Longitudinal Courses of Thought Disorder in Schizophrenia and Schizoaffective Disorder

by Joanne T. Marengo and Martin Harrow

Abstract

This research examined the longitudinal courses of thought disorder in schizophrenia, schizoaffective disorder, and other psychotic and nonpsychotic disorders. One-hundred-eighty young psychiatric inpatients were prospectively diagnosed at an early stage of illness and followed up and evaluated for thought disorder at 2, 4.5, and 7.5 years post-index hospitalization. Patterns of thought disorder were examined in relation to diagnosis, index thought disorder, demographic characteristics, prognostic factors, clinical states of psychosis, outcome at followup, and treatment. Courses of frequent and persistent thought disorder were most frequently found in schizophrenia. The prevalence and course of thought disorder over time in schizoaffective disorder laid between those in schizophrenia and those in other psychotic disorders. Demographic factors were not predictive of the course of thought disorder. Diagnosis, the presence of thought disorder at index, pre-index work and academic competence, and pre-index social functioning were associated with courses of thought disorder (when courses were classified as remitted/infrequent and frequent/persistent). The longitudinal relationships between thought disorder and psychosis suggested that, in schizophrenia, thought disorder is not simply a function of psychosis. Thought disorder appeared more closely tied to the presence of psychosis over time in schizoaffective disorder. Increased inquiry into the factors associated with different courses of thought disorder across psychiatric disturbances appears merited.


Thought disorder is a symptom found in many individuals with schizophrenia (80%-90%) during acute episodes of illness (Marengo et al. 1993). Neuroleptic medications tend to ameliorate the severity of acute-phase thought disorder symptoms, although residual signs of thought disorder persist in some treated patients (Spohn and Strauss 1989; Gold and Hurt 1990). Harrow et al. (1986b) found that 42 percent of patients with schizophrenia who experienced thought disorder during an acute episode of illness also showed thought disorder at 2-year followup. At 4.5-year followup, Marengo and Harrow (1987) reported that approximately 39 percent of patients with schizophrenia showed persistent thought disorder; 37 percent, episodic thought disorder; and 24 percent, sustained remission of thought disorder.

Thought disorder, like almost all other major psychiatric symptoms, is not specific to schizophrenia or to any other psychiatric diagnosis (Marengo and Harrow 1985). However, longitudinal research indicates that early in the illness course thought disorder is more persistent and recurrent in schizophrenia than in nonschizophrenic disorders. Patients with nonschizophrenic disorders have demonstrated less thought disorder 6 months after hospitalization than patients with schizophrenia (Andreasen and Grove 1986); and although thought disorder is particularly common in mania, as well as in schizophrenia, during acute episodes of illness (Harvey et al. 1984), mania is associated with higher rates of thought disorder remission and lower rates of recurrence (Harrow et al. 1986a).

Although thought disorder is more persistent and recurrent in schizophrenia than in nonschizophrenic disorders during early stages of illness, the longer-term courses of thought disorder across psychiatric disturbances remain unknown. It is also unknown whether persistent and recurrent thought disorder is common to all disorders within the schizophrenia spectrum and may thus help distinguish them from nonschizophrenic disorders.

Along these lines, research to date has shown similarities between schizoaffective disorder and schizophrenia in the prevalence and severity of thought disorder symptoms during acute phases of illness (Marengo and Harrow...

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1985; Andreasen and Grove 1986; Shenton et al. 1987; Cuesta and Peralta 1993). Despite ongoing theoretical interest in the symptoms and prognoses that schizophrenia and schizoaffective disorder have in common (Angst 1986; Marneros and Tsuang 1990), prospective longitudinal studies have not yet compared the longer-term courses of thought disorder in the two conditions. Followup studies have indicated that patients with schizophrenia and patients with schizoaffective disorder show similar rates of depression (Harrow et al. 1994) but dissimilar rates of psychosis and improved adjustment (Marneros and Tsuang 1990; Harrow et al. 1995) over the course of the illness. Generally, schizoaffective disorder is associated with fewer psychotic episodes and better adjustment than schizophrenia is and with more severe symptoms and poorer adjustment than nonschizophrenic illnesses. Therefore, the severity and course of thought disorder over time in schizoaffective disorder may also lie between those in schizophrenia and those in nonschizophrenic illnesses.

Given the primacy of diagnostic issues in thought disorder studies, investigations of other factors that may be associated with the course of thought disorder have been rare. In general, prognostic models that include demographic features (e.g., gender, marital status, social class) and other prognostic factors (e.g., age at hospitalization, type of illness onset, and prehospitalization social competencies) have improved predictions of psychiatric prognosis (Westermeyer and Harrow 1984, 1988; Goldstein 1988). However, cross-sectional investigations to date have not supported strong relationships between demographic factors and thought disorder symptoms (Haimo and Holzman 1979), and studies of illness onset in relation to thought disorder have been restricted to schizophrenia samples and have produced uncertain results (Thomas et al. 1990; Marengo et al. 1991). So far, the contributions of age at hospitalization, prehospitalization social functioning, and prehospitalization work and academic competence to the prediction of the longer-term thought disorder course have not been assessed.

Extending our earlier research in this area, we assessed the severity, prevalence, and course of thought disorder in schizophrenia, schizoaffective disorder, and other psychotic and nonpsychotic disorders at 2, 4.5, and 7.5 years posthospitalization. Multiple-assessment studies of large samples of patients with schizophrenia and other psychotic and nonpsychotic disorders remain rare. The hypotheses examined in this study are as follows:

1. Schizophrenia will be associated with significantly more severe and prevalent thought disorder symptoms at each followup than nonschizophrenic illnesses will;

2. Over 7.5 years, schizophrenia will be associated significantly more often with courses of persistent and recurrent thought disorder than will other psychotic and nonpsychotic disorders;

3. The severity, prevalence, and course of thought disorder symptoms in patients with schizoaffective disorder will lie between, and be significantly different from, those in schizophrenia patients and those in patients with nonschizophrenic illnesses over time;

4. Demographic characteristics such as gender, social class, and marital status will not be associated significantly with the longitudinal course of thought disorder; but

5. Factors that have been predictive of general psychiatric outcomes (i.e., age at hospitalization, illness onset type, and pre-illness adjustment) will be significant predictors of the course of thought disorder.

Methods

Subjects. This report is based on data from the Chicago Followup Study, which is longitudinal and involves prospective followup evaluations of a large cohort of patients selected for study during early, nonchronic stages of disorder (Grinker and Harrow 1987). Subjects in the current research represent consecutive psychiatric inpatient admissions to Michael Reese Medical Center and the Illinois State Psychiatric Institute who (1) were between 18 and 30 years old at the time of admission, (2) had no more than two previous psychiatric hospitalizations or no more than three hospitalizations within 2 years before index, and (3) had completed at least 2 years of high school education. Informed consent was requested and obtained from each subject at index hospitalization and at all successive followups. The 180 subjects who participated in this investigation represent patients evaluated for thought disorder at three successive followups. The subjects were relatively young at index hospitalization (age: mean = 23.4; standard deviation [SD] = 3.7) and approximately 50 percent had not been hospitalized before.

Data on posthospital functioning at the 7.5-year followup were available for slightly more than 80 percent of the original sample. However, the current study included only subjects who had been given a battery of tests for thought disorder at all three followups. Subjects who were assessed by phone at one or two of the three followups were excluded because the standardized thought disorder test battery could not be administered. There were no significant differences in demographic or diagnostic distributions between patients who were excluded and those who were included in the study.
Longitudinal Courses of Thought Disorder

Diagnosis. Subjects were prospectively diagnosed according to the Research Diagnostic Criteria (RDC; Spitzer et al. 1978). RDC diagnoses were based on information obtained in face-to-face interviews, using the Schedule for Affective Disorders and Schizophrenia (SADS; Endicott and Spitzer 1978). In approximately 60 percent of the cases, an additional semistructured audio-recorded research interview was conducted by a senior psychiatrist and psychologist at index hospitalization (Grinker and Holzman 1973). All diagnoses were made by consensus of a diagnostic team consisting of the principal investigator, two research psychologists, and a research assistant with no knowledge of later followup status. The present sample included 45 subjects with schizophrenia, 26 with schizoaffective disorder, 33 with nonschizophrenic psychotic disorders (8 with major depression, 19 with bipolar disorder, and 6 with other psychotic disorders), and 76 with nonpsychotic disorders (43 with major depression, 4 with dysthymia, 6 with bipolar disorder, 2 with hypomania, 4 with anorexia or bulimia, 3 with anxiety/panic disorders, and 14 with personality disorders or other nonpsychotic disorders).

Predictor Variables. The demographic and prognostic data used to predict thought disorder (table 1) were collected and scored by trained research assistants through structured interviews conducted at index hospitalization (Grinker and Harrow 1987). These data consisted of patient age, gender, marital status, and social class and type of illness onset. Age at hospitalization has been associated with psychiatric prognosis in previous research (Rosen et al. 1971; Bromet et al. 1974; Zigler and Levine 1981; Westermeyer and Harrow 1986). This research hypothesized that patients who were older at index hospitalization (≥25 years old) would show a more benign course of thought disorder symptoms. Social class ratings were made according to the Hollingshead and Redlich (1958) scale on the basis of parents' occupation and education when the subjects were 18 years old. Illness onset was rated on a 4-point scale that assessed symptom onset before hospitalization (1 and 2 = acute onset or symptom development within less than 6 months; 3 and 4 = chronic onset or symptom development over longer than 6 months) in accordance with the Zigler-Phillips Social Competence Scale (Westermeyer and Harrow 1986).

Pre-index social competence was rated on a 7-point scale (1–4 = satisfactory; 5–7 = poor) obtained from the SADS. Fifty-one percent of the sample showed poor pre-index social adjustment. Pre-index work and academic competence was rated as 1 (satisfactory) or 2 (unsatisfactory) in accordance with Westermeyer and Harrow (1984). Thirty percent of the sample had shown unemployment,

### Table 1. Sample patient characteristics and treatment rates

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Schizophrenia (n = 45)</th>
<th>Schizoaffective (n = 26)</th>
<th>Psychotic (n = 33)</th>
<th>Nonpsychotic (n = 76)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (&lt; 25 years)</td>
<td>69</td>
<td>77</td>
<td>61</td>
<td>61</td>
</tr>
<tr>
<td>Gender, men</td>
<td>60</td>
<td>61</td>
<td>48</td>
<td>40</td>
</tr>
<tr>
<td>Marital status, married</td>
<td>9</td>
<td>4</td>
<td>24</td>
<td>19</td>
</tr>
<tr>
<td>Social class¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I and II</td>
<td>32</td>
<td>42</td>
<td>23</td>
<td>35</td>
</tr>
<tr>
<td>III, IV, and V</td>
<td>68</td>
<td>58</td>
<td>77</td>
<td>65</td>
</tr>
<tr>
<td>Acute onset of illness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 6 months</td>
<td>29</td>
<td>36</td>
<td>44</td>
<td>47</td>
</tr>
<tr>
<td>Index thought disorder</td>
<td>71</td>
<td>53</td>
<td>60</td>
<td>35</td>
</tr>
<tr>
<td>At followup</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuroleptic treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At no followups</td>
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<td>31</td>
<td>58</td>
<td>85</td>
</tr>
<tr>
<td>At 1 or 2 followups</td>
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<td>14</td>
</tr>
<tr>
<td>At all followups</td>
<td>45</td>
<td>38</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Psychosocial treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At no followups</td>
<td>26</td>
<td>16</td>
<td>30</td>
<td>38</td>
</tr>
<tr>
<td>At 1 or 2 followups</td>
<td>48</td>
<td>36</td>
<td>44</td>
<td>48</td>
</tr>
<tr>
<td>At all followups</td>
<td>26</td>
<td>48</td>
<td>26</td>
<td>14</td>
</tr>
</tbody>
</table>

¹Social class rated according to Hollingshead and Redlich (1958) scale.
Thought Disorder.

Thought disorder at follow-up. The method used in this study to evaluate thought disorder has been described in detail in previous reports (Marengo et al. 1986). It has been used in studying thought disorder at acute and post-acute phases of psychiatric disturbance (Marengo and Harrow 1985, 1987). In this method, subjects are given the Goldstein-Scheerer Object Sorting Test (Goldstein and Scheerer 1941), the Gorham Proverbs Test (Gorham 1956), and the Comprehension Subtest of the Wechsler Adult Intelligence Scale (Wechsler 1955). These protocols are then scored for thought disorder by trained research assistants blind to diagnosis and study questions. Interrater reliability has been satisfactory (Pearson \( r \) = 0.75 to 0.95).

Total thought disorder scores on each test are first categorized on a 5-point scale of thought disorder severity, which reflects the most severe level of thought disorder shown on any of the three tests. Thought disorder severity ratings are 1 = no thought disorder, 2 = mild thought disorder, 3 = abnormal thinking/definite thought disorder, 4 = severe thought disorder, and 5 = very severe thought disorder. In analyses of the prevalence of thought disorder symptoms and in comparisons of thought-disordered and non-thought-disordered groups, subjects with thought disorder scale scores of 1 or 2 are considered non-thought-disordered, and subjects with thought disorder scale scores of 3 through 5 are considered thought-disordered, consistent with our previous work (Harrow and Marengo 1986; Marengo and Harrow 1987).

The following representative responses from protocols reflect abnormal thinking/definite thought disorder and very severe thought disorder, respectively.

Abnormal thinking/definite thought disorder

Proverb: The grass is always greener in the other fellow's yard.

Answer: Don't trouble trouble 'til trouble troubles you. (Inquiry) People are always (pause) it's like you're always getting a raw shake and you're always trying to keep up with the Joneses. My response is don't touch that question of comparison and competition. It's killing the world.

Very severe thought disorder

Question: Why are people who are born deaf usually unable to talk?

Answer: When you swallow in your throat like a key it comes out, but not a scissors. A robin, too. It means spring.

In addition to assessing the severity and prevalence of thought disorder symptoms at each followup, we assessed the course of thought disorder over the study period. Since thought disorder was evaluated at three points during the study, longitudinal classifications were constructed to characterize thought disorder patterns. Because there were few guidelines and little standardization for symptom course classifications (Marengo 1994), we developed one classification intended to mirror symptom phenomenology as closely as possible. Thought disorder courses were grouped as remitted thought disorder (thought disorder absent at all three followups), episodic thought disorder (thought disorder present at one followup [infrequent] or at two followups [frequent]), and persistent thought disorder (thought disorder present at all three followups). This classification approximated the *DSM-IV* classification for courses of schizophrenia (American Psychiatric Association 1994). The second longitudinal classification bifurcated courses into (1) remitted and infrequent thought disorder and (2) frequent and persistent thought disorder. This classification reflected the more common delineation of remitting and chronic disorders.

Thought disorder at Index. Index thought disorder evaluations were assessed in the same way as followup evaluations. They were obtained at index hospitalization for 125 of the 180 subjects in the study. Previous research has established differences in thought disorder among diagnostic groups at acute phases of disorder (Harvey et al. 1984; Marengo and Harrow 1985; Andreasen and Grove 1986). Since diagnoses were made at index hospitalization, which was an acute phase of disorder for most of our subjects, the relative contributions of diagnosis and index thought disorder to predicting thought disorder at followup could be examined in this subsample. As seen in
assigned randomly to treatment conditions. In low-up studies of psychotic patients, subjects were not chiatrists and public clinics, and aftercare treatments were established. At the time these followups were conducted, the aftercare of patients was managed by attending psy-
tic groups reflect significant differences ($X^2 = 11.23; df = 3; p < 0.02$); the contributions of index diagnosis and index thought disorder to the course of thought disorder over time were therefore examined in this study. Patients who had received complete index thought disorder evaluations ($n = 125$) differed significantly from those who had not ($n = 55$) in that they were more likely to be divorced at the time of index hospitalization ($X^2 = 6.41; df = 2; p < 0.04$) and had less satisfactory pre-index work and academic histories ($X^2 = 12.91; df = 1; p < 0.0003$). No significant between-group differences in diagnosis, thought disorder at followup, or other predictor variables emerged.

**Other Course Features.**

**Medication and psychosocial treatment.** The existence and dose of all pharmacological treatments received during the month before each followup and the existence and extent of psychosocial treatment were assessed at each followup. Table 1 shows the frequency of neuroleptic and psychosocial treatment across time in each diagnostic group. Between-group differences in neuroleptic treatment were significant ($X^2 = 61.3; df = 6; p < 0.0001$). As expected, nonpsychotic and nonschizophrenia psychotic groups reported less frequent neuroleptic treatment. Analyses of chlorpromazine (CPZ)–equivalent neu-
roptic doses across time also were significant at 2 years ($F = 6.64; df = 3,119; p < 0.0003$; schizophrenia > non-
schizophrenia psychotic and nonpsychotic), 4.5 years ($F = 20.14; df = 3,164; p < 0.0000$; schizophrenia, schizoaffective and nonschizophrenia psychotic > nonpsychotic; schizophrenia and schizoaffective > nonschizophrenia psychotic), and 7.5 years ($F = 22.38; df = 3,166; p < 0.0000$; schizophrenia > schizoaffective; schizophrenia and schizoaffective > nonschizophrenia psychotic). Because most of the followups were conducted before the introduction of the newer atypical antipsychotic medications, the impact of these medications on thought disorder over time could not be assessed. Relationships between neuroleptic treatment and thought disorder symptoms will be reported in the results. However, caution should be exercised in using these naturalistic study data to interpret the efficacy of neuroleptic treatment. Participation in treatment varied greatly among patients and in individual patients over time, and compliance could not be firmly established. At the time these followups were conducted, the aftercare of patients was managed by attending psychiatrists and public clinics, and aftercare treatments were not standardized. As in all longer-term (i.e., 4-year) followup studies of psychotic patients, subjects were not assigned randomly to treatment conditions.

No significant diagnosis-related differences in reported antidepressant treatment were found during the three followups. Reports at followup showed trends toward more frequent participation in psychosocial interventions by patients with schizophrenia at the 4.5-year followup ($X^2 = 6.78; df = 3; p < 0.08$) and by patients with schizophrenia and patients with schizoaffective disorder at the 7.5-year followup ($X^2 = 5.59; df = 3; p < 0.13$).

**Psychotic symptoms and instrumental adjustment at followup.** Associations between the severity and course of thought disorder, the severity and course of other psychotic symptoms, and the level of overall adjustment at followup were examined. The presence of psychosis at followup was evaluated by using a modified version of the SADS that was revised to also include items from an earlier modification of the Present State Examination (see Harrow et al. 1985). Delusions and hallucinations were rated on a 3-point scale (1 = psychotic symptoms absent, 2 = uncertain or possible psychosis, and 3 = psychotic symptoms present). These ratings were categorized further as psychosis absent (scores of 1 or 2) and psychosis present (score of 3) to compare longitudinal patterns of thought disorder with longitudinal patterns of psychosis. Classification of courses of psychosis was identical to that of thought disorder courses. Categories were (1) absent or infrequent (when delusions or hallucinations were present [score of 3] at no more than one followup) and (2) frequent or continuous (when these symptoms appeared at two or three followups).

Instrumental adjustment was assessed at each followup through structured interviews (Grinker and Harrow 1987) by trained research assistants blind to diagnosis and to study questions. On the Levenstein et al. (1966) scale, scores ranged from 1 (adequate or satisfactory functioning in all areas) to 8 (unsatisfactory or poor functioning in multiple areas). Scaled ratings were based on assessments at each followup of work performance, interpersonal relations, level of self-support, symptoms, and rehospitalization. The intraclass correlation for this adjustment rating was 0.92 (Westermeyer and Harrow 1986).

**Results**

**Diagnosis and Thought Disorder Severity Over Time.** Table 2 presents the average severity of thought disorder at each followup, across diagnostic groups. A 4 (diagnosis) $\times$ 3 (followups) repeated-measures multivariate analysis of variance (MANOVA) of thought disorder showed a significant main effect for diagnosis ($F = 9.84; df = 3,176; p < 0.001$). The within-subject effect of time and the diagnosis $\times$ time interaction were not significant. Diagnosis-related differences in thought disorder severity
Table 2. Thought disorder severity at 2-, 4.5-, and 7.5-year followup

<table>
<thead>
<tr>
<th>Diagnostic group</th>
<th>Severity of thought disorder symptoms¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2-year Mean (SD)</td>
</tr>
<tr>
<td>Schizophrenia (n = 45)</td>
<td>2.8 (1.4)</td>
</tr>
<tr>
<td>Schizoaffective disorder (n = 26)</td>
<td>2.3 (1.3)</td>
</tr>
<tr>
<td>Nonschizophrenic psychotic disorder (n = 33)</td>
<td>2.4 (1.3)</td>
</tr>
<tr>
<td>Nonpsychotic disorder (n = 76)</td>
<td>2.2 (1.0)</td>
</tr>
</tbody>
</table>

¹Note.—SD = standard deviation.

Table 3. Pearson correlations of thought disorder severity over time in schizophrenia, schizoaffective disorder, nonschizophrenic psychotic disorders, and nonpsychotic disorders

<table>
<thead>
<tr>
<th>Diagnostic group</th>
<th>Thought disorder severity correlations across followups (r)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2-year and 4.5-year</td>
</tr>
<tr>
<td>Total sample (n = 180)</td>
<td>0.40¹</td>
</tr>
<tr>
<td>Schizophrenia (n = 45)</td>
<td>0.47¹</td>
</tr>
<tr>
<td>Schizoaffective disorder (n = 26)</td>
<td>0.40²</td>
</tr>
<tr>
<td>Nonschizophrenic psychotic disorder (n = 33)</td>
<td>0.44²</td>
</tr>
<tr>
<td>Nonpsychotic disorder (n = 76)</td>
<td>0.27²</td>
</tr>
</tbody>
</table>

¹p < 0.001.
²p < 0.01.
³p < 0.05.

occurred at the 4.5-year followup (F = 8.66; df = 3,176; p = 0.0001) and the 7.5-year followup (F = 7.98; df = 3,176; p < 0.0001). At 4.5 and 7.5 years post-index hospitalization, individuals with schizophrenia and schizoaffective disorder showed more severe thought disorder than nonpsychotic subjects, and individuals with schizophrenia showed more severe thought disorder than subjects with nonschizophrenic psychotic disorders (Newman-Keuls procedure, p < 0.05).

The relative effects of diagnosis and index thought disorder (independent variables) on thought disorder severity at followup (dependent variable) were examined in the 125 patients for whom index thought disorder evaluations had been obtained. A 4 (diagnosis) X 3 (absent, definite, and severe thought disorder at index) repeated-measures MANOVA on thought disorder severity across the three followups showed significant main effects for diagnosis (F = 4.94; df = 3,113; p = 0.003) and index thought disorder (F = 4.08; df = 2,113; p = 0.03), with no significant interactions.

Stability of Thought Disorder Severity Over Time.
The severity of thought disorder symptoms correlated positively and significantly between followups in schizophre-
Longitudinal Courses of Thought Disorder

It is presented in table 4. About one-half to two-thirds of the subjects with schizophrenia demonstrated thought disorder at each followup. Thought disorder was significantly more prevalent in schizophrenia than in nonpsychotic disorders at the 4.5-year followup ($X^2 = 22.85; df = 2; p < 0.0001$) and the 7.5-year followup ($X^2 = 20.58; df = 2; p < 0.0001$). Thought disorder was also more prevalent in schizophrenia than in nonschizophrenic psychotic disorders at the 7.5-year followup ($X^2 = 7.38; df = 2; p < 0.03$).

Patients with schizoaffective disorder showed higher rates of thought disorder than nonpsychotic patients at the 4.5-year followup ($X^2 = 9.32; df = 2; p < 0.01$) and the 7.5-year followup ($X^2 = 11.99; df = 2; p < 0.001$). However, the prevalence of thought disorder over time in schizoaffective disorder fell midway between, and was not significantly different from, those in schizophrenia and in nonschizophrenic psychotic disorders.

Within the nonschizophrenic psychotic group, the prevalence of thought disorder did not differ significantly among patients with bipolar disorder, psychotic major depression, or any other nonschizophrenic psychotic disorder at any followup. Approximately 20 percent of subjects with nonschizophrenic psychotic disorders showed severe thought disorder at each followup.

Diagnosis and the Longitudinal Course of Thought Disorder. The longitudinal courses of thought disorder in each diagnostic group are presented in table 5. Diagnostic differences for thought disorder courses classified as remitted, episodic, and persistent were significant ($X^2 = 17.12; df = 6; p < 0.009$). By using the Bonferroni correction for multiple comparisons (Winer et al. 1991), $p$ was set at 0.008 for post hoc between-group analyses. Thought disorder course differences between schizophrenia and the nonpsychotic disorders were significant ($X^2 = 15.89; df = 2; p = 0.0004$). Although rates of remitted and persistent thought disorder courses were distributed across diagnoses in predicted directions, rates of episodic thought disorder were similar across diagnoses, and other thought disorder course differences were not significant.

The bifurcated course classification, remitted/infrequent and frequent/persistent thought disorder produced significant diagnostic differences ($X^2 = 25.93; df = 3; p < 0.00001$). With $p < 0.008$ as the level of significance, post hoc comparisons again showed thought disorder course differences between schizophrenia and the nonpsychotic disorders ($X^2 = 24.41; df = 1; p < 0.00001$). However, this bifurcated view also indicated a trend toward differences in longitudinal thought disorder courses between schizophrenia and schizoaffective disorder ($X^2 = 4.49; df = 1; p < 0.03$) and between schizophrenia and nonschizophrenic psychotic disorders ($X^2 = 10.53; df = 1; p < 0.002$).

Whereas the thought disorder course distributions in schizoaffective disorder and nonschizophrenic psychotic disorders were quite similar, schizoaffective disorder tended to have higher associated rates of frequent/persistent thought disorder than did nonpsychotic disturbances ($X^2 = 7.95; df = 1; p < 0.02$).

Thought disorder course distributions between psychotic and nonpsychotic nonschizophrenic disorders were

<table>
<thead>
<tr>
<th>Diagnostic group</th>
<th>Followup (years post-Index)</th>
<th>No thought disorder</th>
<th>Definite thought disorder abnormal thinking</th>
<th>Severe thought disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schizophrenia ($n = 45$)</td>
<td>2.0</td>
<td>51</td>
<td>22</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>4.5</td>
<td>51</td>
<td>20</td>
<td>38</td>
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<td></td>
<td>7.5</td>
<td>51</td>
<td>22</td>
<td>42</td>
</tr>
<tr>
<td>Schizoaffective disorder ($n = 26$)</td>
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<td>66</td>
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<td>15</td>
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<td>23</td>
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<td></td>
<td>7.5</td>
<td>66</td>
<td>12</td>
<td>38</td>
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<tr>
<td>Nonschizophrenic psychotic disorder ($n = 33$)</td>
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<td></td>
<td>4.5</td>
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<td>Nonpsychotic disorder ($n = 76$)</td>
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<td></td>
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</tbody>
</table>
Thought Disorder and Treatment Over 7.5 Years Post-Index Hospitalization. In patients diagnosed with a psychotic disorder at index \((n = 104)\), neuroleptic treatment was administered significantly more often (use reported at one or more followups) to subjects with frequent/persistent thought disorder (77%) than to those with remitted/infrequent thought disorder (52%) \((X^2 = 6.08; df = 1; p < 0.02)\).

Thought disorder severity also was correlated positively and significantly with neuroleptic dose at the 2-year (Pearson \(r = 0.24; p < 0.04\)) and 4.5-year (Pearson \(r = 0.21; p < 0.04\)) and 7.5-year followups (Pearson \(r = 0.34; p < 0.001\)). However, the association between more severe and frequent thought disorder and more frequent, higher-dose neuroleptic treatment may be related to the design of this study. It is possible that in a controlled study in which neuroleptic treatment was assigned randomly and compliance was monitored, a different relationship between thought disorder and neuroleptic use might have emerged.

Analyses of the course of antidepressant and psychosocial treatment in relation to the course of thought disorder produced no significant results. Cross-sectionally, antidepressant treatment was associated with less severe thought disorder in the total sample \((r = -0.15; p < 0.02)\) and in the schizophrenia group \((r = -0.34; p < 0.01)\) only at the 2-year followup.

Thought Disorder, Psychosis, and Adjustment Over Time. After the 2-year followup, severity of thought disorder symptoms was correlated positively and significantly with overall adjustment in all but the nonschizophrenic psychotic patients. The severity of thought disorder also was correlated positively and significantly with the severity of psychosis at the 2-year followup in schizophrenia (Pearson \(r = 0.62; p < 0.001\)) and in nonschizophrenic psychotic disorders (Pearson \(r = 0.36; p < 0.05\)). However, at 4.5- and 7.5-year followups, correlations between thought disorder severity and the severity of psychosis were significant only in schizoaffective disorder (Pearson \(r = 0.46; p < 0.01\) and \(r = 0.36; p < 0.05\), respectively). Analyses of the course of psychosis in relation to the course of thought disorder also were significant only in schizoaffective disorder \((X^2 = 4.86; df = 1; p < 0.03)\). Closer inspection of the co-occurrence of thought disorder and psychotic symptoms at each of 78 followup points (26 schizoaffective subjects \(\times 3\) followups) confirmed a high rate of concordance for these symptoms in schizoaffective disorder. Schizoaffective subjects showed no thought disorder and no psychosis 38 percent of the time, both thought disorder and psychosis 30 percent of the time, thought disorder but no psychosis 15 percent of the time, and psychosis but no thought disorder 17 percent of the time. The data in table 6 suggest that in schizophrenia, thought disorder may persist independent of psychosis, but in schizoaffective disorder, thought disorder and psychosis tend to occur together.

Prediction of Thought Disorder Courses by Demographic and Prognostic Factors. Two direct discriminant-function analyses were performed using diagnosis, demographic factors, and other prognostic factors as predictors of (1) remitted, episodic, and persistent thought disorder courses and (2) remitted/infrequent and fre-
quently/persistent thought disorder courses. Predictor variables included diagnosis, gender, marital status, social class, age at index hospitalization, illness onset type, and pre-index social and work and academic competencies. Of the 180 original patients, 24 were not included in these analyses because of incomplete demographic or prognostic data. However, incomplete data were not associated systematically with any particular diagnostic group or predictor.

In the first analysis, two discriminant functions emerged, with a combined $X^2 = 28.79; df = 16; p < 0.03$. After removal of the first function, there was no significant association between groups and predictors. The two discriminant functions accounted for 88 and 12 percent, respectively, of the between-group variability. The first discriminant function maximally separated remitted thought disorder courses from persistent thought disorder courses. The loading matrix of pooled-within-groups correlations between predictors and the first discriminant function suggested that the best predictors of remitted persistent thought disorder patterns were diagnosis ($r = 0.80$), pre-index work and academic competence ($r = 0.61$), and pre-index social competence ($r = 0.56$). Satisfactory pre-index work adjustment was associated more often with remitted (85%) and episodic (66%) thought disorder courses than with persistent (42%) thought disorder courses. Satisfactory pre-index social competence was associated more frequently with remitted (65%) than with persistent (30%) thought disorder courses. However, this analysis correctly classified only 43 percent of cases, including 60 percent of patients with remitted thought disorder and 71 percent of patients with persistent thought disorder. Only 26 percent of episodic thought disorder courses were correctly classified.

The second direct discriminant-function analysis examined the same predictors in relation to remitted/infrequent and frequent/persistent thought disorder, with $X^2 = 31.56; df = 8; p < 0.0001$. Predictions of classifications were improved, and 72 percent of cases were correctly classified (76% of remitted/infrequent thought disorder and 66% of frequent/persistent thought disorder). The loading matrix of pooled-within-groups correlations between predictors and the discriminant function again suggested that the best predictors of remitted/infrequent and frequent/persistent thought disorder are diagnosis ($r = 0.80$), pre-index work/academic competence ($r = 0.60$), and pre-index social functioning ($r = 0.56$).

A third discriminant-function analysis, with index thought disorder added as a predictor, was performed for the 125 patients who had had complete index thought disorder evaluations. Nineteen patients were not included in the analysis because of incomplete demographic or prognostic data (again, incomplete data were not associated systematically with any particular diagnostic group or predictor). With $X^2 = 31.89; df = 9; p < 0.0002$, 73.58 percent of the cases were classified correctly (74% of remitted/infrequent thought disorder cases and 74% of frequent/persistent, thought disorder cases). The loading matrix of pooled-within-groups correlations suggested that in this subsample the strongest contributions to the predictive matrix were made by diagnosis ($r = 0.74$) and pre-index work and academic competence ($r = 0.66$), followed by

### Table 6. Severity of thought disorder in relation to overall adjustment and course of psychosis up to 7.5 years post-index hospitalization

<table>
<thead>
<tr>
<th>Diagnostic group</th>
<th>Course of thought disorder, %</th>
<th>Course of psychosis</th>
<th>Correlation (r) between severity of thought disorder adjustment at followup</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absent or infrequent</td>
<td>Frequent or persistent</td>
<td>2 years</td>
</tr>
<tr>
<td>Schizophrenia (n = 42)</td>
<td>Absent/infrequent</td>
<td>Frequent/persistent</td>
<td>0.37$^1$</td>
</tr>
<tr>
<td>Schizoaffective disorder (n = 25)</td>
<td>Absent/infrequent</td>
<td>Frequent/persistent</td>
<td>0.50$^1$</td>
</tr>
<tr>
<td>Nonschizophrenic psychotic disorder (n = 32)</td>
<td>Absent/infrequent</td>
<td>Frequent/persistent</td>
<td>0.29</td>
</tr>
<tr>
<td>Nonpsychotic disorder (n = 75)</td>
<td>Absent/infrequent</td>
<td>Frequent/persistent</td>
<td>0.18</td>
</tr>
</tbody>
</table>

Note.—Six out of 180 subjects had missing data in at least one area of adjustment at one followup and therefore could not be included in this table. Absent or infrequent = delusions or hallucinations present at no more than one followup. Frequent or persistent = delusions or hallucinations present at two or three followups.

$^1p < 0.01$.

$^2p < 0.05$. 

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index thought disorder ($r = 0.58$) and pre-index social functioning ($r = 0.40$).

Finally, when medication course was added as a predictor in exploratory replications of these analyses, a pooled-within-groups correlation of $r = 0.66$ emerged for the course of medication in both thought disorder classifications. However, the percentage of patients correctly classified did not change. Diagnosis remained the strongest predictor of thought disorder, and pre-index work and social adjustment continued to contribute significantly to thought disorder course predictions.

**Discussion**

The positive symptoms of schizophrenia remain a dynamic field of inquiry because these symptoms are fundamental to diagnostic decisionmaking and may guide us to the basis of the disorder (Persons 1986; Carpenter et al. 1988; David and Appleby 1992; Costello 1993). The longitudinal approach taken in this study rests on the assumption that course vicissitudes may help to distinguish illnesses that are unique but show similar symptoms at acute phases of disorder (Preskorn 1995). This approach may improve our ability to discern the nature of unique disorders (Marengo 1994).

**Thought Disorder in Schizophrenia: A Longitudinal Perspective.** With reference to our first two hypotheses, the data support a distinction between schizophrenia and other psychotic disorders in the longitudinal course of thought disorder symptoms. Schizophrenia is most often associated with frequent and persistent thought disorder over time. This result bears on a number of major theoretical issues concerning the diagnosis and course of illness in schizophrenia.

Some theorists have advocated a closer adherence to dimensional, as opposed to diagnostic, views of psychopathology. Dimensional views deemphasize diagnosis and stress the investigation of key symptoms (e.g., psychosis, thought disorder, depression) as a path to understanding psychopathology (Bentall et al. 1988; Altman and Jobe 1992; Costello 1993). However, consistent with a diagnostic view, the data in this study indicate that thought disorder is more prevalent and severe over time in schizophrenia than in nonschizophrenic disorders. Courses of frequent and persistent thought disorder also were more common in schizophrenia. These results support the diagnosis of schizophrenia as a viable empirical construct.

Consistent with a dimensional view of psychopathology, however, thought disorder severity did show some stability over the followup period across diagnostic groups. The analyses also indicated that the presence of thought disorder at index, as well as diagnosis, is associated with subsequent thought disorder courses.

For a number of patients with schizophrenia, thought disorder symptoms also seem to persist independent of the course of psychosis. Although our observations in this area remain tentative because this study used different modes of assessment for these symptoms, the observations are consistent with a prior formulation (Parnas et al. 1988) that viewed thought disorder as a semi-independent dimension in schizophrenia, with determinants that are partially independent of psychosis and other aspects of adjustment. Our findings also agree with the results of Spitzer et al. (1994) and with our own cross-sectional research that suggest that thought disorder is not simply a function of psychosis (Marengo and Harrow 1985). A continued search for the determinants of thought disorder in schizophrenia is needed. Further, the data in this study indicate that a concurrent search for mechanisms that sustain more persistent forms of thought disorder in schizophrenia also may prove fruitful.

**Thought Disorder in Schizoaffective Disorder.** This research also examined the longitudinal courses of thought disorder in schizoaffective disorder. From a theoretical standpoint, debates about the nature of schizoaffective disorder focus, in part, on whether schizoaffective disorder is more similar to affective disorder or to schizophrenia and its spectrum. Detailed prospective longitudinal data on the course of schizoaffective disorder compared with that of other diagnostic groups remain rare.

In this study, schizophrenia and schizoaffective disorder did not differ significantly with respect to the severity and prevalence of thought disorder at any cross-sectional point. This finding emerged in a context of highly similar treatment experiences in these groups over the course of the study. Although differences in thought disorder courses between schizophrenia and schizoaffective disorder also were not significant, trends toward higher rates of remitted/infrequent thought disorder symptoms were more often associated with schizoaffective disorder. These results correspond with a view of schizoaffective disorder as a more episodic and less chronic illness than schizophrenia.

With regard to spectrum issues, patients with schizophrenia and patients with schizoaffective disorder both experience thought disorder, psychosis, and affective symptoms over the long-term course of the disorder (Siris 1991; Harrow et al. 1994). Yet, cross-sectional similarities in the symptoms of these two disorders may arise along different longitudinal routes. Studies replicating the less frequent nature of thought disorder symptoms in schizoaffective disorder and the more frequent and persistent
thought disorder of schizophrenia are needed, along with inquiries into factors that may be associated with remitted, episodic, and persistent thought disorder courses.

This study also suggested that thought disorder may be tied more closely to the presence or absence of psychosis in schizoaffective disorder than in schizophrenia. The association between thought disorder and illness episodes in schizoaffective patients therefore may be similar to that found in manic patients, where the presence of positive thought disorder has been associated with active states of illness (Harvey et al. 1990). The improved symptom prognoses of individuals who display affectivity in conjunction with schizophrenia symptoms also provides compelling support for these findings (Carpenter et al. 1978; Knight et al. 1979; Dworkin et al. 1993; Grimes and Walker 1994). Our future longitudinal data may help us evaluate whether thought disorder courses in schizophrenia and schizoaffective disorder grow increasingly distinct over the long term and whether correspondences between thought disorder, psychosis, and affective symptoms in schizoaffective disorder evolve into a meaningful pattern.

**Other Predictors of the Course of Thought Disorder Over Time.** We had hypothesized that key prognostic characteristics associated with pre-index adjustment would be predictive of thought disorder course. The data support this, showing an association between pre-index assessments of social and work and educational functioning and the subsequent course of thought disorder. Demographic factors such as gender, marital status, and social class were not prognostic of thought disorder course. The observed association of thought disorder, pre-index social and work competencies, and post-hospital social and work competencies is consistent with the findings of Comblatt et al. (1992). However, the temporal and functional relationship of these factors is still unknown. Continued assessment of these associations during periods of remission and periods of active illness are indicated (Bellack et al. 1994).

**Thought Disorder Classifications.** Patients who showed remitted and infrequent thought disorder seemed diagnostically and prognostically distinct from those with more recurrent or sustained thought disorder. The thought disorder pattern that was most difficult to predict was the course we called “episodic thought disorder,” a classification that covered both infrequent and frequent thought disorder episodes. Although intended to characterize less stable symptom patterns in broad stroke, the category proved to be too heterogeneous for meaningful prediction. Overall, the classifications remitted or infrequent thought disorder and frequent or persistent thought disorder proved more powerful. Although coarser in its approach, this bifurcated classification mirrors a common distinction between benign and severe illness courses.

Yet, 50 percent of our patients exhibited infrequent and frequent (i.e., episodic) thought disorder, and more specific studies of course patterns are indicated. Studies that investigate the neurological, neurochemical, and social correlates of thought disorder episodes are also needed, along with studies to further determine the features associated with remitted, episodic, and persistent thought disorder patterns.

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