SHORT REPORTS

Lexical Cohesion and Formal Thought Disorder During and After Psychotic Episodes

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Speech samples obtained from schizophrenics, manics, schizoaffectives, and normal subjects were compared for the amount of lexical cohesion both within and between clauses. Two speech samples were obtained for each patient: one shortly after admission to a psychiatric hospital and another several weeks following discharge. All of the psychiatric patients showed evidence of formal thought disorder at admission, and all three groups showed a significant decline in the extent of thought disorder at follow-up. There were no differences between groups with regard to between-clause lexical cohesion at either point in time. Within-clause lexical cohesion did distinguish among the psychiatric groups at the first assessment interval; schizophrenics showed less within-clause lexical cohesion than the manics or schizoaffective patients. The manics and the schizoaffectives showed a significant decline in the amount of within-clause lexical cohesion from initial assessment to follow-up. The schizophrenics exhibited a modest decline in the amount of between-clause lexical cohesion.

Several recent empirical attempts to describe thought disordered discourse have examined "linguistic cohesion" using a system developed by Halliday and Hasan (1976). This system defines five types of semantic relation that speakers may use to connect elements within a text: reference, substitution, ellipsis, conjunction, and lexical cohesion. Rochester and Martin (1979) found that schizophrenics whose speech was considered thought disordered could be distinguished from schizophrenics whose speech was not considered thought disordered by the former group's greater reliance on lexical cohesion. Lexical cohesion occurs when a speaker employs the same word, the same root, a synonym, a superordinate, or a general item to create a semantic relation between elements in a text; one element presumes the other so that the two are dependent on each other for interpretation.

Subsequent studies have used measures of cohesion to compare speech samples obtained from manic and schizophrenic patients. Wykes and Leff (1982) found that thought disordered manic patients used more cohesive links than thought disordered schizophrenics. On the other hand, Harvey (1983) did not find differences between thought disordered manics and schizophrenics in either total cohesion or any of three specific subtypes: referential, conjunctive, or lexical cohesion. The only significant

differences that did emerge in Harvey's study were between subjects who exhibited thought disorder and those who did not, regardless of diagnostic category. Thought disordered manics and schizophrenics tended to use less conjunctive and less referential cohesion than did manics and schizophrenics who were not thought disordered.

At the present time, it is not clear whether there are meaningful differences between the verbal discourse problems exhibited by schizophrenic and manic patients. Studies that have employed cohesion analyses have produced somewhat inconsistent results. Two important methodological considerations may clarify this situation by embedding the data in a broader context. One that has been suggested by several previous investigators involves the examination of verbal behavior at different phases of each type of disorder. The unit of linguistic analysis may also be an important consideration. Previous studies have been concerned with the incidence of lexical cohesion between clauses or sentences, but there may be important differences between manics and schizophrenics at a more immediate, within-clause level of discourse analysis.

This article reports results from a detailed examination of lexical cohesion in three groups of thought disordered patients—manics, schizophrenics, and schizoaffectives—as well as a group of normal subjects. Clinical ratings of formal thought disorder and measures of both between- and within-clause lexical cohesion were examined in the three thought disordered groups at two points in time: during the acute stage and following remission.

Method

The subjects included 10 schizophrenics, 11 manic, and 11 schizoaffective patients (8 manic type and 3 depressed type). Subjects with a history of alcohol abuse or organic complications were not included in the study. The psychiatric subjects were interviewed shortly after admission

to a psychiatric hospital and again following discharge. A sample of 10 nonpsychiatric orthopedic patients was interviewed once, shortly after admission to the hospital. The nonpsychiatric subjects were screened for prior personal or family psychiatric history. Each subject was asked to provide an account of the events surrounding his or her admission to the hospital. For the psychiatric subjects, the remainder of the interview followed the Schedule for Affective Disorders and Schizophrenia (Spitzer & Endicott, 1978). Diagnoses were determined by two independent judges using the Research Diagnostic Criteria (Spitzer, Endicott, & Robins, 1978). Diagnostic agreement based on a larger sample of these and other subjects ($N = 42$) was relatively good (weighted kappa = .70). Data regarding the subjects' age, sex, and education are presented in Table 1. Diagnostic procedures and specific demographic characteristics of the patient samples have been described in greater detail elsewhere (Ragin & Oltmanns, 1983). Virtually all of the psychiatric patients were receiving antipsychotic medication.

Thought disorder was assessed at both the initial and follow-up time periods using Andreasen's (1979) Scale for the Assessment of Thought, Language, and Communication Disorders. Details of this procedure and information regarding the reliability of the ratings are also presented elsewhere (Oltmanns, Murphy, Berenbaum, & Dunlop, 1985). At the initial time period, all of the psychiatric subjects and none of the orthopedic subjects would be considered thought disordered on the basis of the criteria employed by Harvey (1983; global ratings of 2 or higher on Andreasen's scale).

Between 3 and 13 months following the initial assessment (and after discharge from the hospital), a second interview was conducted in the patient's home with 8 of the 10 schizophrenics, 10 of 11 manics, and 8 of the 11 schizoaffective subjects. Some patients could not be found, and others refused to participate. Audiorecordings of the follow-up interviews were rated for thought disorder using Andreasen's system. The global ratings of thought disorder for the psychiatric subjects were submitted to a repeated-measures analysis of variance with diagnosis and time period as factors. There was a main effect for time period, $F(2, 23) = 31.9$, $p < .001$, indicating that across diagnostic groups there was a significant decline in thought disorder between initial and follow-up testing. Inspection of the individual ratings indicated that the global measure of thought disorder decreased for 23 of the 26 psychiatric subjects between testings. Three subjects (1 schizophrenic, 1 manic, and 1 schizoaffective) received the same global rating and continued to evidence considerable thought disorder at follow-up.

Lexical cohesion was scored following the method used by Rochester and Martin (1979). Fifteen consecutive independent clauses were transcribed from the first extended speech segment in each of the 68 audiotaped interviews. Independent clauses were identified on the basis of the presence of a noun and a verb that could stand alone. Sentence modifiers were treated as independent clauses, but in order to conform to Rochester and Martin's analysis, complements and relative and adverbial clauses were not.

The number of lexical ties was calculated for each 15-clause segment. In the procedure used by Rochester and Martin, only lexical ties occurring between clauses were scored. In this study, lexical ties occurring within clauses were also identified. The following example, taken from Rochester and Martin (1979), clarifies this distinction:

(1) Each life you know you can't always remember your past lives.
(2) Very f-few pe-people can remember their past lives. (p. 97)

In the second clause, the word *lives* is lexically tied to *lives* or *life* in the first clause. This is an example of between-clause cohesion. In the present study, *lives* in the first clause would also have been scored as an instance of within-clause lexical cohesion because of the tie to *life* earlier in the same clause.

Each transcript was rated at two separate points in time in randomized order by a rater who was blind to previous scoring. The majority of

Table 1
Demographic Characteristics

Group	Sex		Age[a]		Education[a]	
	Male	Female	M	SD	M	SD
Schizophrenic	6	4	28.0	7.9	11.7	2.1
Manic	11	0	26.2	5.8	13.0	1.7
Schizoaffective	9	2	25.8	7.0	11.8	2.2
Normal	10	0	33.6	5.3	12.1	2.3

[a] In years.

ratings were done by the first author. A research assistant, trained in the use of Halliday and Hasan's (1976) system, coded cohesion in a subsample of the transcripts (20%). Intrarater reliability for scoring lexical cohesion was .94 (product-moment correlation) for the total number of cohesive ties per transcript. Interrater reliability was .95. Cohesion was assessed in the absence of diagnostic or time period information. To obtain a measure of verbosity, word counts were also conducted.

Results

Means and standard deviations for each of the measures of lexical cohesion and the number of words per transcript at each of the two time periods are presented in Table 2. One-way analyses of variance (ANOVAs) indicated that the groups were not significantly different in either between-clause or total (between and within combined) lexical cohesion at Time 1. The groups did differ significantly, however, on within-clause lexical cohesion, $F(3, 38) = 3.12$, $p = .04$. Post hoc comparisons using the Newman-Keuls procedure indicated that the schizophrenics displayed significantly less within-clause lexical cohesion than either the manic or schizoaffective subjects ($p < .05$). The manics and schizoaffectives were statistically indistinguishable from one another. None of the means of the patient groups were statistically different from those of the normal subjects, who fell between the schizophrenics and the other two groups.

The schizophrenics also produced fewer words per clause, $F(3, 38) = 3.19$, $p = .03$. In order to determine whether differences in amount of lexical cohesion could be attributed to a diminished level of verbosity, the number of within-clause lexical ties was divided by the number of words per 15-clause transcript. These values were then submitted to a further ANOVA. Controlling for verbosity did not eliminate the significant main effect of diagnosis on within-clause lexical cohesion ($p < .05$).

The measures of cohesion for the three psychiatric groups at Time 2 were also compared with those of the normal subjects. One-way ANOVAs indicated no significant group differences on any of the measures of lexical cohesion for the later testing period. There were also no significant differences between the groups in verbosity at the follow-up time period.

The principal objective of the study was to compare the groups across time. Because the normal subjects were assessed at one time only, they are not included in any of the following analyses. Repeated-measures ANOVAs were conducted for each of the cohesion measures with diagnosis and time period as factors. These analyses indicated a significant main effect of time period for the measures of total and within-clause lexical cohesion, $F(2, 23) = 10.0$, $p = .005$, and $F(2, 23) = 13.9$, $p = .002$, respectively,

Table 2

Lexical Cohesion and Verbosity at Admission and Follow-Up

Group/ interview	Total cohesion	Between clause	Within clause	Number of words
Schizophrenic				
Admission				
M	13.4	12.2	1.2	130
SD	3.7	3.9	1.1	22
Follow-up				
M	9.9	8.3	1.6	118
SD	5.2	5.5	1.7	25
Manic				
Admission				
M	14.8	10.8	4.0	164
SD	7.8	5.2	4.4	29
Follow-up				
M	11.1	10.2	0.9	141
SD	4.2	3.8	1.2	33
Schizoaffective				
Admission				
M	17.8	12.3	4.9	139
SD	7.8	5.2	4.4	26
Follow-up				
M	12.6	12.2	0.4	132
SD	4.8	4.6	0.9	25
Normal				
Admission				
M	13.2	10.7	2.5	147
SD	5.6	4.4	2.9	27

and a near significant main effect of time for between-clause lexical cohesion ($p < .10$). Again, controlling for verbosity by dividing by the total number of words did not eliminate the significant effect of time period on these measures. One significant interaction was obtained: Diagnosis × Time Period on the measure of within-clause cohesion, $F(2, 23) = 3.6$, $p = .04$. Between the initial and follow-up testing, there was a decrease in the amount of within-clause lexical cohesion for the schizoaffective subjects, $t(7) = 4.33$, $p = .003$. The decrease in within-clause lexical cohesion for the manic subjects fell short of statistical significance, $t(9) = 2.11$, $p = .06$. The schizophrenics, on the other hand, displayed approximately the same amount of within-clause lexical cohesion at follow-up as at the initial time period. Deletion of the subjects who continued to evidence thought disorder at follow-up did not alter the obtained pattern of results. Significant main effects of time for the total and within-clause measures and a significant Diagnosis × Time interaction for the within-clause measure were still obtained, $F(1, 20) = 8.8$, $p = .007$; $F(1, 20) = 14.2$, $p = .001$; and $F(2, 20) = 3.9$, $p = .04$, respectively. Following the omission of one subject from each group, there was still a significant decline over time in the amount of within-clause lexical cohesion for both the schizoaffective, $t(6) = 4.05$, $p = .007$, and manic, $t(8) = 2.41$, $p = .04$, subjects.

Discussion

These results indicate that diagnostic differences in lexical cohesion depend on the specificity of the measure. At the acute phase of illness, thought disordered schizophrenic, manic, and schizoaffective subjects did not differ significantly from normals in either total or between-clause lexical cohesion. Thus our results on these measures are consistent with previous studies finding no diagnostic differences in lexical cohesion (Harvey, 1983; Wykes & Leff, 1982). The schizophrenics did differ, however, from both the manic and schizoaffective subjects in the incidence of within-clause cohesion.

Decreases in both clinical ratings of thought disorder and the incidence of total lexical cohesion were observed between the acute phase of illness and remission for all three thought disordered groups. A differential pattern of change was observed among groups, however, when specific forms of cohesion were examined separately. The manic and schizoaffective patients, who had the highest levels of within-clause lexical cohesion at Time 1, showed a significant decrease which coincided with improvement in clinical ratings of their speech. Their scores on between-clause lexical cohesion did not change across time. The schizophrenic patients, who employed the highest levels of between-clause lexical cohesion at Time 1, showed a nearly significant ($p = .07$) decline in this regard, and their within-clause cohesion scores remained unchanged. Although some caution in interpretation of the longitudinal results is warranted owing to the possible influence of floor effects, these patterns may suggest the existence of subtle differences between the forms of verbal communication impairment seen in schizophrenic and affective disorders.

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