CHAPTER

13

Analysis and Description of Narrative Discourse in Right-Hemisphere-Damaged Adults: A Comparison with Neurologically Normal and Left-Hemisphere-Damaged Aphasic Adults

Sr. Deborah Uryase
Robert J. Duffy
Betty Z. Liles

The appropriateness of speech-language services for right-hemisphere-damaged (RHD) adults has been established (Davis et al., 1981), and the deficits of their verbal discourse continue to elude the descriptive power of standard clinical measures. The need to define and explain those deficits continues to challenge right-hemisphere research. Analysis at the discourse level of processing appears indicated as a means of objectifying the clinical impression of deficient verbal communication. Myers (1979) noted that the impairments associated with right-hemisphere damage may pertain to "extracting critical bits of information, in seeing the relationships among them, and in reaching conclusions or drawing inferences based on those relationships" (p. 38). Formal discourse analyses, by definition, specify and quantify units of meaning and the relationships between them. Two highly reliable discourse analyses are cohesion analysis, which describes the semantic relationships across sentences that comprise a text, and story grammar analysis, which describes the logical relationships among goal-directed events that comprise a story.

There is currently little direct reference to either the cohesion or story grammar of discourse in right-hemisphere-damaged patients. A review of right-hemisphere narrative studies using sentence reordering, story retelling, and story generation from pictures indicates that stories of right-hemisphere-damaged adults are deficient in structure (Rivers and Love, 1980; Delis, 1980; Gardner et al., 1983), amount of content (Wechsler, 1986; Wapner, Hamby, and Gardner, 1980; Joanette et al., 1986), and type of content (Myers, 1979; Wechsler, 1983). Furthermore, the inefficient use of semantic cues to reorder sentences and the presence of semantic substitutions suggest reduced attention to text cohesion.

In the aphasia literature, both cohesion (Lemme, Hedberg, and Bottenberg, 1984) and story structure (Ulatowska et al., 1983) have been found to differ quantitatively from neurologically normal (NN) controls. The right-hemisphere literature typically notes the presence of qualitative differences but a marked absence of quantitative differences between right-hemisphere-damaged and left-hemisphere-damaged aphasic (LHDA) subjects.

The purpose of this study was to analyze and describe the verbal discourse of right-hemisphere-damaged adults in terms of cohesion and story grammar to determine whether those aspects are deficient and, if so, to specify how. Three broad questions were addressed:

1. Are narratives of right-hemisphere-damaged subjects as cohesive as narratives of neurologically normal subjects?
2. Are they different in structure?
3. Are they different in content?

To facilitate interpretation of the results, comparisons to left-hemisphere-damaged aphasic subjects are included.

METHODS

SUBJECTS

Twenty-two right-hemisphere-damaged, 20 neurologically normal, and 12 left-hemisphere-damaged aphasic adults participated in this study. All met strict selection criteria, including native English ability, natural right-hand preference, good to excellent auditory acuity as evaluated by a certified audiologist, and no prior history of physiological or psychological illness that could compromise cognition. A one-way analysis of variance (ANOVA) across the three groups using a SAS general linear model (GLM) procedure (SAS Institute, Inc., 1985) found no significant differences with respect to age [$F(2,51) = 0.32$, $p > .05$] or years of education [$F(2,51) = 2.75$, $p > .05$].

The brain-injured subjects were obtained from consecutive inpatient referrals to the Communication Disorders Department of a rehabilitation hospital. All had neuroradiologic or clinical evidence of a single unilateral cerebrovascular accident, intelligible speech, minimal to absent neglect, and sentence-level language competence.

Right-Hemisphere-Damaged Subjects

The right-hemisphere-damaged group consisted of 8 males and 14 females with a mean age of 65 years, a mean of 12 years of education, and a mean of 13.4 weeks after onset. The Behavioral Observation Profile of the Research Institute of Chicago Evaluation of Communication Problems in Right-Hemisphere Dysfunction (Burns, Halper, and Mogil, 1985) classified 60 percent of the group as mild to within normal limits, 32 percent as mild, and the remaining 8 percent as moderately impaired. Fifty-five percent of the subjects meeting selection criteria had been recommended for speech-language therapy subsequent to initial evaluation by a certified speech-language pathologist. The other 45 percent were considered to have communication skills that were functionally intact or did not warrant therapy.

Neurologically Normal Subjects

The neurologically normal group consisted of 12 males and 8 females with a mean age of 64 years and a mean of 14 years of education.

Left-Hemisphere-Damaged Aphasic Subjects

The left-hemisphere-damaged aphasic group consisted of 6 males and 6 females with a mean age of 64 years, a mean of 13 years of education, and a mean of 12.5 weeks after onset. All were admitted with a diagnosis of aphasia. The Porch Index of Communicative Ability (Porch, 1981) classified 50 percent of the group as between the 75th and 90th percentiles and the other 50 percent as between the 50th and 75th percentiles. Seventy-five percent of the subjects meeting selection criteria had been recommended for speech-language therapy.

PROCEDURE

Each subject individually viewed a 9-minute video. When it ended, a naive listener was introduced and the subject was asked to tell the listener the story as completely as possible. Upon completion, the listener left. The subject was asked a series of detail questions followed by a series of story grammar questions.

TRANSCRIPT PREPARATION

Each retelling was transcribed from audiotape and videotape and distributed into T-units (Hunt, 1965). As an indication of length, the numbers of T-units and text words were calculated.

ANALYSES

Cohesion

The cohesion analysis was that developed by Liles (1982). The types of cohesive markers identified were personal reference, demonstrative reference, conjunctive, lexical, and elliptical. To control for length of retelling, the ratio of the total number of each type to the total number of T-units was calculated. Intraexaminer and interexaminer reliabilities for identifying type of cohesive marker were 95 and 93 percent agreement, respectively.

The adequacy of each marker as used in context was classified as complete, incomplete, incomplete-tie, error, and error-tie. To control for varying lengths of the retellings, the proportion of the total number of

each classification to the total number of markers was calculated. Intraexaminer and interexaminer reliabilities for judging adequacy were 93 and 94 percent agreement, respectively.

Story Grammar

The story grammar rules defined by Stein and Glenn (1979) were used to develop a target story consisting of 6 episodes and 54 component parts. Each retelling was compared to the target story. Totals were obtained from each retelling for the number of complete, missing, and incomplete episodes as well as the number of complete episode components in the following categories: setting, initiating event, internal response, internal plan, attempt, direct consequence, and reaction.

Questions

Scores for the question responses facilitated interpretation of the results of the story grammar analysis. Totals were obtained for correct responses to detail questions, correct responses to story grammar questions, and correct responses to story grammar questions by type of component.

DESIGN

A one-way ANOVA across three groups (GLM) was used to demonstrate significant main effects (SAS Institute, Inc., 1985). Where appropriate, post hoc pairwise comparisons were made using the Scheffe test option. Significance was set at the 0.05 level.

RESULTS

Only one of the reported measures differentiated the right-hemisphere-damaged group from the left-hemisphere-damaged aphasic group: The retellings of the right-hemisphere-damaged group had a significantly smaller proportion of incomplete-tie cohesive markers than the left-hemisphere-damaged aphasic group. No statistically significant differences were obtained with any of the other measures.

Relative to the retellings of the neurologically normal group, the retellings of the right-hemisphere-damaged group were deficient in cohesion, structure, and content.

The retellings of the right-hemisphere-damaged group were significantly shorter than those of the neurologically normal group in terms of T-units [$F(2,51) = 15.81$, $p < 0.05$] and text words [$F(2,51) = 20.04$, $p < .05$]. The mean number of T-units for each group was right-hemisphere-damaged, 23.45; neurologically normal, 48.10; and left-hemisphere-damaged aphasic, 27.75. The mean number of text words for each group was right-hemisphere-damaged, 231; neurologically normal, 509; and left-hemisphere-damaged aphasic, 275.

COHESION

Table 13-1 indicates that although shorter, the right-hemisphere-damaged group's retellings were significantly less cohesive. There were a smaller proportion of complete [$F(2,51) = 11.90$, $p < .001$] and a greater proportion of incomplete [$F(2,51) = 13.50$, $p < .001$] cohesive markers.

The distribution of types of cohesive markers was generally stable over the three groups, with the exception that the right-hemisphere-damaged group had a significantly smaller ratio of lexical markers to T-units than the neurologically normal group [$F(2,51) = 13.95$, $p < .01$].

STRUCTURE

Table 13-2 indicates that unlike the retellings of the neurologically normal group, retellings of the right-hemisphere-damaged group did not preserve the target structure in that there were significantly fewer complete episodes [$F(2,51) = 19.64$, $p < .001$] and more missing episodes [$F(2,51) = 18.53$, $p < .001$]. Whereas 50 percent of the neurologically normal group did not omit any of the episodes, 54 percent of the right-hemisphere-damaged group omitted three of six episodes.

CONTENT

Missing episodes implies missing content. The right-hemisphere-damaged group included significantly fewer [$F(2,51) = 40.12$, $p < .001$] complete target components than the neurologically normal group. Out of a maximum of 54 components, the mean number of complete components included by each group was right-hemisphere-damaged, 13; neurologically normal, 30; and left-hemisphere-damaged aphasic, 12.

TABLE 13-1. MEANS, STANDARD DEVIATIONS, AND RANGES FOR RIGHT-HEMISPHERE-DAMAGED (RHD), NEUROLOGICALLY NORMAL (NN), AND LEFT-HEMISPHERE-DAMAGED APHASIC (LHDA) GROUPS OF SUBJECTS FOR SELECTED MEASURES OF COHESION

	Subjects		
	RHD (N = 22)	NN (N = 20)	LHDA (N = 12)
Complete:			
M	0.68a (68%)	0.84b (84%)	0.56a (56%)
SD	0.17	0.13	0.20
Range	0.3–0.9	0.57–0.1	0.21–0.89
Incomplete:			
M	0.10a (10%)	0.04b (4%)	0.15a (15%)
SD	0.08	0.02	0.07
Range	0.02–0.30	0.00–0.11	0.05–0.28
Incomplete-tie:			
M	0.19a (19%)	0.11a (11%)	0.25b (25%)
SD	0.12	0.11	0.17
Range	0.00–0.44	0.00–0.35	0.03–0.57
Error:			
M	0.03a (3%)	0.01a (1%)	0.03a (3%)
SD	0.03	0.01	0.03
Range	0.00–0.09	0.00–0.05	0.00–0.09
Error-tie:			
M	0.00a (0%)	0.00a (0%)	0.01a (1%)
SD	0.01	0.01	0.02
Range	0.00–0.04	0.00–0.05	0.00–0.07

Note: Means with the same letter are not significantly different from each other at the .05 level.

The distribution of complete components by type, presented in Table 13-3, shows that the right-hemisphere-damaged group included significantly less of all kinds of information relative to the neurologically normal group.

QUESTION RESPONSES

The general absence of information in right-hemisphere-damaged group retellings was consistent with a general impairment in the ability to correctly answer questions about the story. Relative to the neurologically

TABLE 13-2. MEANS, STANDARD DEVIATIONS, AND RANGES FOR RIGHT-HEMISPHERE-DAMAGED (RHD), NEUROLOGICALLY NORMAL (NN), AND LEFT-HEMISPHERE-DAMAGED APHASIC (LHDA) GROUPS OF SUBJECTS FOR SELECTED MEASURES OF STRUCTURE

Type (number possible)	*Subjects*		
	RHD (N = 22)	NN (N = 20)	LHDA (N = 12)
Complete episodes (5):			
M	0.82a (16%)	2.65b (53%)	0.50a (10%)
SD	1.10	1.35	0.50
Range	0–4	0–5	0–1
Missing episodes (6):			
M	3.23a (54%)	1.10b (18%)	3.67a (61%)
SD	1.44	1.33	1.15
Range	1–5	0–4	2–5
Incomplete episodes (6):			
M	0.91a (15%)	1.25a (21%)	0.83a (14%)
SD	0.81	1.16	1.11
Range	0–3	0–3	0–3

Note: Means with the same letter are not significantly different from each other at the .05 level.

TABLE 13-3. MEANS, STANDARD DEVIATIONS, AND RANGES FOR RIGHT-HEMISPHERE-DAMAGED (RHD), NEUROLOGICALLY NORMAL (NN), AND LEFT-HEMISPHERE-DAMAGED APHASIC (LHDA) GROUPS OF SUBJECTS FOR SELECTED MEASURES OF CONTENT

Component type (number possible)	*Subjects*		
	RHD (N = 22)	NN (N = 20)	LHDA (N = 12)
Setting (10):			
M	2.91a (29%)	6.60b (66%)	2.75a (28%)
SD	1.95	1.39	2.42
Range	0–6	3–9	0–8
Initiating event (7):			
M	2.86a (41%)	5.30b (76%)	2.58a (37%)
SD	1.67	1.42	2.10
Range	0–7	3–7	1–7
Internal response (9):			
M	2.00a (22%)	5.25b (58%)	2.33a (37%)
SD	1.60	1.59	1.23
Range	0–6	2–8	1–5

Table 13-3. (continued)

Component type (number possible)	*Subjects*		
	RHD (N = 22)	NN (N = 20)	LHDA (N = 12)
Internal plan (6):			
M	0.73a (12%)	2.40b (40%)	0.67a (11%)
SD	1.03	1.23	0.98
Range	0–3	0–4	0–3
Attempt (8):			
M	2.32a (29%)	4.70b (59%)	2.17a (27%)
SD	1.49	1.26	0.58
Range	0–6	2–7	1–3
Direct consequence (9):			
M	1.73a (19%)	4.30b (48%)	1.25a (14%)
SD	1.45	1.81	0.87
Range	0–4	1–7	0–3
Reaction (5):			
M	0.45a (9%)	1.45b (29%)	0.25a (5%)
SD	0.67	0.76	0.45
Range	0–1	0–3	0–1

Note: Means with the same letter are not significantly different from each other at the .05 level.

TABLE 13-4. MEANS, STANDARD DEVIATIONS, AND RANGES FOR RIGHT-HEMISPHERE-DAMAGED (RHD), NEUROLOGICALLY NORMAL (NN), AND LEFT-HEMISPHERE-DAMAGED APHASIC (LHDA) GROUPS OF SUBJECTS FOR THE DISTRIBUTION OF CORRECT RESPONSES TO STORY GRAMMAR QUESTIONS BY TYPE OF COMPONENT

Component type (number possible)	*Subjects*		
	RHD (N = 22)	NN (N = 20)	LHDA (N = 12)
Setting (5):			
M	2.50a (50%)	3.35b (67%)	3.00ab (60%)
SD	1.06	0.99	1.18
Range	0–5	2–5	1–5
Initiating event (6):			
M	2.73a (46%)	5.05b (84%)	3.14a (52%)
SD	1.52	0.89	0.79
Range	0–6	3–6	1–6

Table 13-4. (continued)

Component type (number possible)	*Subjects*		
	RHD (N = 22)	NN (N = 20)	LHDA (N = 12)
Internal response (6):			
M	2.14a (36%)	4.05b (68%)	3.29ab (55%)
SD	1.55	1.43	1.82
Range	0–6	1–6	0–6
Internal plan (3):			
M	0.64a (21%)	1.90b (63%)	1.21a (40%)
SD	0.79	0.79	1.31
Range	0–2	2–3	0–3
Attempt (5):			
M	1.64a (33%)	3.60b (72%)	2.43a (49%)
SD	1.50	1.23	1.91
Range	0–5	1–5	0–5
Direct consequence (5):			
M	2.18a (44%)	4.45b (89%)	2.43a (49%)
SD	1.40	0.76	1.62
Range	0–5	3–5	0–5
Reaction (4):			
M	1.23a (31%)	3.50b (88%)	1.93a (48%)
SD	0.75	0.94	1.07
Range	0–3	1–4	1–4

Note: Means with the same letter are not significantly different from each other at the .05 level.

normal group, the right-hemisphere-damaged group responded correctly to significantly fewer detail questions [$F(2,51) = 20.96$, $p < .001$] and story grammar questions [$F(2,51) = 25.12$, $p < .001$]. The mean number of correct responses to detail questions for each group was right-hemisphere-damaged, 13 (51%); neurologically normal, 21 (82%); left-hemisphere-damaged aphasic, 14 (52%). The mean number of correct responses to story grammar questions for each group was right-hemisphere-damaged, 12 (37%); neurologically normal, 24 (74%); left-hemisphere-damaged aphasic, 14 (43%).

The distribution of correct responses to story grammar questions by component type, presented in Table 13-4, indicates that the right-hemisphere-damaged group provided significantly fewer correct responses across the board when compared to the neurologically normal group.

DISCUSSION

These results suggest that the deficiencies in story retelling evidenced by the right-hemisphere-damaged group were related to an impaired ability to correctly respond to questions about the same material. Although length is not always indicative of completeness, in this case, the brevity of the retellings of the right-hemisphere-damaged group could be attributed to the missing content. Missing content could, in turn, be attributed to a reduction in the amount of information with which to retell the story, as evidenced by the relatively low percentage of correct responses to questions.

To test this interpretation, Pearson's product moment r was calculated using the CORR procedure (SAS Institute, Inc., 1985) to show the strength of relationship between structure variables (number of complete episodes, number of missing episodes) and content variables (number of complete components) and question response variables (number of correct detail question responses, number of correct story grammar question responses). Significant positive correlations ($p < 0.05$) were obtained between the number of complete episodes and correct responses to both detail questions (0.65) and story grammar questions (0.62). Significant negative correlations were obtained between the number of missing episodes and correct responses to both detail questions (-0.57) and story grammar questions (-0.49). A significant positive correlation was obtained between the number of complete components and correct responses to detail questions (0.49). Although statistically significant, these relationships were not strong, and it appears that factors other than lack of information contributed to deficient retelling by the right-hemisphere-damaged subjects.

The difference in type of cohesiveness found between the retellings of the right-hemisphere-damaged and neurologically normal groups could be partially explained by their brevity and missing content. The ratio of lexical markers to T-units could be smaller because of less need to repeat key terms in a text of so few T-units (i.e., meaning would be adequately clear with the use of personal or demonstrative reference). Another explanation is that owing to missing content, some terms are never introduced into the retelling. This explanation is supported by significant positive correlations between the ratio of lexical markers to T-units and the number of correct responses to both detail questions (0.59) and story grammar questions (0.60) as calculated by the CORR procedure (SAS Institute, Inc., 1985).

Adequacy of cohesion was not so clearly correlated as type of cohesion with correct responses to questions and may reflect a distinct area

of semantic deficit that warrants further research. Again, using the CORR procedure (SAS Institute, Inc., 1985), the only significant correlation obtained was between the proportion of complete markers and correct responses to detail questions (0.49).

Why the right-hemisphere-damaged group provided so few correct responses to questions cannot be determined from the results of the analyses. The fact that all types of information were affected contradicts the hypothesis that right-hemisphere-damaged adults have difficulty processing only certain types of information. The fact that detail as well as story grammar questions were missed implies more than just impaired story grammar. To address this question, the retellings are currently being reanalyzed. Group comparisons by type of incorrect response could demonstrate a frank awareness of the inability to recall information and/or patterns of compensation. Similarly, identification of missing and incomplete components with respect to their location within the story could demonstrate patterns of inattention or memory overload that affect discourse processing in right-hemisphere-damaged adults.

Because the analyses of cohesion and story grammar clearly differentiated brain-injured from non-brain-injured subjects and were descriptive of even minimally impaired subjects, their application to clinical assessment will be pursued. It is expected that this line of research will enable clinicians to begin to objectify the elusive processing deficits associated with right-hemisphere damage and to define new areas of treatment.

REFERENCES

Burns, M. S., Halper, A. S., and Mogil, S. I. (1985). *RIC evaluation of communication problems in right-hemisphere dysfunction (RICE).* Gaithersberg, MD: Aspen Systems.

Davis, A., Myers, P., Adamovich, B., and Yorkston, K. (1981). Treatment of right-hemisphere-damaged patients: A panel presentation and discussion. In R. H. Brookshire (Ed.), *Clinical aphasiology,* Vol. 12 (pp. 272–276). Minneapolis, MN: BRK Publishers.

Delis, D. (1980). Hemispheric processing of discourse (Doctoral dissertation, University of Wyoming, 1980). *Dissertation Abstracts International, 41,* 1499B.

Gardner, H., Brownell, H. H., Wapner, W., and Michellow, D. (1983). Missing the point: The role of the right hemisphere in the processing of complex linguistic materials. In E. Perecman (Ed.), *Cognitive processing in the right hemisphere* (pp. 169–191). New York: Academic Press.

Hunt, K. W. (1970). Syntactic maturity in school children and adults. *Monographs of the Society for Research in Child Development, 35.*

Joanette, Y., Goulet, P., Ska, B., and Nespoulous, J. L. (1986). Informative content of narrative discourse in right-brain-damaged right-handers. *Brain and Language, 29,* 81–105.

Lemme, M., Hedberg, N., and Bottenberg, D. (1984). Cohesion in narratives of aphasic adults. In R. H. Brookshire (Ed.), *Clinical aphasiology,* Vol. 14 (pp. 215–222). Minneapolis, MN: BRK Publishers.

Liles, B. Z. (1982). Procedure for the analysis of cohesion in spoken narratives. Unpublished manuscript, University of Connecticut.

Myers, P. S. (1979). Profiles of communication deficits in patients with right cerebral hemisphere damage. In R. H. Brookshire (Ed.), *Clinical aphasiology,* Vol. 9 (pp. 38–46). Minneapolis, MN: BRK Publishers.

Porch, B. (1981). *Porch index of communicative ability: Administration, scoring, and interpretation,* Vol. 2, 3d Ed. Palo Alto, CA: Consulting Psychologists Press.

Rivers, D., and Love, R. (1980). Language performance on visual processing tasks in right hemisphere lesion cases. *Brain and Language, 10,* 348–366.

SAS Institute, Inc. (1985). *SAS user's guide: Statistics,* 5th Ed. Cary, NC: SAS Institute, Inc.

Stein, N. L., and Glenn, C. G. (1979). An analysis of story comprehension in elementary school children. In R. O. Freedle (Ed.), *New directions in discourse processing,* Vol. 2 (pp. 53–120). Norwood, NJ: Ablex.

Ulatowska, H., Freedman-Stern, R., Doyel, A., Macaluso-Haynes, S., and North, A. (1983). Production of narrative discourse in aphasia. *Brain and Language, 19,* 317–334.

Wechsler, A. F. (1983). The effect of organic disease on recall of emotionally charged versus neutral narrative texts. *Neurology, 23,* 130–135.

Wapner, W., Hamby, S., and Gardner, H. (1980). The role of the right hemisphere in the apprehension of complex linguistic materials. *Brain and Language, 14,* 15–33.