The Need to Relate Cognitive Deficits to Specific Behavioral Referents of Schizophrenia

by John M. Neale, Thomas F. Oltmanns, and Philip D. Harvey

Abstract

The implicit rationale for many cognitive studies of schizophrenia hinges on the recognition that verbal communication generated by patients with this disorder is often elusive or difficult to comprehend. This observation has led to the inference that a cognitive dysfunction, which mediates the production of discourse failure, is characteristic of schizophrenia. Unfortunately, most investigators have chosen to examine this type of hypothesis by comparing heterogeneous groups of schizophrenic patients (without regard to whether they exhibit verbal communication impairment) with various control samples; they have not studied the association between cognitive processes and specific schizophrenic symptoms. Data are presented from two studies indicating that such relationships, even when highly plausible, cannot simply be presumed. In both studies, one with adults suffering from schizophrenia and the other with children at risk, a laboratory measure of referential communication failed to be strongly related to language disorder. These data suggest that future investigators should specify the features of schizophrenia that are expected to correlate with their laboratory measures and empirically evaluate these relations.

Several methodological problems have received attention in the recent literature regarding cognitive factors in schizophrenia. Greater care is being taken in the process of patient diagnosis; many studies include comparison groups of patients from other specific diagnostic categories; and longitudinal designs are being used to examine the temporal relationship between cognitive variables and the course of the disorder (thus addressing the issue of directionality). Unfortunately, a conceptual issue that has important methodological implications has been largely ignored. The problem involves the failure to examine the manner in which cognitive variables may be related to specific overt features of schizophrenia. This issue has been raised previously (Bannister 1968; Rochester and Martin 1979; Sarbin and Mancuso 1980), but the argument warrants further documentation with relevant data.

A few studies have gone beyond the demonstration of a simple correlation between a psychological variable and schizophrenia. For example, Mintz and Alpert (1972) and Heilbrun (1980) have related cognitive and perceptual characteristics to the presence of auditory hallucinations, and Manschreck, Maher, and Rucklos (1981) have reported a significant relationship between motor performance and formal thought disorder. But most studies of cognition and information processing have not taken this additional step and do not even discuss which aspect of schizophrenia is expected to be related to the hypothesized dysfunction. The investigators simply suggest that a particular problem may be related to schizophrenia—in general—and then compare heterogeneous groups of schizophrenic and control subjects on a task that presumably measures the ability in question.

Consider, for example, one specific subset of psychological studies. Many investigations of cognitive factors in schizophrenia have been directed implicitly at verbal communication impairment, or formal thought disorder. The

Reprint requests should be sent to Dr. J.M. Neale, Dept. of Psychology, State University of New York at Stony Brook, Stony Brook, NY 11794.
Investigators' assumption has been that disordered speech is mediated by disrupted cognitive functioning. But observable associative disturbance (e.g., "derailment"), and thought disorder in general, are not present in all schizophrenic patients at all times, nor are these disturbances unique to schizophrenia (e.g., Andreasen 1979; Harrow et al. 1982). Thus, the attempt to demonstrate a simple correlation between task performance and diagnosis could be quite misleading. Some schizophrenic patients who do not exhibit verbal communication problems may not be expected to manifest the cognitive impairment under investigation, and some patients in other diagnostic categories (e.g., mania) who do exhibit verbal communication problems may suffer from the same cognitive problems as the schizophrenic patients who exhibit verbal communication problems.

To illustrate our point, we present data on the lack of a significant relationship between a specific cognitive deficit and thought disorder in schizophrenia. Our intent is not to

rule out a relationship between the two measures, or even to present an exhaustive evaluation of the usefulness of these specific measures, but rather to direct researchers' attention to the fact that presumptive relations between laboratory measures and specific symptoms should be assessed.

The cognitive deficit was measured by comparing subjects' performance on a pair of forced-choice, referent communication tasks developed by Kagan and Oltmanns (1981). Relatively large differences between performance on the two forms of this task presumably reflect a deficiency in the ability to consider the needs of a hypothetical listener (Cohen, Nachmani, and Rosenberg 1974) or a failure to engage in "self-editing" (Smith 1970). In previous studies using this measure, the implicit assumption has been that impaired performance by schizophrenic patients is related to, or relevant to, our understanding of impaired verbal communication in the same patients. In order to test this assumption explicitly, we correlated performance on the laboratory measure with specific indices of communication impairment in both hospitalized adults and children at risk for the development of schizophrenia.

The first study included 29 hospitalized psychiatric patients. They were all diagnosed by two independent clinicians using the Research Diagnostic Criteria (Spitzer, Endicott, and Robins 1978). The reliability for these judgments was adequate (weighted Kappa = .70),

1 We are using the term "thought disorder" to refer to observable symptoms, such as derailment, tangentiality, and loss of goal, that descriptive psychopathologists have traditionally associated with the speech of schizophrenic patients. There are, of course, numerous other approaches to the definition and measurement of thought disorder, such as those that depend on the analysis of subtle features of an individual's responses to projective tests. Regardless of the breadth of the definition used, however, there will always be variations within a schizophrenic sample regarding the severity of thought disorder in particular patients (if not its presence or absence), and one would expect that those patients who exhibited the most severe communication anomalies would be those who were most markedly impaired in their cognitive performance.

and disagreements were resolved by further discussion. The patient groups included 9 patients with schizophrenia, 10 patients with mania, and 10 patients with schizoaffective disorder. Using the Scale for Thought, Language, and Communication Disorders (Andreasen 1979), two independent judges rated tape-recorded mental status interviews conducted with each patient shortly after admission to the hospital. Interrater reliability (weighted Kappa) for the subcategories included in subsequent analyses were as follows: derailment (.87), circumstantiality (.67); loss of goal (.91), and global rating (.91). Means (and standard deviations) for each speech subcategory for the 29 subjects were: derailment, 3.07 (1.41); circumstantiality, .66 (.67); loss of goal, 2.00 (1.28); and global rating, 3.10 (1.21). The first and fourth measures are scored on 4-point scales, and the second and third on 3-point scales.

Each patient also completed the referent communication tasks developed by Kagan and Oltmanns (1981). Nineteen of the 29 patients

here. They are more likely, for example, to display poverty of speech. Three other subjects (one in each of the remaining diagnostic groups) were dropped because they were tested more than 3 days after their interview was recorded.

1 Although predictions regarding other subcategories of thought disorder might have been of interest, they could not be evaluated. Some specific types of communication disorder did not occur with sufficient frequency in this sample (e.g., there were no examples of incoherence or poverty of content of speech in these 29 patients). Tangentiality did occur with considerable frequency, but the reliability of the judges' ratings of this subcategory (weighted Kappa = .46) was too low to allow it to be included in the correlational analysis.

2 Reliability was computed for the entire sample which originally included 42 patients. Ten of these were depressed patients, who were excluded from the present analyses because patients in major depressive episodes seldom exhibit forms of thought disorder of the sort examined
completed these tasks on the same day that they were interviewed. Four were tested within 1 day, three were tested within 2 days, and the remaining three were tested within 3 days after their interview. All of the patients were tested before discharge from the hospital.

The 24 items of the forced-choice, referent communication tasks fit the following description:

Each item in this task presents the subject with a pair of words, one of which is designated as the referent. Two clues are provided, and the subject is asked to indicate which clue distinguishes most clearly between the referent and the nonreferent. [The entire set includes] two types of items: Type 1 and Type 2 items [which differ] with regard to the associative relationships between the referent word and the two clues from which the subject must choose . . . In a Type 1 item, the correct clue is more closely associated with the referent than is the incorrect clue. In a Type 2 item, the incorrect clue is more closely associated with the referent than is the correct clue. This difference in structure produces a difference in the way the two types of items may be solved. A Type 1 item may be solved simply by comparing the two clues as to their strength of association with the referent and then choosing the closer associate. On the other hand, in order to solve a Type 2 item, the subject must bear in mind the task of the hypothetical listener who receives only one clue and must examine the relationship of the clue to each member of the word pair. [Kagan and Oltmanns 1981, pp. 205–206]

Examples of both types of items are presented in table 1.

The sets of Type 1 and Type 2 items were matched with regard to psychometric variables affecting discriminating power (difficulty, variability, and reliability). Both sets demonstrated adequate reliability, as measured by internal consistency

<table>
<thead>
<tr>
<th>Type 1</th>
<th>Type 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Heavy</td>
</tr>
<tr>
<td>1. Bulb</td>
<td>1. Sky</td>
</tr>
<tr>
<td>2. Weight</td>
<td>2. Movie</td>
</tr>
</tbody>
</table>

1 Referent
2 These are the best responses since they are more strongly associated with the referent than with the nonreferent.
3 The association between this clue and the referent is stronger than the association between the other clue and the referent.

Results are presented in table 1.

Table 1. Examples of Type 1 and Type 2 items

(coefficient alpha of .74 for Type 1 items and .76 for Type 2 items in a sample of 38 normal subjects; see Kagan and Oltmanns 1981). Across the 29 patients, the means (and standard deviations) for Type 1 and Type 2 items were 9.76 (2.25) and 8.76 (3.10), respectively.

Kagan and Oltmanns (1981) found that the difference between Type 1 and Type 2 errors was significantly greater for schizophrenic patients than for a group of normal subjects, although the tasks did not distinguish between either of these groups and a group of affectively disordered patients. On the basis of the similarity between conclusions drawn by investigators working with structured self-editing tasks and those who have analyzed samples of free speech, the investigators suggested that "the tasks developed in the present study may tap an important aspect of cognitive processing that is closely related to the overt communication problems experienced by schizophrenic patients." They also noted, however, that this hypothesis should be examined empirically. "If this relationship is genuine, then those subjects who show the greatest disparity between performance on Type 1 and Type 2 items should be most likely to produce verbal discourse that is disjointed and occasionally confusing" (Kagan and Oltmanns 1981, p. 210). This prediction was evaluated in the present study.

In previous studies, the measure of interest in the referent communication task has been the difference between performance on Type 1 items and Type 2 items. We decided to avoid the use of difference scores in the present analyses because of their unreliability. Semi-partial correlations were computed between each measure of thought disorder and the number of correct responses on Type 2 items (from which Type 1 was partialled). The three groups were combined for this analysis because patients within each of these diagnostic categories are likely to exhibit formal thought disorder (the primary focus of this article), and because our small samples precluded analyses within groups. Across all subjects, the semi-partial correlations were as follows: derailment, $r = .25$ ($p > .10$); circumstantiality, $r = .02$; loss of goal, $r = -.32$ ($p = .10$); and global rating, $r = .15$.

Clearly our predictions were not confirmed; the only correlation that approached statistical significance was in the opposite direction of our prediction. It should be noted, of course, that these data do not rule out the possibility that a significant relationship may exist between the display of thought disorder and performance on the referent communication tasks within specific diagnostic groups (e.g., schizophrenia). Our principal point is that such relationships should be assessed, not presumed.

In a second study, we examined the relationship between task-measured referent communication and the language rating system used by Rochester and Martin (1979) in their studies of schizophrenic
discourse. The data were collected on a sample of children of schizophrenic (n = 23), unipolar depressive (n = 38), bipolar (n = 38), and normal (n = 53) parents. (For a more complete description of the sample and diagnostic procedures, see Harvey, Weintraub, and Neale 1982.) The speech sample, obtained by having the children describe five thematic apperception test (TAT) cards, was scored according to the procedure developed by Rochester and Martin (1979) from the Halliday and Hasan (1976) model of cohesion in English. The full array of verbal productivity, cohesion, and reference patterns scored on the children was presented in Harvey, Weintraub, and Neale (1982) and will not be fully repeated here.

Two measures of speech competence—the number of unclear and ambiguous references, and the number of explicit verbal references—were selected for the present analysis because of their presumed relationship to the referent communication task. Explicit verbal reference is the process of providing the information necessary for other verbally presented information to be comprehended. Unclear and ambiguous references occur when the referent is not determinable. Because of the relatively low frequency of each individual measure, the number of unclear references was combined with the number of ambiguous references to form a single measure in this report. Two trained undergraduate raters scored each child's transcript for all of the verbal productivity, cohesion, and reference variables. The average interrater reliability (Kappa) for the two variables was .83. The multiple-choice measure of referent communication was collected during the same testing session.

Significant differences were present between groups for both the multiple-choice task and the speech variables. Children of schizophrenic patients made fewer correct responses on Type 2 items, relative to Type 1 items (difference score, M = -1.31, SD = 2.75), than each of the remaining groups (unipolar, M = -.15, SD = 2.44; bipolar, M = -.09, SD = 1.28; normal, M = -.20, SD = 1.35). Children of schizophrenic patients also made more unclear and ambiguous references (M = 3.9, SD = 2.7) than children of unipolar (M = 2.1, SD = 2.1) and bipolar patients (M = 2.4, SD = 2.5) who, in turn, scored higher than children of normal parents (M = .4, SD = .7).

Finally children of schizophrenic patients produced fewer explicit verbal references (M = 7.0, SD = 2.6) than children in each of the other groups (unipolar, M = 10.6, SD = 3.8; bipolar, M = 10.6, SD = 3.4; normal, M = 11.0, SD = 3.6).

Semi-partial correlations between the multiple-choice task (Type 2 partiallling Type 1) and the two speech measures were -.28 and .05 across all subject groups for unclear and ambiguous reference and explicit verbal reference, respectively. Although the former correlation is statistically significant, its magnitude indicates that the laboratory and the language measures share little common variance. The sizes of the samples in this study were sufficient to evaluate correlations within specific groups. Only one of the eight correlations exceeded .14; for children of normals, the referent communication score was reliably related to unclear and ambiguous reference (r = -.34).

Conclusions

Data from the two studies indicate that it is unwise simply to assume that a given laboratory measure is tapping a process related to a particular symptom. Although all of our laboratory, clinical, and language measures were reliable and capable of discriminating among diagnostic groups, the correlations between cognitive performance and measures of communication impairment were either nonsignificant or small in magnitude. These results have implications for both the construct validity of these specific tasks and the general procedure by which investigators develop and test hypotheses about the nature of schizophrenic dysfunctions.

In the absence of further data, the construct validity of the forced-choice, referent communication tasks remains in question. It may be premature to claim that performance on the referential communication tasks is unrelated to deviant discourse and abandon the tasks altogether. Such a relationship might be found in a specific diagnostic group, or if data regarding both cognitive performance and communication impairment were collected on multiple occasions to improve the generalizability of measurement. Our data do suggest, however, that the process of validating tasks of this sort requires more than a static comparison of schizophrenic and nonschizophrenic groups. There must be some circumstances under which performance on a valid laboratory measure will predict verbal behavior in naturalistic settings.

These data also suggest that hypotheses about the role of cognitive variables in schizophrenia should be spelled out explicitly and evaluated thoroughly when possible. Several considerations favor this recommendation. One is parsimony. The literature concerning cognitive factors in schizophrenia is swamped
with hypotheses about the nature of these patients' impairment, and virtually every imaginable task has been used to compare schizophrenic patients with control subjects. Although many contemporary investigators claim that their measures are manifestations of subtle neurological or biochemical dysfunctions, few have bothered to provide a convincing rationale for the relationship between performance on their tasks and observable features of the disorder such as symptoms and course. The validity of their claims then hinges on the demonstration of a relatively uninteresting (and generally easy to obtain) difference between schizophrenic and nonschizophrenic subjects. By setting higher standards for the construction and empirical evaluation of hypotheses, the field might progress in a more directed fashion.

The proposed examination of specific symptom dimensions would also facilitate the process of comparing results across studies. The problem of heterogeneity has typically been addressed by subdividing schizophrenic samples. These methods have ranged from the process/reactive distinction to the currently popular notion of positive and negative subtypes. Thus far, this solution has not been very successful, perhaps because the level at which patients are being selected is still too general. Within a group of schizophrenic patients, it seems reasonable to consider the possibility that, for example, patients who experience auditory hallucinations may exhibit one form of cognitive impairment while those whose verbal conversation is difficult to follow may exhibit another.

Examining the relationship between specific symptoms and laboratory measures has another advantage. In studying thought disorder, for example, an investigator could measure cognitive performance in schizophrenic patients who exhibit moderate or severe thought disorder and those who exhibit either minimal thought disorder or none at all (e.g., Harvey 1982). Schizophrenics with little or no evidence of thought disorder may provide a more suitable contrast group than nonschizophrenic patients because the two groups of schizophrenic patients may be more comparable with regard to the influence of such variables as antipsychotic medication, socioeconomic background, institutionalization, and so on. Depending on the hypothesis under investigation, this procedure may reduce the force of attempts to claim that a between-group difference was due to certain third variables.

References
Spitzer, R.L.; Endicott, J.; and Robins, E. Research Diagnostic Criteria (RDC) for a Selected Group
Family Care of Schizophrenia, authored by Ian R.H. Falloon, Jeffrey L. Boyd, and Christine W. McGill, has been recently published by The Guilford Press (200 Park Avenue South, New York, NY 10003). In an ongoing search for the cause (causes) of schizophrenia, the family has often been identified as a prime candidate. Focus on the harmful effects of critical or rejecting family members and deviant communication patterns has obscured the potentially beneficial role of many families in providing support for their schizophrenic members. Though available evidence suggests that intolerance and emotional overinvolvement do heighten the risk of relapse, the authors' thorough review of the literature reveals that only half of the families studied exhibit such attitudes.

Family Care of Schizophrenia focuses on a model developed by the authors for the broad-based community treatment of schizophrenia and other severe forms of mental illness that taps this underutilized potential. Based on the hypothesis that environmental stress is a major factor in the onset and severity of schizophrenic episodes, the model incorporates well-established behavioral techniques to enhance the coping mechanisms and problem-solving abilities of the family. The goal of the program is not merely the reduction of stress that can trigger florid episodes, but also the restoration of the patient to a level of effective social functioning that permits employment and socialization with persons outside the family. Following a thoughtful and highly readable discussion of the rationale behind their approach, the authors present a detailed description of their behavioral family model, buttressed by illustrative transcripts from actual therapy sessions. Central to their strategy is the development of problem-solving skills and social supports for the patient and his or her family—including education about the illness and the effects of neuroleptics—that will enable them to cope not just with potentially threatening behavioral disturbances and other traumatic life events, but also with the stressors of daily life.

As the authors persuasively demonstrate, families can, with proper guidance, be taught to modulate the level of intrafamilial stress, regardless of whether it derives from family tensions or external life events. Their careful exposition of the family care model, coupled with case studies and results from a controlled outcome study, reveal the family to be an important resource in the community management of mental illness. A major contribution to the treatment of schizophrenia, this unique synthesis of systems theory and behavioral techniques will be of interest to psychiatrists, who are familiar with the limitations of present treatment strategies, as well as to family and behavior therapists concerned with the problems posed by major mental illness.