CHAPTER

12

Effects of Listener Knowledge on Stories Told by Aphasic and Non-Brain-Damaged Subjects

Robin Brenneise-Sarshad
Robert H. Brookshire
Linda E. Nicholas

In 1978, Wilcox and Davis described a treatment approach called *promoting aphasics' communicative effectiveness* (PACE). PACE was an attempt to make treatment more natural by emphasizing practical aspects of communication in situations that resemble real-life communicative interactions. One of the basic principles of PACE is that there should be exchange of new information between patient and clinician in treatment interactions. Consequently, we set out to evaluate the effects of listener knowledge in a narrative production task. As we were designing the study, we learned that Bottenberg and Lemme (Chap. 11) had evaluated the effects of listener knowledge on aphasic speakers' prompted story telling and had found no significant effects of listener knowledge on their subjects' stories. However, Bottenberg and Lemme questioned the validity of their results, because they felt that their aphasic speakers may not have believed that the naive listeners were actually naive about the probable content of the stories. Consequently, we designed this study to evaluate the effects of listener knowledge on aphasic speakers' prompted story telling, with an emphasis on convincing our subjects that naive listeners were, in fact, naive about the content of the stories that they listened to.

The experiment was designed to evaluate two questions:

1. Are the content or form of stories produced by non-brain-damaged and aphasic adults affected by whether they share knowledge of referents for the stories with listeners?
2. Do aphasic adults differ from non-brain-damaged adults in how they respond to shared knowledge when producing stories?

METHOD

SUBJECTS

Subjects were 10 non-brain-damaged, nonaphasic adults and 10 aphasic adults. Age and education were similar for the two groups. Aphasic subjects each had a unilateral left-hemisphere cerebrovascular brain lesion. Five exhibited nonfluent (Broca's) aphasia and five exhibited fluent mixed aphasia (fluent speech with literal and verbal paraphasias and word-retrieval difficulty). Their aphasia severity ranged from mild to moderate. Judgments of aphasia type and severity were independently made by two of the experimenters. If they disagreed on either, the third experimenter independently judged type and severity. Two of the three

had to agree in order for a subject to participate in the experiment. Aphasic subjects' Boston Diagnostic Aphasia Examination (Goodglass and Kaplan, 1983) mean aphasia severity rating was 3.5 (range 3 to 4), and their average overall percentile on the four-subtest shortened version of the Porch Index of Communicative Ability (Disimoni, Keith, and Darley, 1980) was 73 (range 50 to 89).

PROCEDURES

The experimental task was a prompted story-telling task. The prompts were sequences of pictures that portrayed a story, taken from children's books involving stories about animals (Mayer, 1974, 1976). Three picture-story sequences were constructed. One was a *practice story* that consisted of 8 pictures. The other two were *experimental stories* that consisted of 13 pictures each. One portrayed a boat ride and a picnic by two hippos. The others portrayed the adventures of a bear and a goat. The pictures were mounted on boards, and a title was provided for each set of pictures.

The experiment took place in a sound-treated room. A table and two chairs were in the room. On the table were two easels upon which the picture sets for the stories could be placed. There was also a tape recorder and microphone on the table.

The general procedures were the same in all conditions. The subject was brought into the room and seated at the table. A plate of pictures representing one of the stories was placed on the easel in front of the subject, and the subject was asked to tell the story portrayed by the pictures. When another story was to be told, a new plate of pictures was placed on the easel and the subject was asked to tell the story portrayed by those pictures. When a listener was present, the listener sat beside and partially facing the subject. One of the authors (Nicholas), who was known by many of the subjects, served as the knowledgeable listener in these procedures. One of the other authors (Brenneise-Sarshad), who was not known by the subjects, served as the naive listener.

Each session began with a practice trial. The listener (Nicholas) asked the subject to tell the story portrayed by the eight practice story pictures. She answered questions and provided instruction and practice as necessary until she felt that the subject understood the task.

Three experimental conditions followed the practice trial. *No listener condition* always occurred first. The intent was to give each subject practice with each story, in order to stabilize performance in the other two conditions. The subject told the bear story and the hippo story into the tape recorder. No one else was in the room.

The order of *naive* and *knowledgeable* listener conditions was counterbalanced across subjects. In the *knowledgeable listener condition,* the subject told the story to the listener, who was looking at a set of pictures identical to those in front of the subject.

In the *naive listener condition,* the listener told the subject that he or she would be telling the stories to someone else who had not seen the pictures and did not know the stories portrayed by the pictures. She then cautioned the subject not to let the new person see the pictures, either when the new person came into the room or while the subject was telling the stories. Then Nicholas brought Brenneise-Sarshad into the room, introduced her to the subject and instructed her that she was to listen to the stories told by the subject and that she was not to look at the pictures in front of the subject. Then Nicholas left the room.

All stories were tape-recorded. A typist transcribed the 80 stories (4 stories for each of 20 subjects). To assess the reliability of the typist's transcriptions, one of the experimenters (Brenneise-Sarshad) independently transcribed 8 stories (4 from non-brain-damaged subjects and 2 from each aphasic group). Point-to-point agreement, calculated with the formula (agreed-upon words/total words transcribed by Brenneise-Sarshad) $\times$ 100, averaged 94 percent (range 90–97 percent).

Several measures were extracted from each transcript by one of the experimenters (Brenneise-Sarshad):

Number of words.

Percent of words that were correct information units (CIUs). Correct information units were informative words that were intelligible in context and accurately communicated information relevant to the story (Nicholas and Brookshire, 1988).

Mean terminal unit (T-unit) length in CIUs (Hunt, 1965). T-units consist of a main clause and all related subordinate clauses.

Ratio of clauses to T-units.

Percent CIUs in four kinds of successful cohesive ties (Halliday and Hasan, 1976; Hedberg and Stoel-Gammon, 1985):
- Lexical repetition ties
- Conjunctive ties
- Pronominal ties
- Definite article ties

The reliability of each measure was evaluated as follows. A second experimenter (Nicholas) independently scored each measure in the eight transcripts that had been used to establish transcription reliability. Point-to-point percent reliability, using the formula [total agreements/

(total agreements + total disagreements)] × 100, was calculated for each measure. Reliabilities ranged from 79 to 98 percent for the eight measures (mean 88%).

RESULTS

The responses of subject groups to listener conditions and stories were evaluated by repeated-measures analyses of variance. The alpha level for main effects and interactions was set at $p < .01$ to control the experiment error rate for multiple analyses of variance. The range of scores for ratio of clauses to T-units was restricted and not appropriate for statistical analysis. Neither group membership, listener condition, nor stories appreciably affected the ratio of clauses to T-units. The ratio of clauses to T-units ranged from 1.09 to 1.30 across all conditions and stories.

EFFECTS OF APHASIA AND APHASIA TYPE

Non-brain-damaged speakers generated significantly more words, a significantly higher percentage of words that were correct information units, and significantly longer T-units that aphasic speakers (Table 12-1). There were no significant differences between non-brain-damaged and aphasic subjects on any of the four kinds of cohesive ties. There were no significant effects of aphasia type on any of the eight measures.

TABLE 12-1. NUMBER OF WORDS (#WDS), PERCENT CORRECT INFORMATION UNITS (%CIUs), AND MEAN T-UNIT LENGTH (MTL) FOR NON-BRAIN-DAMAGED (NBD) AND APHASIC (APH) SUBJECTS TELLING THE BEAR AND HIPPO STORIES

Measure	*Comparison*	
	NBD	APH
#WDS	253.6	151.2
%CIUs	84.6	64.9
MTL	8.9	6.1

Note: Differences between aphasic and non-brain-damaged subjects were significant for each measure ($p < .01$).

EFFECTS OF LISTENER CONDITIONS AND STORIES

There was one statistically significant effect of listener conditions on the content of the speech samples. Both aphasic and non-brain-damaged subjects produced significantly more words in naive listener condition than in knowledgeable listener condition (Table 12-2).

There were some statistically significant effects of stories on measures of content. Non-brain-damaged subjects produced significantly more words in the bear story than in the hippo story (Table 12-2). Both groups produced significantly longer T-units in the bear story than in the hippo story. There were also a few scattered effects of stories on cohesion. Both groups generated a significantly greater percentage of lexical repetition cohesive ties in the bear story than in the hippo story. In contrast, both groups generated a significantly greater percentage of conjunctive cohesive ties and a significantly greater percentage of pronominal cohesion in the hippo story than in the bear story.

TABLE 12-2. COMPARISONS OF THE MEAN NUMBER OF WORDS, MEAN T-UNIT LENGTH, AND MEAN NUMBERS OF LEXICAL REPETITION, CONJUNCTIVE, AND PRONOMINAL COHESIVE TIES PRODUCED BY NON-BRAIN-DAMAGED (NBD) AND APHASIC (APH) SUBJECTS IN RESPONSE TO THE BEAR AND HIPPO STORIES AND IN NAIVE LISTENER (NAIVE) AND KNOWLEDGEABLE LISTENER (KNOWL) CONDITIONS

Measure	*Bear vs. Hippo*		*Naive vs. Knowl*	
#WDS:				
NBD	283.7	223.5	274.9	232.3
APH	157.9	144.5	159.0	143.4
Mean T-unit length:				
NBD + APH	7.9	7.1	7.6	7.4
Lexical repetition:				
NBD + APH	13.1	9.2	11.6	10.7
Conjunctive ties:				
NBD + APH	3.9	5.7	4.9	4.8
Pronominal ties:				
NBD + APH	12.1	15.0	13.7	13.5

Note: $p < .01$.

DISCUSSION

Our results resemble those reported by Bottenberg and Lemme (Chap. 11). As Bottenberg and Lemme did, we found few effects of listener knowledge on the content of stories generated by aphasic and non-brain-damaged speakers. Both non-brain-damaged and aphasic speakers produced more words when telling stories to a naive listener than when telling them to a knowledgeable listener, but no other meaningful effects of speaker knowledge on the content of stories were found. As Bottenberg and Lemme did, we found that differences in the pictorial prompts used to elicit stories had greater effects than listener knowledge on the content of subjects' spoken stories. However, the magnitude of these effects was relatively small, and they seem to be of questionable clinical importance.

It is tempting to suggest that we may safely ignore Davis and Wilcox's claim that exchange of new, unshared information is an important aspect of aphasia treatment interactions. However, that would both be unfair to PACE and would go beyond our results. The situation in PACE treatment is not like the situation in our study. In PACE, messages are short, and clinician and patient take turns as senders and receivers of information. There is exchange of feedback between clinician and patient contingent upon delivery of each message. In our experiment, the message was long, the "patient" was the only one producing messages, and there was no interchange of response-contingent feedback between "patient" and clinician. Therefore, our results speak to Davis and Wilcox's claim only in a general way. Whether listener knowledge does, in fact, affect what aphasic speakers say and how they say it in interchanges such as those described in PACE remains to be seen.

However, our results are important, we think, in terms of what they say regarding procedures for eliciting connected speech from aphasic adults. They suggest that one need not expend the time and effort necessary to construct situations in which the speaker believes that his or her listener is naive about the probable content of what the speaker is about to say. They may say more words if they believe the speaker is uninformed about what they are talking about, but the content of what they say is unlikely to be affected in any meaningful way by their perceptions of listener naiveté or knowledge.

ACKNOWLEDGMENTS

This report represents a master of arts thesis completed by the first author in the Department of Communication Disorders at the University

of Minnesota. It was supported by an award from Communication Skill Builders and by the Research Service, Minneapolis Veterans Medical Center.

REFERENCES

Bottenberg, D. E., and Lemme M. L. (1989). Effect of shared and unshared listener knowledge on narratives of normal and aphasic adults. In T. E. Prescott (Ed.), *Clinical aphasiology*, Vol. 19. Austin, TX: PRO-ED.

Disimoni, F. G., Keith, R., and Darley, F. L. (1980). Prediction of PICA overall score by short versions of the test. *Journal of Speech and Hearing Research, 23,* 511–516.

Goodglass, H., and Kaplan, E. (1983). *The Boston diagnostic aphasia examination.* Philadelphia: Lea & Febiger.

Halliday, M. A. K., and Hasan, R. (1976). *Cohesion in English.* London: Longmans.

Hedberg, N. L., and Stoel-Gammon, C. (1985). Discourse analysis manual. Unpublished manuscript, University of Colorado, Boulder.

Hunt, K. W., (1965). *Grammatical structures written at three grade levels.* Research Report No. 3. Urbana, IL: National Council of Teachers of English.

Mayer, M. (1974). *Two moral tales.* New York: Four Winds Press.

Mayer, M. (1976). *Hiccup.* New York: Dial Press.

Nicholas, L. E., and Brookshire, R. H. (1988). Manual for scoring correct information units (CIUs). Unpublished manuscript, Minneapolis, Minnesota.

Wilcox, M. J., and Davis, G. A. (1978). Procedures for promoting communicative effectiveness in the aphasic adult. Miniseminar presented at the annual convention of the American Speech and Hearing Association, San Francisco, California.