

The Validity of Cognitive Distance in Oral and Written Discourse

Brenda M. Wilson and Rebecca Smith

Eastern Illinois University, Charleston

and

Adele Proctor

University of Illinois-Champaign

Oral and written discourse samples of adolescents with closed head injury (CHI) and controls were analyzed to determine if efficiency and coherence measures changed as the length of their picture descriptions increased. The hypothesis was that as ideas were elaborated, the number of words used to express an idea would increase and the conceptual connectedness of ideas would decrease. This research study supported this expectation for efficiency in normal oral and written discourse but not for the discourse of participants with CHI. Further, the efficiency measure significantly differentiated the writing and speaking of the two groups as the picture descriptions were elaborated. Coherence ratings did not distinguish the development of discourse within or between groups. © 2001 Academic Press

Introduction

The term closed head injury (CHI) is often used interchangeably with traumatic brain injury (TBI). However, CHI specifically pertains to injuries resulting in more complicated and diffuse brain injury than the classification of TBI.

Discourse has been found to be disrupted after CHI in children, adolescents, and adults. Glosser and Deser (1990) and Wilson and Proctor (1999) have analyzed the speaking and writing skills of persons after CHI. From the previous research, efficiency (the number of words used to express an idea) and coherence (the connectedness of sentences to the topic and to preceding and following ideas) have been shown to differ between those with CHI and controls. The persons with CHI use fewer words to express ideas and the sentences are less connected.

Muma and Harn (1995) theorize that because of reduced working memory, persons with CHI find it cognitively demanding to remember and combine stored information with new ideas. It is then believed that organization becomes too difficult as cognitive distance (the distance from the original topic) increases.

The present study was therefore designed to determine how measures of oral and written efficiency and coherence change as the length of the discourse increases. This study provided insight into the cognitive aspect of speaking and writing. It was hypothesized that as oral and written ideas are elaborated, the number of words used to express an idea will increase (decreased efficiency) and the conceptual connectedness of sentences will decrease (decreased coherence). This finding was expected to be more evident for those with CHI than for controls.

Method

Discourse samples from participants and controls were reanalyzed from a previous study by Wilson (1998). The participants included eight adolescents between the ages of 15 to 22 years (mean age 18 years 9 months; $SD = 2$ years) who had CHI. The controls for the study were matched as a group to CHI participants for sex, age, and general maternal education level. The ages of the control group varied from 15 to 22 years (mean age 19 years 3 months, $SD = 2-6$ years). There was no significant difference in age between the two groups ($t = -.46, p = .65$).

Before testing, the participants and controls took tests to determine their cognitive-linguistic ability, verbal working memory, and executive functioning. The experimental stimuli for this study included oral and written narratives about the "Cookie Theft Picture" from the *Boston Diagnostic Aphasia Examination* (Goodglass & Kaplan, 1983). The instruction for each person was to provide as much information as possible. Each person gave an oral narrative about that picture which was tape recorded and later transcribed, and a written narrative was completed. Order of oral and written tasks was counterbalanced. There was no time limit on the completion of either task.

The written and oral narratives were transcribed into separate communication units (CUS). The efficiency of discourse was measured by counting the number of words per CU and dividing it by the number of CUS to determine the mean length of communication unit (MLCU). The first half of each discourse sample was then compared to the second half for each individual in order to test cognitive distancing. Besides efficiency, the local and global coherence were also analyzed. Each narrative received one global and one local rating on the top half and the bottom half of each narrative. The rating scales from one to five were based on Wilson's (1998) informal coherence assessment. The interrater reliability for the top half of global was 84 and 81% for the bottom half and 72 for the top half of local and 81% for the bottom half (± 1 on rating scale).

Results

The within group analysis compared the top and bottom halves of oral and written narratives of the participants with CHI and the control groups for MLCU, local coherence, and global coherence. The between group analysis compared samples of the participants with CHI to the controls on the oral top and bottom halves and the written top and bottom halves for MLCU, local coherence, and global coherence. All of the analyses were completed by using a paired t test, and a significant difference was considered $<.05$.

Results indicated that there was a significant difference in the within group analysis between the control group's oral narrative of the top half MLCU compared to the bottom half ($t = 3.25, p = .01$). Another significant difference occurred when the control group's written narrative of the top half MLCU was compared to the bottom half ($t = 3.09, p = .02$). That is, controls spoke and wrote more words to express each idea in the second halves of their narratives.

For the between group analysis, a significant difference was found between the bottom halves of the written narratives of the participants with CHI when MLCU was compared to that of the control group MLCU ($t = -2.60, p = .04$). The only other significant difference was between the MLCU of the bottom halves of the oral narratives of the participants with CHI and the controls ($t = -2.36, p = .05$). When comparing the discourse samples of participants with CHI and controls, only differences were found between the bottom halves of the samples. In both oral and written narratives, controls used more words to express an idea than participants with CHI in the last halves of the samples.

There were no significant differences found within or between groups for the local and global coherence measures. The only analysis that approached significance for coherence was a within control group difference for the global ratings of oral narratives ($t = -2.20, p = .06$). This finding suggests that controls strayed from the topic more on the bottom halves of narratives than on the top halves.

Discussion

The purpose of this study was to determine if measures of oral and written efficiency and coherence change as the length of discourse increases. Even though many studies have been completed concerning discourse, this study concentrated on the concept of cognitive distance. The results for the control group supported the hypothesis that as oral and written ideas are elaborated, the number of words used to express an idea increases (decreased efficiency). This was not true for the CHI group. Earlier studies have demonstrated that when the entire discourse samples are analyzed, persons with CHI tend to use fewer words to express an idea. This pattern does not appear to change as ideas are elaborated for CHI communicators, while controls talk and write more as their narratives are developed.

This study supports the validity of the concept of cognitive distance for efficiency of discourse and that it appears to be more of a normal process for controls than a disordered process associated with CHI. The tendency of normals to use more words to express ideas as their thoughts are elaborated was true for spoken and written picture descriptions. Therefore, future studies should test a larger sample of controls to establish the influence of cognitive distance during processing in normals. Further, findings suggest that it may be more important to analyze the discourse process as ideas are developed rather than as static samples. Longer samples of writing and speaking may reveal more differences between disordered and normal communication than shorter versions. Cognitive factors such as working memory should be investigated as they relate to discourse performance.

Coherence, as measured in this study, did not distinguish the development of oral and written discourse of controls and participants with CHI within or between groups. There was a tendency for controls to demonstrate less connectedness of ideas to topic as they were developed in speaking. The relationship between coherence of ideas and cognitive distance could be further studied by eliminating shorter discourse samples. In this study, the top and bottom halves of some samples only contained two CUS, making it difficult to apply coherence ratings. It is felt that with refinement of the coherence rating scale, this will also provide a useful measure for discourse analysis.

REFERENCES

- Glosser, G., & Deser, T. (1990). Patterns of discourse production among neurological patients with fluent language disorders. *Brain and Language*, *40*, 67-88.
- Goodglass, H., & Kaplan, E. (1983). *Boston diagnostic aphasia examination* (2nd ed.). Philadelphia: Lea and Febiger.
- Muma, J. R., & Harn, W. E. (1995). Cognition, language, communication: Some challenging issues. In M. J. Ashley & D. K. Krych (Eds.), *Traumatic brain injury rehabilitation* (pp. 275-287). New York: CRC Press.
- Wilson, B., & Proctor, A. (1999). Oral and written discourse of adolescents with closed head injury. *Brain and Cognition*, *41*, 536-540.