

Production of Discourse and Communicative
Competence in Aphasia

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In this presentation, we will report on our investigation of the production of connected language (discourse) in aphasia. This investigation is a continuation of the work we have conducted over the last three years. The study reported at the Clinical Aphasiology Conference last year dealt with the performance of mildly impaired aphasic subjects on the tasks of telling stories, producing summaries of stories, and giving procedures. The results of that investigation indicated that mildly impaired aphasic subjects produced well-structured narrative and procedural discourses which preserved essential elements of the structure and maintained their order. The aphasic subjects properly utilized cohesive devices for identifying participants in the action and for connecting events and procedural steps. These findings confirmed the observation of earlier naturalistic studies and clinical impressions that aphasic subjects communicate better when the unit of communication is situationally more natural, for instance, telling a story or giving instructions. Although the mildly impaired aphasic subjects in this study preserved discourse structure, their language was reduced in both quantity and complexity. Reduced complexity of language was evident at both the sentence and discourse levels and was manifested in both cases by less embedding: sentences contained a smaller number of dependent clauses, and discourses contained a smaller number of embedded episodes in the narratives and a smaller number of substeps in the procedures. Analysis of propositions occurring in the stories of aphasic and control subjects revealed that the reduced quantity of language in the discourses of aphasic subjects was highly selective, in that it involved reduction of elaborative material but not the basic narrative propositions or procedural steps. Thus, we concluded that aphasic subjects can be communicatively viable despite disruption of language at the sentence level, since the reduction of information at the discourse level is selective—the information that is lost is elaborative in nature and is not essential to the preservation of the central message.

Since the time of last year's report, we have extended this study to a population of moderately impaired aphasic subjects in an attempt to characterize the performance on discourse of subjects whose deficits span the whole scale of impairment of language in aphasia. Because the framework of this year's study is very similar to that of last year's, the only change being the level of impairment of the aphasic subjects, and because the scope of the study is considerable, this presentation will focus on two concerns only: 1) How the emergence of new analytical constructs from discourse grammar allows us to reveal which structures are preserved in discourses produced by aphasic subjects, and 2) What possible explanations may be offered for the patterns of disruption of these structures. The rationale for this focus is as follows. Recently in a chapter contributed to a book on aphasia, I summarized the contributions that neurolinguistics

can offer to the field of aphasiology as follows. Neurolinguistics attempts to provide facts about language and techniques and descriptive categories of analysis and, using these, offers possible explanations of mechanisms underlying the disruption of language in aphasia (Ulatowska, forthcoming). The application of discourse grammar to the language of aphasic subjects provides a productive illustration of the role of neurolinguistics within aphasiology. Since I regard this paper to be primarily of a methodological nature, I will consider the data in a global way, rather than dealing with detailed linguistic analyses and a multitude of figures pertaining to the results.

A number of recent studies of connected language in aphasia address the issue of information in aphasic communication. At last year's conference, Yorkston and her colleagues stated that maximizing the communication of information in a natural setting is one of the primary goals of aphasia treatment. In her presentation, Yorkston established a construct of efficiency of information exchange, which she defined in terms of the accuracy and duration of the exchange. In her previous study of connected speech (1980), Yorkston measured the amount of information by content units, and the rate at which information was conveyed by content units per minute. A content unit was defined as a "group" of information that was always expressed as a unit by normal speakers. As I understand the concept, content units could roughly be equated with lexemes, excluding function words. In another recent investigation of discourse (Berko-Gleason *et al.*, 1980), the issue of units by which to measure information appeared again. Target lexemes corresponding to content words, and themes corresponding to propositions, were utilized. These studies, then, express one of the basic concerns of aphasiology at present, the issue of defining and measuring the content of connected language in terms of the information it conveys. This new concern has emerged as a result of a shift of emphasis from the analysis of language at the sentential level to the discourse level, and a shift of emphasis from the form of language to its meaning. In the same way as the information conveyed by sentences is measured in terms of their structure (constituents and syntactic order), so the information contained in connected discourse should be measured in terms of those structural elements of discourse which organize the information.

In discourse studies, various structures are proposed which constitute the organizing principles according to which the information is processed. For the purpose of this presentation, I have selected just a few of these structures to illustrate the general methodology of discourse analysis. They are narrative superstructure, spectrum, profile, and procedural superstructure. A narrative superstructure states that a fully formed narrative consists of an episode with the following structure: (1) an abstract, (2) a setting involving time, location, background and identification of participants, (3) complicating action involving events, (4) evaluation, (5) a resolution, and (6) a coda. The above order is conventional, but variants can occur. Some of the elements of the narrative superstructure are essential for the preservation of the story (setting, complicating action and resolution), while others are optional (abstract and coda). This superstructure and its elements provide a framework of organizing information for producing and comprehending stories.

Another construct proposed recently (Longacre, 1980) is that of spectrum, which traces continuing strands of information that unite a discourse and distinguish hierarchically the types of information within

it. The analysis of a narrative text according to spectrum reveals a cline or gradient of information contained in verb elements, ranging from the most dynamic elements of the story to the most static, depictive elements. Thus, by analysis of verb categories from most to least dynamic, one can establish levels of information relevance in discourse and isolate main event line from background events. Another construct proposed recently in the literature on discourse (Longacre, 1980) is that of a profile in the narrative. This construct allows us to analyze the developing plot of the story according to mounting and declining tension exhibited in pre-peak, peak, and post-peak elements; peak, representing the climax of the plot, is the most important from the point of view of information load.

In procedural discourse, which tells us how something is done, steps, substeps, target steps and optional steps provide the conventional structure according to which the information is organized. Procedural discourse, like narrative discourse, optionally may contain introduction, resolution, and coda in addition to steps. It also can include evaluation, though much less frequently than narrative does. Again in a way similar to narratives, information in procedures is organized hierarchically. Among the steps, there is a subset of essential steps which form the most important core of the procedure and are necessary for the well-formedness of the procedure, and optional steps which carry the less important information. Furthermore, steps can be broken down into substeps which individually carry less information than the steps themselves. These substeps may be optional. All of the discourse elements we have just reviewed suggest a very important principle: preservation of discourse structure in aphasia is possible only if these levels carrying different information loads are reflected in the reduced language, and only if the hierarchical arrangement of information is maintained.

Some of the findings of this year's study support this principle. The investigation involved fifteen aphasic subjects, ten males and five females between the ages of twenty-four and seventy-one. The etiology of the aphasia in twelve cases was a single cerebrovascular accident in the left hemisphere and in two cases aphasia was secondary to closed head injury. At the time of the experimental testing, which on the average was 49.4 months post onset, all fifteen subjects were described as moderately aphasic. A control group of fifteen non-brain-damaged subjects was matched to the experimental population. The diagnostic battery consisted of standardized tests to evaluate language function, standardized tests to evaluate cognitive function, and experimental tests to elicit narrative and procedural discourses. The narrative tasks included retelling a story, describing a story from a picture, and telling the story of a memorable experience, as well as summarizing stories. The procedural tasks involved giving instructions for performing a number of activities such as making a sandwich and changing a light bulb. Analyses of the data described the amount and complexity of language at both sentential and discourse levels. In addition, a rating system was devised to evaluate the communicative competence of the subjects in terms of the coherence and comprehensibility of their discourses.

I will report now only on the results of the analysis of the discourses according to their information structure. In narratives, all aphasic subjects preserved all the necessary elements of the superstructure (settings, complicating actions, and resolutions), although the amount of language

expressing settings and resolutions was reduced. Most of the aphasic subjects, like normal subjects, produced some evaluation, but it was reduced in amount. For example, in the narrative task of relating a memorable experience, aphasic subjects produced only 34% as much evaluation as was produced by normal subjects. Spectrum analysis of verb elements according to dynamism of action indicated that though the variety of information clines was reduced, the basic hierarchical structure was retained. The clines containing primary event line verbs, the most dynamic clines, were not reduced, while the clines containing evaluating and emotional verbs were greatly reduced. Profile analysis of the plots indicated that all of the aphasic subjects produced peaks; however, there was a conspicuous reduction in the number of prepeaks and postpeaks. This reduction was more marked in postpeaks, which do not carry as important a function as prepeaks in maintaining tension in the development of the plot. Analysis of summaries of the narratives produced by aphasic subjects provided the best evidence for their ability to reduce information selectively—most aphasic subjects included only the essential information and excluded most of the elaborative information contained in the original stories. In procedures, aphasic subjects produced only 63% of the number of steps produced by the control subjects. Hierarchical reduction of information was manifested in the more frequent reduction of substeps and optional steps as compared to essential steps. Aphasic subjects also produced less non-essential elaboration in the form of introduction or evaluation.

Finally, these findings of reduction can be related to the rating scale measuring coherence and comprehensibility of discourses which we developed. The rating scale was intended to provide us with a listener's subjective evaluation of, roughly, the quality of the discourses. Three speech pathologists rated tape-recorded versions of the discourses. On the basis of their judgments, we isolated the best and the worst of the discourses. We then looked for elements of our analysis which correlated with these extreme ratings. Correlation analysis revealed that the main difference between the aphasic subjects who were rated low as opposed to those who were rated high was the pattern of reduction of information that they exhibited in their discourses. If the reduction reflected the hierarchical arrangement of information, the rating was high; for example, if the reduction affected only optional elements such as evaluation or coda in narratives, and the optional steps and substeps in procedures, raters judged the discourses high. On the other hand, the discourses that were rated low violated the principle of selective reduction by reducing essential elements or inconsistently reducing only certain elements in the hierarchy, leading to discourses which, according to the distribution of information, were no longer balanced. For example, a procedure that did not include all the essential steps but contained sequences of substeps, constituted such a violation of the reduction rule. In analyses of the discourses of normal subjects, we observed a much wider variety of discourse types according to information structure: some of them were highly elaborate whereas others were quite reduced. The reduced ones were similar to those of the aphasic subjects who were rated high; they exhibited a selective reduction of information. Violation of the principle of selective reduction was not found in the normal subjects.

This selective reduction of information is, we would suggest, a result of utilizing cognitive and linguistic strategies to deal with the

exchange of information in communication. The exact nature of these strategies remains to be discovered; however, our study indicates that, on the whole, most moderately impaired aphasic subjects can successfully employ these strategies to simplify the form and the content of their discourses and thus maintain their communicative competence. The relation between reduced information and simplified language structure is unclear. We would like to suggest that complex information structure may require certain levels of syntactic complexity of language. For example, evaluative information in narratives involves the use of complex syntactic devices such as comparatives, negatives, modals, and dependent clauses. Because aphasic individuals are unable to produce certain complex syntactic constructions like these, they may necessarily fail to produce certain complex information structures such as evaluation. The connections between form and content require further study. It is also within the realm of speculation whether this reduction of information structures and syntactic complexity is motivated by a communicative strategy of compensating for the loss of language or whether it is a general strategy which we all use when the processing load becomes excessive.

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DISCUSSION

Q: Who were the control subjects?

A: They were non-brain-damaged subjects.

Q: Did you notice any cases of elipsis in the reduced language?

A: Yes, there were many instances of elipsis, especially in procedural discourse when the deletion of subjects of clauses occurred.

- Q: Could you state again the hypothesis of the study?
A: Preservation of discourse structure in aphasia is possible only if the levels carrying different amounts of information load are reflected in the reduced language.
- Q: What is the application of the results of this study?
A: Discourse analysis provides an additional way to evaluate communicative competence in aphasia. It is often difficult to predict a patient's performance in real life communicative situations on the basis of standardized tests only.
- Q: Have you done any work on discourse with right hemisphere patients?
A: Yes, two of our doctoral students have been working on coherence in discourse of right hemisphere patients.
- Q: Have you found any correlations between the results of cognitive tests and performance on discourse?
A: Yes, performance on block design and picture arrangement correlate with performance on discourse. It is especially clear why there is a correlation between picture arrangement and discourse, since success on that task depends on reaching perceptual closure in producing a pictorial narrative.
- Q: What were the tasks used to elicit discourse?
A: In the case of the narrative discourse, it was describing a picture, retelling a story and telling a story on a specified topic. Procedural discourse involved giving four different procedures such as changing a light bulb and shopping in a department store.
- Q: To what extent can the results of this study be generalized?
A: One has to be very careful since only small populations of mildly impaired and moderately impaired aphasic subjects have been studied up to now. We are planning to extend this investigation to other aphasic populations. It is also important to emphasize that since little knowledge on discourse production in the normal population is available at present, all the studies by necessity should involve normal control subjects.

APPENDIX A

Narratives

| <u>Profile Features</u> | <u>Stimulus</u> | <u>Control Subject</u> | <u>High-rated Aphasic Subject</u> | <u>Low-rated Aphasic Subject</u> |
|-------------------------|--|---|---|---|
| Stage | Two roosters were fighting over the chicken yard. (Setting) | Two roosters were fighting in the barnyard. (Setting) | Two roosters is fighting. (Setting) | Well, two roosters were fighting over the farmyard fence. (Setting) |
| Prepeak | The one who was defeated hid himself in the corner. The other rooster flew to the top of the roost and began crowing and flapping his wings to boast of his victory. | And as one rooster defeated the other rooster, the rooster who won flew to the top of the coop where he crowed quite loudly proclaiming his victory. Second rooster returned to the side of the barnyard and hiding under the chicken coop where he sulked in defeat. | And the best rooster chuckled. | And as one rooster he was in the corner. And the other rooster he was crowing and crowing.* (Complicating Action) |
| Peak | Suddenly, an eagle swooped down, grabbed the rooster and carried him away. (Complicating Action) | However, an eagle was passing over the barnyard, seeing the rooster on top of the chicken coop as he was crowing, swooped down and captured him, (Complicating Action) | And then the hawk swooped down and picked up the rooster. (Complicating Action) | And the crow got him. And so the crow caught the second rooster. And the crow had got the rooster. (Resolution lacking) |
| Postpeak | This was good luck for the defeated rooster. (Evaluation) | which was very bad for the victor but in turn served quite well for the defeated rooster. (Evaluation) | And the defeated rooster is proud. (Implied Resolution and Evaluation) | |
| Conclusion | Now he could rule over the roost and have all the hens that he desired. (Resolution) | The defeated rooster then being the only rooster left had complete run of the chicken yard. (Resolution) | | |

*The key information as to why these events happened is omitted.

APPENDIX B

PROCEDURES

Stimulus: Changing the Light Bulb

| <u>Superstructure</u> | <u>Control Subject</u> (Excerpt) | <u>Aphasic Subject with High-Rating</u> |
|-----------------------|--|--|
| Introduction | All right now, if the light bulb goes out, let me show you how to change that. | I would find out the light fixture needs to be replaced. |
| Optional Steps | So you see how I'm doing this. And now I'm taking the fixture. | And I found a light fixture, going to take the old one out. And put the new one back in. |
| Essential Steps | | |
| Substeps | And I'm moving it and tilting it to the side so that you can see where the nuts are that you have to undo those. Now I'm taking the screwdriver. And I'm turning those to the right—'cause that's the way that you turn to loosen 'em. You loosen 'em one on one side, one on the other side and one on the far side. Now the reason you do that is because the light is held by the pressure from all three screws as they go into the fixture. And then you back those off gradually | |
| Target | Then you straighten back your fixture to the position that it originally was. | And turn it back on and see if it works. |

Stimulus: Grocery Shopping

| | <u>Control Subject</u> (Excerpt) | <u>Aphasic Subject with Low-Rating</u> |
|-----------------------|---|---|
| Introduction-Optional | You go in the grocery store. | |
| Optional Step | | We all the different shops in to go. |
| Optional Evaluation | | Then he ask what all the different want to. |
| Essential Steps | And you get a cart. You go down the aisles and find up milk and bread and butter and vegetables and meat —whatever else you need. Then you go through the checkout lanes. | It's walking at the basket. Then when all that want to have he pays for them. |
| Optional Steps | And then when you are done with, you put your cart up. | And put them on a carton. And put them in a car. |
| Coda | And you go back home. | |