Cohesion in Aphasic Language

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In doing the research described here, I had two objectives. One was to examine studies of cohesive ties in normal and disordered language to see what kinds of results had been obtained. The other was to analyze the cohesive ties in the conversational discourse of two aphasic patients. Cohesive ties are defined as those linguistic features that contribute to making a passage of spoken or written language a unified text. A cohesive tie consists of the unifying relationship between a referring item and the item in the surrounding text to which it refers. For example: "Michael loves the ocean. He swims in it for hours." In this example there are two ties, each consisting of two parts. The first tie is made up of the referring item HE, and the item to which it refers, MICHAEL. The second tie consists of the referring item IT and the item to which it refers, OCEAN. Both parts are necessary for a successful tie. The referred-to item MICHAEL is essential for an interpretation of HE, and the referred-to item OCEAN is essential for interpreting the referring item IT. It is the semantic relationship between the parts that constitutes the tie, rather than either of the two elements.

If, for instance, we saw this passage: "David preaches sermons. She could walk on it for hours." We would be likely to select SHE and IT as possible referring items. Within this text, the only possible items referred to are DAVID and SERMONS. But the pronouns do not agree, and the sentences do not fit together even as nonsense. As it stands, the referring items are unresolved by items referred to, and so the requirement of two parts for a successful cohesive tie is not met. Thus, in this passage there are no cohesive ties.

"Mary is an ice skater. Chris attends Brown University." In this example there are no referring items, resolved or otherwise, and no cohesive ties, and these two sentences are not cohesive. Most of us as speakers of English would intuitively agree on the cohesion or lack of cohesion of the examples above. Analyzing cohesive ties provides a concrete way to describe the differences between a cohesive and a non-cohesive passage.

Halliday and Hasan (1976), provide a comprehensive system for analyzing cohesive ties, as well as a detailed rationale for their taxonomy of cohesion. They divide cohesive ties into five major categories, 19 subcategories, and a multitude of sub-subcategories. Our concern here is mainly with the five major categories: Reference, Substitution, Ellipsis, Conjunction, and Lexical Reiteration and Collocation. A brief definition and an example of each follows.

(1) _Reference_. Ties which depend for their semantic interpretation on another item in the text. For example: Michael loves the ocean. He swims in it for hours. HE and IT depend for their interpretation upon MICHAEL and OCEAN, which appear in the preceding sentence. (2) _Substitution_. The replacement of one lexical item by another. For example: You haven't called home? Well please do so. The SO in the second sentence replaces CALLED in the first sentence. (3) _Ellipsis_. A form of substitution in which a lexical item is replaced by nothing. For example: I have plenty of nut rolls. And many more to come. After the word MORE in the second sentence, NUT ROLLS is understood. (4) _Conjunction_. Indicates the way what is to follow is systematically related to what preceded. For example: I had a pretty good

night's rest. And I've been on the phone with my son. AND indicates that the second sentence continues the account begun in the first. (5) Lexical Reiteration and Collocation. The cohesive effect achieved by choice of lexicon. For example: Sister Lois. You are a nun. NUN is a near repetition of SISTER, and is therefore cohesive with it.

The results of the sparse cohesion research so far indicate that there are rule-based quantitative and qualitative differences in various subjects' use of cohesion. Past applications of cohesion analysis can be divided into three major categories: language of normal children, written language of normal adults, and disordered adult language.

Studies of children indicate that as they acquire language they learn to use ties in a developmental sequence, according to a hierarchy of linguistic sophistication (Haslett, 1983; Maratsos, 1976; Michaels, 1981; Owens, 1983; and Rutter and Raban, 1982). Children's use of ties was also noted to change according to the situation and mode of expression (Fine, 1981; Owens, 1983). Use of cohesive ties in normal adults has been studied in the writing of college students. Writers of essays judged as "high" quality use cohesive ties differently from writers of "low" quality essays (Witte and Faigley, 1981). Certain kinds of cohesive ties improve memory of text (Fishman, 1978), and a greater density of ties facilitates better comprehension of text (Irwin, 1980).

Cohesive ties have been used to distinguish one clinical pathology from another. In one study (Wykes and Leff, 1982) the use of cohesion analysis as a diagnostic tool significantly increased the diagnostic accuracy of psychiatrists who were asked to classify patients as either manic or schizophrenic on the basis of transcripts of speech. Other studies have found that thought-disordered schizophrenics use ties differently from non-thought-disordered schizophrenics (Rochester and Martin, 1979), Alzheimer's disease patients use cohesive ties differently from normal elderly subjects (Ripich, Spinelli and Terrell, 1983), and Alzheimer's patients use a greater range of some cohesive ties than Wernicke's aphasia patients (Obler et al., 1982). The evidence so far suggests that cohesion analysis can be used to differentiate among varying degrees of language mastery, as well as between certain pathologies.

This study was designed to investigate whether cohesion analysis can be used to evaluate changes in the language of aphasic patients. It was limited to two questions: (1) In an aphasic patient whose language improves during hospitalization, can his or her language immediately post-onset be distinguished from that midway in the hospitalization and just prior to discharge on the basis of his or her spoken use of cohesive ties? (2) At these same points of observation, can the language of a fluent aphasic patient be distinguished from that of a nonfluent aphasic patient by their differential use of cohesive ties?

METHOD

Subjects. Two acute stroke patients were studied over the course of their hospitalization. The language of both was judged by trained observers to have improved over the course of their hospital stay. Mr. F., age 72, was classified at onset as having a moderate Wernicke's aphasia. By the time of discharge one week later, he was classified as having a moderate conduction aphasia. Ms. N., age 45, was initially classified as having a moderate to severe Broca's aphasia. At the final observation a week later, her Broca's aphasia was reclassified as mild to moderate.

Procedures

Each patient was seen within 72 hours of hospital admission, and was observed on six of the seven days' hospitalization. Two trained observers participated in each 15-minute informal conversational visit. Five minutes of the tape recording of each visit was subsequently transcribed for analysis. The cohesive ties in the first, middle, and last hospital visit of each subject were tabulated and each was classified as belonging to one of the five major categories of cohesion.

RESULTS

In discussing the way these patients changed in their use of cohesive ties, the number of ties per utterance and percentage of each kind of tie are considered. It is important to remember that the absolute output of speech of the two is quite different, as can be seen in Table 1.

Table 1. Coherence analysis for Mr. F. and Ms. N.

	First Visit	Last Visit
Mr. F.		
Words	446	354
Utterances	67	74
Words/Utterance	6.66	4.78
Ties/Utterance	1.2	.89
Ms. N.		
Words	42	163
Utterances	21	40
Words/Utterance	2.0	4.0
Ties/Utterance	.66	1.15

Both Mr. F. and Ms. N.'s use of cohesive ties changed over the course of their hospitalization (see Figure 1). Mr. F., the fluent patient, used fewer cohesive ties per utterance at each successive observation, while the nonfluent Ms. N. used more.

Patterns of change also differentiated the subjects, as Figure 2 illustrates. Ms. N. systematically shifted from using almost entirely Lexical and Elliptical ties to using all five kinds of ties. Mr. F.'s use of the various kinds of ties fluctuated from visit to visit, but a marked change was evident between the first and last visits. At the final visit he used nearly twice the percentage of Reference ties and half the percentage of Conjunctive ties he had at visit 1, and he increased his use of Elliptical ties.

At each observation point, the subjects' use of cohesive ties differed. The patients not only differed from one another, but their individual use of cohesive ties changed rather dramatically over the course of one week post stroke. These individual differences may reflect early recovery of fluent versus nonfluent aphasic patients. Both the number of ties per utterance and the configuration of the kinds of ties changed as each subject's language improved.
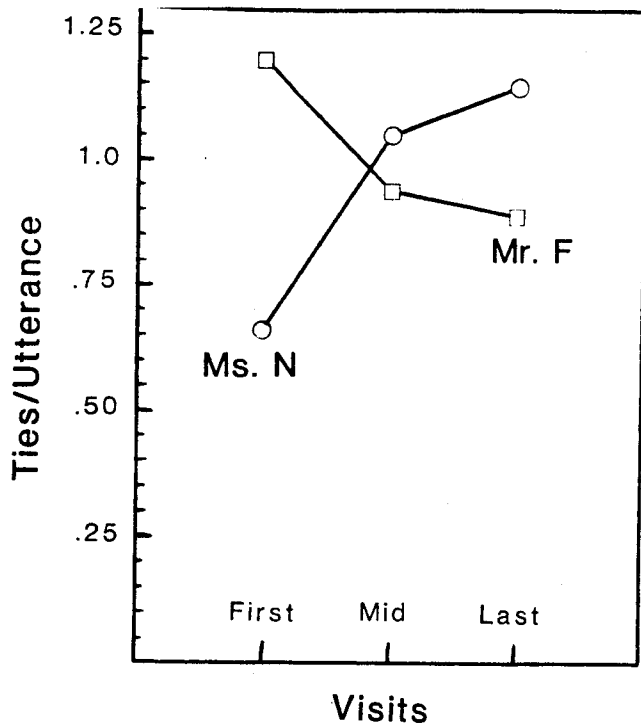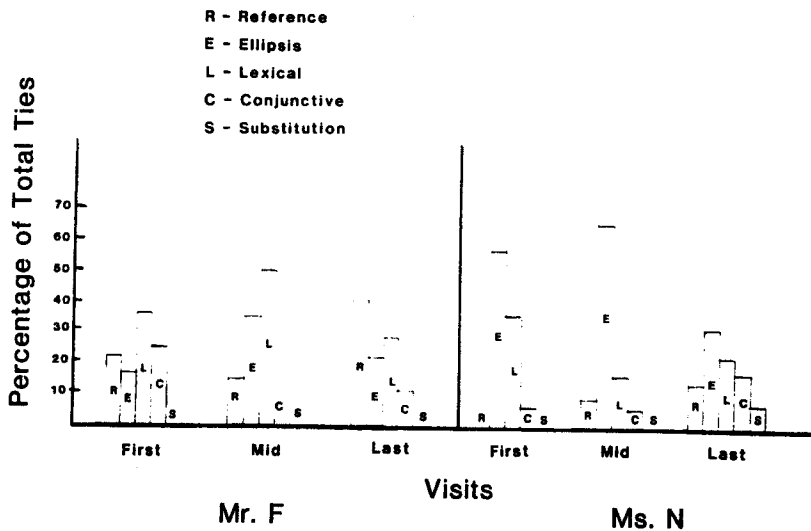
Figure 1. Subjects' use of cohesive ties.

R - Reference
E - Ellipsis
L - Lexical
C - Conjunctive
S - Substitution

Figure 2. Patterns of change in subjects' use of cohesive ties.

DISCUSSION

Very little research has been done on cohesion, and we therefore have no norms for its use in normal or disordered language. We do not know how much variability to expect within an individual, among people, or from situation to situation, and we have few guidelines as to what to expect from any given speaker. Here we attempted to gather descriptive information about the changes in cohesive ties as aphasic language improves.

Looking at the results of this study, it seems that a more cogent pattern of recovery in terms of cohesive ties emerges in Ms. N.'s case than Mr. F.'s. As Ms. N.'s language improved, she gradually expanded her repertory of cohesive ties. At the most general level, she increased the number of ties per utterance. She also increased the number of major categories of ties, as well as the subcategories.

Her change in cohesion seemed to reflect the general picture of her language recovery. She began with very limited output, characterized by few words and a few short utterances with no grammatical complexity. Her large proportion of Lexical and Elliptical ties at visit 1 represents frequent repetition and single-word responses. All of this gradually improved as her language improved, with more words and utterances, a longer MLU and subjectively more nearly normal conversation.

Mr. F.'s pattern of change of cohesive ties provides a less consistent picture. At the general level, he decreased the number of cohesive ties per utterance, a change which accompanied a decrease in total words and in MLU. It is tempting to speculate that his decrease in cohesive ties per utterance reflects recovery from a tendency to overelaborate the connective elements of language to compensate for the relative lack of content in what he said -- the "empty" speech often noted in fluent aphasia. When one reads the transcript of Mr. F.'s first visit, it is evident that despite much empty speech, he conveyed most of his message.

The notable area of similarity in the two subjects' recovery was that they changed from no ties in the Lexical subcategory of collocation to including them in their speech by the last visit. The analysis of the ties of "good" writers cited earlier pointed to increased use of Lexical collocation as probably the most important indicator of linguistic competence that cohesive analysis can provide. While written and spoken language differ, it seems reasonable to infer that increased collocation would also accompany increased mastery of spoken language.

Further study of cohesive ties in aphasic patients is needed before these suggestions become clear pictures. Preliminary evidence has been provided indicating that fluent versus nonfluent aphasic patients can be distinguished by analyzing their use of cohesive ties. It seems possible that it would benefit patients to include cohesive ties among those aspects of language that we try to facilitate in the recovering patient.

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ACKNOWLEDGMENT

DISCUSSION

Q: Under your example of Lexical Collocation you said, "Sister Lois. You are a nun." What does the system do if the person says, "Sister Lois. You are a priest."? If they're attempting cohesion, but have a word retrieval difficulty.

A: For the way that we did it, it wouldn't be counted as a cohesive tie.

Q: Might that type of behavior then be worthwhile to note?

A: That kind of behavior would be. We noted successes only -- ties in which an accurate referent was there.

Q: So that we should probably view this as a semantic analysis, but it's not necessarily all inclusive. There might be additional semantic analyses to perform?

A: Certainly other semantic analyses could be done, including additional analyses of ties. All I talked about was successful ties and the fluent aphasic patient especially made many unsuccessful attempts at cohesive ties.

Q: My feeling is that over time it also might be valuable to evaluate an attempt at this kind of tie and a success.

A: I suspect you're right. I think it would change.

Q: One thing that we don't know about cohesive ties is how much they really contribute to intelligibility, because we know that we can have too much cohesion. So until we know more about cohesion, I think maybe judgments or ratings of intelligibility of the message would help. What is your feeling on that?

A: What we rated was improved language.

Q: In terms of quantity, but what about quality, or clarity of the message?

A: Our ratings of language were not based on quantity of output. What we judged was the evolution of language toward normal from aphasic. The two subjects of this study were chosen because their language was judged to have changed quite dramatically toward normal during their hospital stay. Our goal was to describe how their use of cohesive ties changed as their language improved.

Q: How did you control for subject matter from the first time to the second time?

A: As part of our protocol, each patient was visited in the hospital, and each visit consisted of an informal conversation about how the patient was doing. It was only controlled to that extent, and so there was some variation in subject matter. The circumstances of each visit were essentially the same, but it was not a tightly controlled interaction.