Discourse Production in Aphasia: Relationship to Severity of Impairment

Sandra L. Bond, Hanna K. Ulatowska, Sara Macaluso-Haynes, Erin Brown May
The University of Texas at Dallas, Dallas, Texas

"An uncommunicating communicator, a beastly bad thing to be."
----Henry James----

The picture painted by the notion of an uncommunicating communicator depicts the severely impaired aphasic subjects in this study. We observed these individuals draw upon their residual language skills and try to communicate at great cost.

INTRODUCTION

This paper deals with the investigation of aphasic individuals' ability to produce narrative discourse. It is a continuation of the studies of discourse production in both mildly and moderately impaired aphasic individuals (Ulatowska, North and Macaluso-Haynes, 1981; Ulatowska, Freedman-Stern, Weiss-Doyel, Macaluso-Haynes and North, 1983). Specifically, this paper will focus on pilot work for investigating discourse production in severely impaired aphasic individuals.

Research on severely impaired aphasic subjects is sparse. Several factors may account for the limited research with this population. One is the widely held belief of a poor prognosis for severely impaired aphasic patients. As a result, it is felt that research will be more effective if efforts are directed toward populations with better capability for recovery. Another factor which may impede research in this population is a methodological one, resulting from the difficulty in measuring language and communication skills in patients with minimal expressive output (Sarno and Levita, 1981). The fact that there is need for more information related to the severely impaired aphasic population, however, is not challenged, especially in light of evidence that a majority of patients referred for speech and language pathology services fall within this severity range (Prins, Snow and Wagenaar, 1978).

BACKGROUND

Discourse. The term "discourse" is used in a variety of ways. In one sense, discourse is a general nontechnical term. It is frequently used as a synonym for dialogue or connected language. Typically, sentential grammars are used to describe discourse samples. Another sense comes from the field of linguistics. Discourse grammars have been formulated which attempt to specify features or elements necessary for well-structured discourse. There are several types of discourse, such as conversational, narrative, procedural and expository. For the purposes of this paper, only narrative discourse will be discussed.

A narrative discourse is a description of a happening expressed as a sequence of events or episodes. An episode has a definite structure with identifiable components which do not correspond directly to individual sentences. Just as certain structures are necessary for correct sentence

formation, in narrative discourse certain structures are also required to produce a grammatically well-formed text. Elements which are necessary to produce a well-formed narrative include a setting, complicating action and a resolution. Elements which contribute to the storyline but are optional include an abstract, a coda, and evaluation. (For a description of these elements refer to Ulatowska et al., 1981.) This narrative discourse framework was adopted to investigate discourse production in mildly, moderately, and severely impaired aphasic individuals.

Questions posed. The following questions were investigated.

1. What is the form and content of the language that is preserved in the discourse of aphasic individuals?
2. What aspects of language are impaired in discourse?
3. What is the relationship between ability to produce discourse and sentential level skills?
4. How does the severity of aphasia affect performance on discourse?

Mildly and moderately impaired aphasic individuals. The findings from the earlier research into discourse production by mildly and moderately impaired aphasic subjects (Ulatowska et al., 1981, 1983) revealed that both populations produced well-structured discourse. This was supported by two facts. First, the narratives contained the essential elements; i.e. setting, complicating action, and resolution. Second, the narratives maintained the proper sequence of events. Both populations were able to produce well-structured discourse despite reduction in complexity and amount of language at both discourse and sentential levels. The reduction of information was selective in that the essential elements were produced in the narratives and the optional elements were more frequently omitted.

However, certain differences were observed between the discourse produced by mildly and moderately impaired aphasic individuals. The primary differentiating factor was the larger number of grammatical errors at a sentential level in the moderately impaired aphasic population. Such grammatic errors may adversely affect cohesion in discourse. This expectation was supported by the fact that moderately impaired aphasic subjects received low ratings for clarity from unbiased judges. With evidence that disruption of sentence structure affects, but does not destroy, the ability to produce discourse, we were motivated to investigate discourse production in severely impaired aphasic individuals. The question raised was, what level of language is necessary to support discourse?

METHOD

Subjects. Five aphasic individuals participated in this investigation. They were referred by speech pathologists who judged their expressive language to be severely impaired. There were four males and one female, ranging in age from 31 to 64 years. Educational level ranged from 10 years to 18 years. Four had anterior lesions and one had a posterior lesion. The etiology of the aphasia in each case was a single cerebrovascular accident in the left hemisphere. Months post onset ranged from 10 to 45.

Each subject received a severity rating of 1 on the Boston Diagnostic Aphasia Examination as rated independently by three judges. The judges rated them after viewing a video tape recording of a self-generated account of a memorable experience. The "1" rating indicated that all communication was through fragmentary expression and that the burden of communication was carried by the listener.

Tasks. The diagnostic battery consisted of standardized diagnostic tests to evaluate language and cognitive functioning. A limb apraxia subtest was also included. Experimental tests were designed to elicit narrative and procedural discourse, and included the following.

    a. A self-generated account of a memorable experience.
    b. A "cat" story elicited with the help of sequence pictures.
    c. A "rooster" story told immediately following the examiner's reading of the story.
    d. A summary and a moral for the "cat" and "rooster" story.

Procedural discourse was elicited by asking subjects to describe procedures for making a sandwish, changing a light bulb, mailing a letter, and brushing teeth. For the purposes of this paper, we will only discuss the "cat" and "rooster" stories.

Analysis. Discourse samples were videotape recorded so that both gestural and verbal modalities could be analyzed. Both gestural and verbal responses were transcribed. There were two major categories of gestures: referential and nonreferential. Referential gestures were defined as gestures which were used to transfer meaning independently of the verbal message. They consisted of emblems, deictic gestures, simple pantomimes and complex pantomimes. Nonreferential gestures were those whose primary function was to regulate the flow of speech or to emphasize certain components of the speech. Verbal language was transcribed verbatim. If the language was unintelligible, phonetic spelling was used.

After the transcriptions were completed, output was segmented into propositions. A proposition was defined as a predicate and at least one argument. However, all linguistic features necessary for forming a grammatically correct sentence were not required for the proposition to be counted. For this study, the proposition could be expressed through either the verbal or gestural modality, or a combination of both. For example, the argument could be spoken (ex. "man") and the predicate gestured (ex. climbing action).

The narratives produced by the aphasic subjects were analyzed for amount of language and type of information. Amount of language entailed counting the number of propositions as well as coding the modality of expression. Additionally, the propositions were compared to those contained in the stimulus story as well as to those produced by normal subjects. The type of information contained within the narrative was determined by classifying the propositions as referring to the particular discourse structure; i.e. setting, complicating action, resolution, etc. This information was used to determine whether the minimal components necessary to produce a well-structured discourse were present. In other words, the following questions were considered.

    Were all participants mentioned?
    What was the form of their mention?
    Were the participants systematically encoded?
    Were the most important events produced?
    Was the sequence maintained?
    Was the complicating action and resolution included?

RESULTS

Standardized Language Tasks. Table 1 summarizes the language profiles obtained from selected subtests of the Boston Diagnostic Aphasia Examination

(BDAE) on the three aphasic populations, i.e. 10 mildly impaired, 15
moderately impaired, and 5 severely impaired aphasic subjects. As the
table indicates, performance on both auditory comprehension and oral
expression subtests decreased as severity level increased. There was a
greater reduction in performance on expressive tasks than on auditory
comprehension tasks.

Table 1. Performance on BDAE: All Levels of Severity.

	Possible Points	Mild Mean	Mod. Mean	Severe Mean
Severity Rating*	5.	3.9	2.3	1.
Auditory Comprehension (Total Score)	99.	95.3	87.5	76.2
Complex Ideational Material	12.	11.2	9.2	5.8
Oral Expression (Total Score)	168	146.6	124.5	80.6
Visual Confrontation Naming	105	95.5	82.9	53.6
Animal Naming	19	11.5	8.3	4.6
Responsive Naming	30	28.5	24.1	11.4

*BDAE = Boston Diagnostic Aphasia Examination

Individual test scores for the severely impaired subjects are reported in
Table 2. The subjects experienced the greatest difficulty with the Complex
Ideational Material Subtest and The Token Test. The poorest performance
on these particular subtests was exhibited by the posterior lesioned
patient, Subject 4. This same subject exhibited the poorest performance on
tasks of oral expression. Animal naming tended to be a particularly diffi-
cult task for four of the five subjects. Three of the five subjects, two
anterior, displayed associated motor speech difficulties as measured by the
Verbal Agility Subtest of the BDAE. Results of limb apraxia testing were
unremarkable.

Table 2. Performance on Standardized Language Tests: Severe Aphasia

	Possible Points	Individual Subjects #1	#2	#3	#4	#5
BDAE						
Severity Rating	5	1	1	1	1	1
Auditory Comprehension (Total Score)	99	76.2	59	95	67	89
Complex Ideational Material	12	4	5	8	3	9
Oral Expression	168	113	102	115	15	58
Verbal Agility	14	12	12	6	5	4
Visual Confrontation Naming	105	72	71	74	10	41
Animal Naming	19	5	3	11	0	4
Responsive Naming	30	24	16	24	0	9
Token Test						
Short Form	80	1	6	4	2	2

Cognitive Tests. Performance of the aphasic and normal subjects on the three cognitive tests (Block Design, Picture Arrangement, and Raven's Colored Progressive Matrices), can be seen in Table 3. In general, the three aphasic groups exhibited a similar range of abilities. Table 4 describes the individual performances for the severely impaired aphasic subjects.

Table 3. Performance on Cognitive Tests: All Levels of Severity.

Measure	Normals	Mild Mean	Moderate Mean	Severe Mean
Block Design	37.3	25.2	25.3	30.6
Picture Arrangement	25	18	17.6	20.4
Raven's Colored Progressive Matrices	21	--	18.4	21.4

Table 4. Performance on Cognitive Tests: Severe Aphasic Subjects.

	Subjects				
Measure	#1	#2	#3	#4	#5
Block Design	37	32	16	36	32
Picture Arrangement	26	12	18	24	22
Raven's Colored Progressive Matrices	20	23	24	23	17

General Performance on Linguistic Tasks. The narratives produced by the five severely impaired aphasic subjects are summarized below. Only performance on the "cat" and "rooster" story will be described. Table 5 shows individual performance in terms of amount of language and type of information produced.

Table 5. Amount and Type of Information Produced on Discourse Tasks: Severe Aphasic Subjects.*

	Subjects				
Measure	#1	#2	#3	#4	#5
Amount of Language (# of propositions)					
Verbal Modality	7	6	7	17	2
Gestural Modality	0	0	0	0	1
Combined Modalities	1	2	6	11	3
Total Propositions	8	8	13	28	6
Incomplete Propositions	10	14	12	15	?**

*Data are combined for "cat" and "rooster" stories.
**Not possible to determine.

Pragmatics. All subjects exhibited communicative intent, because they readily initiated a story without repeated instructions. For 6 of the 10 stories produced, the subjects used conventional starters such as "well" and "once upon a time." Three of the five aphasic individuals also used story terminators such as "done" and "that's all."

Amount of language. Table 5 shows that anterior lesioned subjects produced considerably less language than the posterior patient. The severely impaired aphasic subjects produced 8.7 propositions (Table 5). By comparison, in Ulatowska, et al. (1983), moderately impaired aphasic individuals produced a mean of 29 clauses on the same two stories. Thus, there was a considerable reduction in the amount of language produced by our severely impaired anterior aphasic subjects compared with previously studied moderately impaired subjects. This reduction in quantity of language was not observed for the severely impaired posterior patient.

Content analysis. Although amount of language did not differentiate the severely impaired posterior patient from the moderately impaired aphasic subjects, content of language did. On the basis of content analysis, the posterior subject performed similarly to severely impaired anterior patients. Of 30 propositions established for the "cat" and "rooster" stories, 13 were either present or implied in the stories of every normal subject. The moderately impaired subjects produced all the identified propositions for the "cat" story, and more frequently produced the essential propositions for the "rooster" story. This was not the case for the severely impaired aphasic individuals. For the "cat" story, only 39% of the total propositions were produced. Of those produced, only 47% were essential. For the "rooster" story, 37% of the total propositions were produced, and 34% of these fell within the essential category.

Mode of expression. In Table 5, the amount of language is categorized according to modality of expression. The primary mode of expression was the oral mode. Subjects 3, 4, and 5 utilized the gestural modality to the greatest extent. Subjects 3 and 5 (anterior lesioned patients) used numerous pointing gestures. The most elaborate gesturing was observed in Subject 4, the posterior lesioned patient, who exhibited primarily simple pantomime with some complex pantomime as exemplified by two action sequences. This observation is contrary to expectations for posterior patients. Research has indicated that aphasia will produce parallel deficits in speech and gesture. Posterior patients may produce more gestures than anterior patients, but their gestures tend to be more ambiguous as documented by Cicone, Wapner, Foldi, Zurif and Gardner (1979). The same finding of posterior patients using more gestures, but expressed in an ambiguous way, was reported by Warner (1983) using the severely impaired subjects described in this paper.

Narrative components. Severely impaired aphasic subjects produced only a minimal amount of setting information (especially as compared to the moderately impaired group described by Ulatowska et al., 1983). Only 17% of the propositions produced by our severely impaired subjects was classified as setting or background information, while 46% of the information produced by the moderately impaired was setting information. It should be noted that subjects in the severe group did produce most of the participants in the narratives. A problem arose in that the participants were not systematically encoded. As a result, it was difficult to differentiate the particular actors. One example of this can be

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demonstrated by Subject 3. This subject began differentiating the two roosters in the "rooster" story by calling one a "rooster" and the other a "chicken." This distinction was not maintained. By the end of the story, the listener was unclear as to the final destiny of each character.

Most of the information produced by the severe group was classified as action (52% of the propositions). The moderately impaired group produced 33.7% action clauses. Resolution information was only minimally produced by the severely impaired aphasic individuals (6%), while moderately impaired produced 21% resolution clauses.

It is important to note that only two of the five severe subjects produced the correct sequence of events in both narratives. This problem did not occur for the moderately impaired group.

DISCUSSION

In general, severely impaired aphasic subjects demonstrated communicative intent in that they performed the act of telling a story. Typically, the story boundaries were delimited by use of initiators such as "well," and by terminators.

Despite the impression that these subjects were attempting to produce a narrative, their attempts were unsuccessful. Discourse structure was destroyed for this population. This conclusion was supported by three findings. First, the essential elements were not preserved--there was little or no setting or resolution produced by these subjects. The listener had to know the content to understand the story line. Secondly, discourse structure was disrupted by inappropriate sequences of events in the narratives of three of the five patients. Third, unsystematic marking of participants resulted in difficulty in decoding the association between participants and actions.

These disruptions in discourse structure are felt to be a result of subjects' reduced language. There seems to be a limit on the amount of reduction of language which will still support information structure at a discourse level. Severely impaired subjects did not produce the most essential information as measured by content analysis. At a sentential level, their responses consisted primarily of the most basic elements, nouns and verbs. Even with this minimal level of requirement, many of the aphasic individuals' responses were not acceptable since they consisted of incomplete propositions.

Another issue considered was to what extent the analysis of gestural behavior helped in understanding the discourse of severely impaired aphasic subjects. This was an important consideration as recent evidence has suggested that patients with little or no expressive language may resort to a wide range of alternate means of communication (Sarno and Levita, 1981). Our impression was that the severely impaired aphasic individuals were not effective with gesture in the presence of severe verbal deficits. Gestures reinforced the verbalizations, but did not carry additional information.

In conclusion, our results indicate that for this population of severely impaired aphasic subjects, propositional structure of narratives is only minimally developed, and discourse structure is destroyed, in that essential elements are not retained. Despite the disruption of discourse, two important observations should be made. The first is that the subjects seemed to have an internal representation of the story in their mind. An indication of this was their use of initiators and terminators. Other evidence to support the presence of an internal representation of the story

was subjects' performance on the Picture Arrangement of the <u>WAIS</u>. Their high level of performance on this task suggests that they were able to conceptualize the entire story, decipher intricate relationships between sequences of events, and understand relationships between actors and actions.

By saying that discourse is destroyed in this population, we are not saying that these subjects do not communicate. They do express "bits" of information. A skilled interactant may be able to elicit from the aphasic individual the information contained within the story with a systematic series of cue questions. At this point, more research is necessary to verify these impressions.

ACKNOWLEDGMENTS

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DISCUSSION

Q: How did you define severity of aphasia?

A: The severity of aphasia was based on the ratings of three judges of the quality of speech. The speech sample was the spontaneous telling of a story, since the quality of expressive language was the primary focus of the story.

Q: Do you feel the patients' language would exhibit the same pattern of disruption if the listener did not know the content of the story?

A: Currently we are in the process of analyzing the spontaneously produced stories. Since the decoding of the message in them is difficult, the process is extremely laborious. Subjectively, we feel they exhibited more difficulty on this task.

Q: On your videotapes you showed us one predominantly dysfluent aphasic patient and one predominantly fluent patient. Of the 5 subjects, would you categorize them by fluent and dysfluent? Would you consider in future analysis such as this, looking at differences between those two groups?

A: Four of the patients studied were nonfluent and one was fluent. Yes, we are very much interested in continuing our study with fluent and nonfluent patients. However, we find it difficult to match these two groups according to level of severity.

Q: As I was watching the gestural system of these patients (which I thought was incredibly rich), it occurs to me that Gardner's work in which he talks about the differences between anterior and posterior patients in terms of gestures was just smashed by the videotapes. I wonder if you see it that way too?

A: We had only one posterior patient in this study and although he used a lot of gestures, many of them seemed to be ambiguous. His pantomime, however, was quite good. We discovered later that he had been an accomplished story teller before his stroke. Thus, it would be risky to generalize the findings on gestural behavior of this small sample of patients to aphasic patients in general.