds during connected speech. Indeed, Ellis and Peach (in press) recently found substantial sentence planning deficits in individuals with TBI when using “on-line” methods (pause times, sentence initiation times) to examine production of individual sentences during repetition and reading.

These findings raise questions as to whether the discourse problems following TBI are the result of a) a microlinguistic disturbance resulting from deficient attention, memory or executive functioning (organization/planning), b) a microlinguistic deficit that disrupts the process by which semantic representations of ideas are elaborated to produce surface syntactic representations, or c) some interaction between the two. To address these questions, we tallied instances of sentence reformulation and pausing during the connected discourse of a small group of speakers with TBI and correlated these findings with methods of sentence processing.

Methods and Procedures

The data for this investigation were derived from audio recordings of five individuals with TBI that were obtained as part of a larger study (see Table 1). The participants were matched for level of language functioning using the Aphasia Quotient (AQ) from the Western Aphasia Battery (WAB) (see Table 2). None of the participants demonstrated frank aphasia (as evidenced by their A.Q. and language characteristics). All of the participants were at least six months post injury at the time of the recordings.

The microlinguistic deficits observed in these participants may be related to executive deficits involving allocation of attention and planning. If so, these results would be consistent with the findings of Ellis and Peach (in press) suggesting that planning defects underlie the sentence production deficits observed following TBI. Although these findings are preliminary, they suggest that language production deficits in sentences and discourse may be part of a more global planning impairment resulting from executive dysfunction following TBI.

Results

Substantial variability was observed for the microlinguistic measures obtained for these participants (see Table 2). Correlations among the participants’ WAB AQ scores and these sentence production measures were small and not significant confirming that these variations were not due to overall level of language functioning. The mean number of pauses per utterance ranged from .25 to 1.78. Significantly more pauses were produced within clauses than between clauses (Z=2.023, p<0.043). Mean number of pauses per utterance ranged from .11 to .89.

The mean numbers of pauses and mazes per utterance were correlated with the language and cognitive measures (see Table 3). A strong (r=.90, p<.05) correlation emerged between the mean number of mazes per utterance and performance on Trails B (see Figure). No other meaningful correlations were observed.

Discussion

These preliminary results suggest that the microlinguistic deficits observed in these participants may be related to executive deficits involving allocation of attention and planning. If so, these results would be consistent with the findings of Ellis and Peach (in press) suggesting that planning deficits underlie the sentence production deficits observed following TBI. Although these findings are preliminary, they suggest that language production deficits in sentences and discourse may be part of a more global planning impairment resulting from executive dysfunction following TBI.


