c.1

HOSPITALIZED AND RELEASED SCHIZOPHRENIC AND NONPSYCHIATRIC SUBJECTS' PERFORMANCE ON MEASURES OF THOUGHT DISORDER

by

JAN A. KLINKA

Charles University, Prague, 1964-1969

M.A., The University of British Columbia, 1975

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF

THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

in

THE FACULTY OF GRADUATE STUDIES

Department of Psychology

We accept this thesis as conforming

to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

February 1981

In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the Head of my Department or by his representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Department of Psychology

The University of British Columbia
2075 Wesbrook Place
Vancouver, Canada
V6T 1W5

Date April 10, 1981

ABSTRACT

An attempt was made to separate the effects of length of illness from the effects of length of hospitalization on the vocabulary and concept formation performance of chronic schizophrenic and chronic nonpsychiatric patients. Groups of these patients approximately matched for length of illness, but which differed in terms of total time spent in institutions (several years vs. a few months) were compared on the Rattan and Chapman vocabulary test that includes associative distractors and on several concept formation measures derived by Harrow et al. from the Object Sorting Test. The schizophrenic inpatients and outpatients (all under antipsychotic medication) were further subdivided into paranoid and nonparanoid subgroups and equated on severity of current disturbance. A total of 90 patients served as subjects.

The results indicated that nonparanoid schizophrenics show the most deficits on the measures used in the study (particularly associative intrusions and idiosyncratic thinking), while paranoid schizophrenics performed at levels that were comparable to the performance of the chronic nonpsychiatric patients. It was also found that associative intrusions and idiosyncratic thinking were the measures that

provided the best discrimination between patients with prolonged as opposed to short institutionalization.

It was concluded that neither length of illness nor length of institutionalization by itself accounts for the cognitive deficits found in this study. Rather, such effects depend on the particular subtypes of schizophrenic patients, the particular indices of thought deficits, and the particular measuring instruments.

TABLE OF CONTENTS

LIST OF TABLES

ACKNOWLEDGEMENTS

I am grateful to Dr. Demetrios Papageorgis for his support and encouragement as my thesis supervisor and departmental advisor. My special thanks go to Drs. P. Davidson and R. Hakstian of the Psychology Department, University of British Columbia, to Dr. D. Crockett of the Psychiatry Department, University of British Columbia, and to Dr. A. Clark of Riverview Hospital for their contributions as members of my thesis committee.

Further thanks go to Drs. M.W. Hislop, W. Goresky, members of the Research and Ethics Committee and staff of Riverview Hospital; to Mr. J.W. Seager, Mr. R.W. Lakes, members of the Research Committee of Greater Vancouver Mental Health Services, and to its Strathcona Community Care Team staff; to Dr. M. Seraglia, Mr. W.E. Gueho, Mr. B. Brown, Mrs. M. Brockett of Pearson Hospital; to Dr. J.M. Houston, Mrs. C. Martin, Mrs. M. Vulpe of Gorge Road Hospital, and to Mrs. J. McNamara of Vancouver Island MS Society for their invaluable assistance in making available their facilities and experimental subjects.

I am also indebted to Dr. L.J. Chapman of the University of Wisconsin and to Dr. M. Harrow of Michael Reese Hospital, Chicago for test materials.

Mrs. V. Green of the University of British Columbia deserves my warm thanks for help with analyzing the data and Ms. J. Pitcher for typing the manuscript.

Chapter 1

Statement of the Problem

Introduction

This chapter presents the basic rationale of the study. A more detailed review of the relevant literature will be provided in Chapter 2. The study itself will be presented in detail and discussed in the remaining chapters.

The present study deals primarily with the effects of length of illness and length of hospitalization on thought processes of chronic schizophrenic patients. The main question is whether disordered thought in chronic schizophrenics is best viewed as a result of a long-term illness process or of prolonged and continuous hospitalization. In the light of this objective, chronic schizophrenic patients with lengthy and continuous hospitalization were compared to chronic schizophrenic patients with a relatively short stay in hospital and to comparable groups of non-psychiatric chronically ill patients. Additional questions concern possible differences between paranoid and non-paranoid chronic schizophrenics, and the relative utility of several indices of thought disorder in schizophrenia.

The particular aspects of thought disorder that were investigated were associative intrusions in vocabulary performance and certain indices of disordered concept formation.

Key Variables

Chronicity of illness is considered to be a continuous variable in a time dimension and is defined as length of illness (either mental or physical) in years since the time when the disorder in question was first recognized and recorded by a professional. Length of hospitalization is defined as length of continuous hospital stay in years since beginning of current admission.

The major initial problem faced by the investigator involves the separation of chronicity of the disorder from length of hospitalization. Until recently, public policies had practically guaranteed that most chronic schizophrenic patients would remain hospitalized. As a result, research had to settle for conditions that kept the variables of length of illness and length of hospitalization hopelessly confounded. Thus, deficits[1] in performance observed in most

---

[1]It is recognized that the term 'deficit' may contain unwarranted evaluative connotations in addition to its descriptive status. "Deficit," as it is used throughout the present study, in no way implies judgements of inferiority, disability, etc. It refers simply to differential performance (decrement), and its use is dictated by a long established tradition in studies of schizophrenia.

chronic schizophrenic samples could be interpreted as results of a chronic illness process or of lengthy institutionalization or of some unknown combination of the two (cf. Wing, 1962). Psychiatric management of the chronically ill schizophrenic patients has recently shifted away from lengthy and continuous inpatient hospitalization and has, to a considerable extent, been replaced by brief hospitalizations for recurrent episodes of psychosis. Improved treatment techniques seem to have lessened the need for large institutions and have made it possible to deal with a substantial number of the mentally disordered through services developed within local communities (e.g., Bigelow & Beiser, 1977; Test & Stein, 1978). The changing policies regarding hospitalization have provided clinical investigators with opportunities to obtain samples of chronically ill inpatients *and* outpatients. Accordingly, the present study seeks to determine the effects of chronicity on thought disorder by testing equally chronic and equally disturbed schizophrenic patients who were either released from hospital after a relatively brief stay or who were retained in hospital for a lengthy period of time. As a control group, equally chronic physically ill hospitalized and nonhospitalized patients were also tested. Efforts were made to ensure that all inpatients had comparable lengths of hospital stay.

Another major problem that confronts the contemporary investigator of schizophrenic functioning concerns the appropriate procedure for assigning patients to this diagnostic category. The use of the Research Diagnostic Criteria of Spitzer, Endicott, and Robins (1975; 1978) permitted a more objective and replicable method of assignment than broad definitions of schizophrenia provided in the Diagnostic and Statistical Manual of Mental Disorders, Second Edition (*DSM-II*) classification (American Psychiatric Association, 1968), and avoided possible false positive identification.[2] Heterogeneity was further reduced by subdividing the schizophrenic subjects into paranoid and nonparanoid subgroups on the basis of the presence of delusional ideation (cf. Goldstein, 1978; Ralph & McCarthy, 1968; Ritzler & Smith, 1976). There is considerable evidence for the validity of the paranoid-nonparanoid distinction (e.g., Chapman & Chapman, 1973b; Lang & Buss, 1965; Shakow, 1962; Strauss, 1973), with paranoids often performing in a manner more similar to that of normal control subjects than to other subgroups of chronic schizophrenics.

In view of the numerous methodological problems involved in cross-sectional studies of institutional effects

---

[2]At the time that the study was conceived and started, the *DSM-III* (1980) classification was not yet available.

(Chapman & Chapman, 1973b; 1977; Mednick & McNeil, 1968; Strauss, 1973; Wynne, 1963), particular care was necessary in forming subject groups and ensuring their relative comparability on potentially influencing variables. While removing schizophrenic subjects from psychoactive drugs was not feasible in the context of the present study, the variables of premorbid adjustment, paranoid dimension, and current overall severity of illness were all taken into account, as were age and education.

Dependent Variable Measures

The vast majority of earlier investigations concerned with demonstration and measurement of various performance deficits in schizophrenia may have been lacking in parsimony because hypothesized specific performance deficits were not clearly separated from generalized across-the-board performance deficit (Chapman & Chapman, 1973a; 1973b). As schizophrenics, for the most part, perform less well in almost every behavior requiring a voluntary response, the mere demonstration of inferior performance on a particular task selected by the investigator may reflect no more than the fact that schizophrenics exhibit inferior performance on this task and on a variety of other related (or possibly even unrelated) tasks. Furthermore, spurious deficits may be inferred as schizophrenic when experimental

task performance is compared to performance on control tasks, but the tasks in question are not comparable in terms of certain psychometric requirements. Chapman and Chapman (1973a; 1973b) have specifically suggested that tasks designed to measure differential schizophrenic deficit should be matched in advance (with normal subjects) in terms of reliability and item difficulty. Only then the tasks are considered to be matched on discriminating power (the extent to which the scores differentiate the more able from the less able subjects), and thus permit the assessment of hypothesized differential performance deficits in schizophrenic and other deviant samples.

The Rattan and Chapman (1973) test of associative interference in vocabulary performance meets the above requirements; for this reason and because of its demonstrated utility in previous investigations with schizophrenic samples (Klinka & Papageorgis, 1976; Rattan & Chapman, 1973), the test was included as one of the dependent measures of the present study. In addition, the Goldstein and Scheerer (1941) Object Sorting Test, which is designed to assess peculiarities of concept formation, has played an important historical role in investigations of schizophrenic thought processes; the version adopted in this study is the modification of the Object Sorting Test by Harrow, Himmelhoch, Tucker, Hersh, and Quinlan

(1972) which has been shown to be quite powerful in several recent studies by Harrow and his associates. At the same time, it must be emphasized that the dependent measures of the present investigation clearly do not exhaust the domain of thought disorder in schizophrenia.

Hypotheses Formulation

The present study compared the performance of hospitalized and nonhospitalized chronic schizophrenic and nonpsychiatric patients on measures of associative interference in vocabulary performance and of concept formation. No differential predictions were made concerning performance on vocabulary and concept attainment tasks. Similarly, no specific differential predictions were made with regard to the various different measures of concept formation, though it was expected that certain of these measures (e.g., idiosyncratic thinking) would provide a better means of discriminating between schizophrenic and nonpsychiatric patients than others (e.g., behavioral overinclusion).

The following specific hypotheses were made:

(1) Hospitalized patients, regardless of diagnosis, will show greater deficit in (a) vocabulary performance (i.e., greater susceptibility to associative intrusions), and (b) concept formation performance than

will nonhospitalized patients, again regardless of diagnosis.

(2) Nonparanoid schizophrenic patients will show greater deficit in (a) vocabulary performance (i.e., greater susceptibility to associative intrusions), and (b) concept formation performance, regardless of hospitalization status, and nonpsychiatric patients will show the least corresponding deficits, again regardless of hospitalization status. Paranoid schizophrenics are expected to perform at a level that will be lower but still more similar to that of nonpsychiatric patients.

No interactions between hospitalization status and diagnosis on the various measures were predicted.

Chapter 2

Review of Relevant Literature

This chapter is divided into six sections. The first section briefly discusses the concept of schizophrenic thought disorder. The second section touches upon issues related to chronicity of illness and length of hospitalization. Since the results obtained in many investigations concerning cognitive (schizophrenic) deficits depend, to a large extent, on the particular test used (Payne, 1973), the third section deals with the utility and evolution of methodologically improved investigative instruments of concept formation processes (Goldstein & Scheerer, 1941; Vigotsky, 1962). The fourth and fifth sections deal in turn with theory and measurement of associative interference and cognitive differential deficits in general. A final brief section concerns the effects of psychoactive medication on the cognitive performance of schizophrenic patients.

Disordered Thought in Schizophrenia

Since its original modern conceptualizations by Kraepelin (1919; originally 1913) and Eugen Bleuler (1950; originally 1911), disordered thinking has been considered a

central feature of the schizophrenic psychoses. Even though many earlier claims for specific aspects of disordered thought probably rest on shaky methodological grounds (e.g., Chapman & Chapman, 1973b) and even though the extent to which disordered thought uniquely characterizes schizophrenic patients has been probably overestimated (e.g., Harrow & Quinlan, 1977), the overwhelming body of both clinical and research observations continues to support the important role of disordered thought in schizophrenia and the need to specify its nature.

For example, Bleuler (1950) listed disturbed thought associations among the fundamental symptoms of schizophrenia. In fact, he considered these disturbances to be of primary significance. As he explained it, in schizophrenic psychoses the associative threads that characterize and direct normal thought processes break up (split) partly or completely. The progression of schizophrenic thought thus seems only partially determined by a specific guiding idea. Since words of the same, similar, or even opposite meaning, as well as irrelevant or seemingly nonsensical associates find their way into the broken associative pathways of the patients, much of the schizophrenics' ideation and verbalization gets beyond the normal listener's expectation and comprehension. Utterances of schizophrenic individuals are then often judged to be

fragmentary, illogical, or simply bizarre.

Partially as a result of Bleuler's influence, every ensuing major conceptualization of schizophrenia has included disordered thought as either a core or very prominent feature of the psychosis (for one of the few exceptions, see Knight, Roff, Barnett, & Moss, 1979). Several of the viewpoints about the nature and origins of thought disorder in schizophrenia are actually variants of a hypothesis that attributes the thought disorder (as well as other forms of performance deficit) to the interference of competing stimuli, often of an associated nature (Buss & Lang, 1965; Lang & Buss, 1965). Despite a voluminous literature on deficit in schizophrenic cognition, methodological inadequacies (Buss & Lang, 1965; Chapman & Chapman, 1973b), misunderstanding of theoretical formulations, or faulty assessment of the data (Wright, 1975) preclude any unequivocal conclusions at this time.

Issues Related to Chronicity and Hospitalization

The controversy over the relationship between length of illness (chronicity) and severity of disordered thought derives in all likelihood from Kraepelin's observation that dementia praecox patients became progressively more disorganized in their cognition the longer they remained in hospital. It would seem too easy to contend that long

illness with concomitant stay in the generally impoverished environments of institutions may bring about an impairment of most mental abilities in psychiatric or even nonpsychiatric populations. The persuasive arguments of numerous authors often stemming from first-hand observation of life conditions of residents in large institutions (e.g., Barton, 1959; Belknap, 1956; Goffman, 1961; Ludwig & Farrelly, 1966) give additional weight to the data drawing on empirical evidence (e.g., Braginsky & Braginsky, 1967; Goldstein & Halperin, 1977; Gordon & Groth, 1961; Klinka & Papageorgis, 1976; McKinney, 1973; Ullmann, 1967; Wing, 1962). Findings of abnormalities in behavior and cognition have also been reported in studies dealing with institutionalized children (Bettelheim & Sylvester, 1948; Haggerty, 1959; Yarrow, 1961), prison inmates (Silverman, Berg, & Kantor, 1966), and prisoners of war (Bettelheim, 1943; Klonoff, McDougall, Clark, Kramer, & Horgan, 1976; Shein, 1957).

The study of Silverman et al. (1966) in particular, in which significant differences in perceptual and conceptual performance were found between short-term and

long-term nonpsychiatric prison inmates, approximating the difference found previously between short-and long-term schizophrenics (Silverman, 1964), is widely cited in support of an institutionalization-deterioration hypothesis. However, even seemingly convincing data do not allow for firm conclusions if the effects of institutionalization are investigated by means of cross-sectional designs in which the hospitalized long-term schizophrenic subjects cannot be presumed to be representative of the total long-term schizophrenic population.

Strauss (1973), for instance, pointed out that the significant differences between Silverman's (1964) acute and chronic schizophrenics were obtained post hoc, and were applicable to paranoid schizophrenic subjects only. In another context, Best (1968), cited in Strauss (1973), reported differences in reaction time and some conceptual tasks between short- and long-term schizophrenic patients, but not between matched prisoner controls. Johannsen and O'Connel (1965) also presented disappointing findings on re-examination of an earlier study (Johannsen, Friedman, & Liccione, 1964), in which a number of visual-perceptual measures were found to be related to chronicity. When schizophrenic patients were subsequently divided into groups in terms of proportion of time spent in hospital, the perceptual performance of short-term and long-term

subjects was, with a single exception, comparable.

Almost an equal number of investigations can be found that either favor or oppose the notion that cognitive changes (decrement) during the course of schizophrenia should be ascribed to hospitalization effects alone. Among studies in favor of the notion are those by Blaney (1974), Harrow, Tucker, Himmelhoch, and Putnam (1972), Klinka and Papageorgis (1976), Silverman, Berg, and Kantor (1965) and Wynne (1963). Examples of studies that reject the above notion include those by Foulds, Hope, McPherson, and Mayo (1967), Moran, Gorham, and Holtzman (1960) and Smith (1964). Differences in these findings and conclusions may be explained in terms of inconsistencies in the use of the chronicity construct, centered around the confusion or coalescence of chronicity with length of hospitalization. In addition, criteria for separating long- and short-term patients are often arbitrary. Both of these problems result in inconsistent and sometimes biased sampling practices. Admittedly, longitudinal investigations, rather than cross-sectional comparisons, are preferable (cf. Pokorny, Thornby, Kaplan, & Ball, 1976) although a biased selection of subjects cannot be ruled out in this case either mainly because an unknown number of improved subjects may no longer be part of the original sample. Furthermore, groups of equal chronicity but with different

length of hospitalization are likely to differ with respect to demographic and symptom-related variables the significance of which is largely unknown. It is prudent to keep in mind and act upon Strauss' (1973) concluding remarks regarding research designs in schizophrenic chronicity studies:

> . . . comparisons of hospitalized early-term and long-term subjects . . . are comparisons of differently heterogeneous groups: paranoid and nonparanoid, good and poor premorbid, drug responsive and nonresponsive subjects are compared with primarily nonparanoid, primarily poor premorbid, drug responsive, and non-responsive subjects. Early-term-long-term differences are also affected by the selective retention, and readmission of schizophrenics associated with social, psychological and psychopharmacological variables.
> (Strauss, 1973, p. 277)

Thought Disorder and Object Sorting Tasks

Essentially, concept formation has to do with the thought process that enables a person to bring disparate stimuli together in some orderly fashion which is meaningful to himself and to others. Within the context of object sorting tasks, the objects of the environment can be grouped according to various principles (levels), notably physical dimension, functional relationship, and abstract relationship. An abstract concept thus refers to a certain general class of objects which share many common properties simultaneously (e.g., animals, fruit, furniture), or put

differently it is defined by a grouping of objects based on a single common attribute.

Difficulties in forming abstract concepts or in abstract thinking experienced by brain-damaged and schizophrenic patients when asked to perform on sorting tasks were explained as an impairment in the patients' 'abstract attitude' (Goldstein, 1944) or 'complexes' (Vigotsky, 1934). Cameron (e.g., 1938) described several major conceptual components of schizophrenic thinking peculiarities, including asyndetic thinking, metonymic distortion, and interpenetration (subsumed later under the term "over-inclusion")[1], and inspired a great many research studies and test developments, including sorting tasks (Payne, 1962).

The Object Sorting Test, as originally developed by Gelb, Goldstein, Weigl, and Scheerer (Goldstein & Scheerer, 1941), has proved to be particularly rich in providing data about conceptual level and breadth. The Object Sorting Test comprises a variety of real and toy objects, including tools, eating utensils, food items, smoking material, and playthings. The objects lend them-

---

[1]Nowadays usually defined as a conceptual disorder in which boundaries of concepts become overly broad and blurred, making the schizophrenic ideation imprecise, vague, and often incomprehensible.

selves to numerous groupings by substance (e.g., wood, metal, rubber, plastic) or by use (e.g., to make things with, to eat with, to play with). As such, the stimuli of the Object Sorting Test embrace virtually all the dimensions that can be involved in developing concepts: substance (material), color, shape, use, class, and any combinations of these.

The original version of the Object Sorting Test had been nonquantitative, at best only partially standardized, and provided no data on reliability or group norms. Accordingly, findings of early studies using the Object Sorting Test (e.g., Bolles & Goldstein, 1938; Goldstein & Scheerer, 1941), although of great exploratory value, should be viewed with caution, even more so in view of the lack of control over subject variables such as age, educational or intellectual levels, and length of illness and hospitalization. The potentialities of the Object Sorting Test as a diagnostic and research instrument have been recognized along with its shortcomings (e.g., Lovibond, 1954; McGaughran & Moran, 1956; Rappaport, Gill, & Schafer, 1945; Tutko & Spence, 1962; Wild, Singer, Rosman, Ricci, & Lidz, 1965), and this has led to test quantification and procedural simplication.

A particularly thoughtful application of the Object Sorting Test was that of McGaughran and Moran (1956).

This investigation tested whether schizophrenic thought reflects an impairment in the ability to conceptualize at an abstract level or whether it can be viewed as an impairment of skills in social communication. Sorting performance, including both 'active' and 'compliant' sorting phases, was scored in terms of two conceptual levels (abstract vs. concrete) and four conceptual areas derived from dichotomous variables of publicness-privateness and openess-closedness. In the active (handing over) phase, the subject's task is to group objects that belong with a particular object selected by the examiner, while the passive (compliant) phase consists of tasks requiring the subject to identify the basis for grouping of a number of objects arranged by the examiner. While no significantly different performance in abstracting ability was found between schizophrenic and nonpsychiatric patients, schizophrenics, in addition to scoring significantly higher on an 'autistic' index than nonpsychiatric controls, employed fewer closed-public and more open-private concepts than their nonpsychiatric counterparts. Furthermore, education and intelligence were found to be related to conceptual performance on some measures, especially to the public-private dimension in schizophrenics. The importance of the open-private dimension, suggestive of tendencies toward autism (McGaughran, 1954), will become apparent in further

Object Sorting Test refinements described below. Despite limited generalizability of the McGaughran and Moran study (the schizophrenic sample was composed only of chronic paranoid males), its outcome basically supported deductions from Sullivan's (1944) and Cameron's (1938; 1944) positions concerning defective social communication in schizophrenia, and failed to support the specific notions of Goldstein (1944) and Vigotsky (Kasanin & Hanfmann, 1938).

Further meaningful distinction within the construct of concreteness has come from Tutko and Spence (1962) who distinguished two types of nonabstract response: restrictive (reflecting difficulties to specify a basis for the sorting), and expansive (reflecting tendencies to give loose, idiosyncratic sortings). These investigators employed the compliant portion of the Object Sorting Test to compare groups of physically ill, brain-injured, and process and reactive schizophrenic patients (unfortunately unmatched on length of illness or hospitalization) in terms of the two varieties of response. While the process schizophrenics resembled the brain-injured patients as to their relative proportions of restrictive and expansive errors, they differed from reactive schizophrenic and tubercular patients. The reactive schizophrenics were comparable to nonpsychiatric controls on restrictive errors but exceeded them on

expansive errors. Since the process schizophrenics gave predominantly restrictive errors, in contrast to the reactive schizophrenics who erred in roughly the opposite direction, both schizophrenic groups differed from the non-psychiatric subjects by virtue of manifesting *different* kinds of concrete errors.

Among the predominant studies conducted on the topic of overinclusion over the last two decades have been those of Payne and his co-workers. Initially, Payne, Matussek, and George (1959) compared schizophrenic and neurotic patients on several measures of overinclusion including their own Object Classification Test (Payne, 1962), the Benjamin Proverbs Test (Benjamin, 1944), and the 'handing over' score of the Goldstein-Scheerer Object Sorting Test. As predicted, scores on these and other tests differentiated acute schizophrenics from neurotics (e.g., Payne & Hewlett, 1960). Payne et al. (1959) reasoned that overinclusive individuals would likely select more objects in their sortings in response to the starting object. This resulted in the creation of a quantitative index of overinclusion, later labelled 'behavioral over-inclusion' by Harrow, Himmelhoch, Tucker, Hersh, and Quinlan (1972). Thus, the researcher who follows Payne's procedure asks the subject to select the first object from the set ('object of departure' or 'starting point')

and then to hand over all objects that might be grouped with it; the procedure is repeated three more times, but the 'points of departure' that follow, that is, the red plate, the box of matches, and the bicycle bell are selected by the examiner. The (behavioral) overinclusion score is the average number of objects chosen over the four sortings, excluding the four starting objects.

Payne and Friedlander (1962) proposed a single composite overinclusion score obtained by combining measures of the proverb count, the sum of the objects sorted on the Object Sorting Test, and the sum of unusual solutions in the Object Classification Test. Using this approach, Payne, Ancevich, and Laverty (1963) reported that after schizophrenic patients began to recover from their psychoses, overinclusion scores declined. Similarly, Payne, Friedlander, Laverty, and Haden (1963) found that long-term chronic schizophrenics gave, in comparison to acute schizophrenics tested previously, lower overinclusion scores, and suggested that chronic patients may not be as overinclusive as those patients who do not progress to the chronic stage. The idea that overinclusive schizophrenics may have a better prognosis was further pursued by Payne (1968). His newly-admitted psychiatric patients, most of whom were later diagnosed as schizophrenic, were more overinclusive and showed

better adjustment in a 3-year follow up in terms of a number of outcome criteria, including length of continuous stay in hospital, full-time employment with no relapse, and so on. The correlation between overinclusion composite index and outcome criteria (r=.33) was statistically significant. These findings indicated that overinclusiveness may be considered as a possible good prognostic sign for those patients who manifest it (contrary to one popular assumption that schizophrenics with pronounced thought disorder should have a poorer prognosis), or as a possible predictor of chronicity for those who do not show it (cf. Payne, Hawks, Friedlander, & Hart, 1972). An alternative explanation that

> . . . overinclusion is somewhat eliminated by the apathy that develops with institutionalization, and thus its disappearance may be, in effect, hospital-induced . . .
> (Maher, 1966, p. 416)

also seems plausible. Subsequent studies, however, failed to confirm the Payne et al. findings. Bromet and Harrow (1973), for instance, found nonsignificant correlations between the overinclusion measure (derived from Payne's modification of the Object Sorting Test and defined as the total number of objects sorted on the Object Sorting Test, using seven different 'starting point' objects) at the acute stage and the 8-month post-hospitalization adjustment of mixed schizophrenic and nonschizophrenic

patients. Still another alternative, 'the sample composition-change hypothesis,' states that differences between short-and long-term patients on overinclusion

> . . . could reflect the loss of overinclusive subjects from long-term groups rather than any cognitive change. (Strauss, 1973, p. 275)

Similarly, Harrow, Bromet, and Quinlan (1974) obtained rather equivocal results about the prognostic utility of thought disorder as measured by several Rorschach and Object Sorting Test indices with emphasis on reasoning involved in the sorting selection.

Harrow and his colleagues (Harrow, Himmelhoch, Tucker, Hersh, & Quinlan, 1972) distinguished three types of overinclusiveness:

(a) behavioral overinclusion, based, as already mentioned, on quantitative aspects of the subject's behavior;

(b) conceptual overinclusion, depending on both the number of objects sorted and the quality of the subjects' reasoning processes; and

(c) stimulus overinclusion, reflecting difficulty in attending selectively to stimuli considered relevant in a given context and a tendency to be distracted by irrelevant stimuli.

As stimulus overinclusion appeared to be primarily a disorder of attention rather than of concept formation

(Harrow, Tucker, & Shield, 1972), the group focused on the distinction between behavioral and conceptual varieties of overinclusion. The authors also raised the question whether or not other features of schizophrenic thinking, such as the presence of rich associations (original, creative, or uncommon) or idiosyncratic ideas (bizarre or autistic) contribute to scores on overinclusion tests. As a result, other measures, labelled 'richness of association' and 'idiosyncratic thinking,' were objectively defined and added to the list of conceptual indices. Since McGaughran's open-private dimension and Cameron's interpenetration tendency referred in essence to similar phenomena, that is, to intrusion of fantasy and thoughts of a personal nature in ongoing schizophrenic verbal discourse, both of these characteristics may be regarded as conceptual precursors of the idiosyncratic thinking measure. Harrow et al. (1972) found conceptual overinclusion and idiosyncratic thinking to differentiate between recently hospitalized schizophrenic and nonschizophrenic patients; such thinking was also more frequent in delusional patients regardless of diagnosis. On the behavioral overinclusion variable, schizophrenics were generally more overinclusive, but so were many acutely disturbed nonschizophrenics. The investigators concluded that the behavioral overinclusion index probably reflects excessive

behavioral output rather than a particular quality of thinking (cf. Gathercole, 1965).

The longitudinal aspect of schizophrenic thought disorder has been examined in studies by Harrow, Tucker, Himmelhoch, and Putnam (1972), Harrow, Harkavy, Bromet, and Tucker (1973), and by Harrow and Quinlan (1977). In the first part of the Harrow et al. (1972) investigation, the performance of acute schizophrenic patients during their first 10 days of hospitalization was compared to their performance 7 weeks later. Contrary to nonschizophrenics, whose conceptual overinclusion and idiosyncratic thinking scores remained virtually unchanged over time, the schizophrenics displayed reduction in thought pathology as they became less psychotic. The second part of the study involved comparisons of acute, mostly female schizophrenics and nonschizophrenics, and chronic female schizophrenics who were, on the average, hospitalized for almost 10 years. The results indicated that the chronic schizophrenic patients scored significantly lower on richness of association and behavioral overinclusion than either the acute schizophrenic or nonschizophrenic patients. The acute schizophrenics scored higher on idiosyncratic thinking and conceptual overinclusion than other patients, but chronics also gave relatively high scores on these indicators of disturbed thinking. The authors' comment

about chronic patients' test functioning seems worthy of quote because it has a direct bearing on the first of the two major hypotheses of the present investigation:

> . . . key factors that may help explain why the chronic schizophrenics scored relatively high on measures of disturbed thinking (such as idiosyncratic thinking and conceptual overinclusion) but low on behavioral overinclusion are their absence of rich associations, their low motivational and energy level, and possibly other factors associated with chronic institutionalization and desocialization. (Harrow et al., 1972, p. 825)

Similarly, in the Harrow et al. (1973) study, schizophrenic and nonschizophrenic patients were tested at admission to the hospital and again 11 months later. The schizophrenic patients significantly reduced their conceptual overinclusion scores during the posthospital phase of the disorder, while their idiosyncratic thinking scores declined only marginally. The investigators suggested that conceptual overinclusion rather than bizarre thinking characterizes the acute stage of schizophrenia; idiosyncratic thinking, on the other hand, may be seen as a permanent characteristic of thinking for a subgroup of schizophrenics. (Nonschizophrenic patients, in contrast, although initially less overinclusive and idiosyncratic than schizophrenics, scored higher on conceptual overinclusion and slightly higher even on idiosyncratic thinking at follow-up than they did in the acute phase of hospitalization.)

Harrow and Quinlan (1977) assessed thought disorder in short-term schizophrenic and nonschizophrenic patients using the Comprehension subtest of the Wechsler Adult Intelligence Scale, the Benjamin Proverbs test, the Object Sorting Test, and the Rorschach test (to evaluate levels of disordered thinking, mild vs. severe) at admission and after 7-8 weeks of hospitalization. Briefly, the scores on all indices of thought pathology dropped (except for the nonschizophrenics' performance on conceptual over-inclusion) as the patients went into remission. These findings thus appear consistent with those reported earlier (Harrow et al., 1972; Harrow et al., 1973).

Thus, there is considerable support for the utility of the Object Sorting Test in investigations of the details of schizophrenic thought disorder and this justifies its adoption in the present investigation. Measures of behavioral overinclusion, conceptual over-inclusion, and idiosyncratic thinking were derived from the Object Sorting Test. Two more potentially important indices of thought disorder, concrete thinking and under-inclusive thinking, for which quantifiable definitions are available (Himmelhoch, Harrow, Tucker, & Hersh, 1973), were also included. Other thought disorder measures mentioned in the review, such as stimulus overinclusion or richness of association were, however, excluded. The

stimulus overinclusion variable is probably more suitable for measuring attentional deficits rather than concept attainment disorder, and the richness of association variable appears unsuited for chronic schizophrenic patients in view of the relative lack of rich associations that they manifest (e.g., Harrow, Tucker, Himmelhoch, & Putnam, 1972). Also the use of other instruments utilized previously for assessment of disordered thinking, e.g., the Rorschach test and the Benjamin Proverbs test, were deemed unnecessary given the objectives, constraints, and possible psychometric superiority of the measures adopted in the present study.

While a detailed description of the Object Sorting Test's scoring system with examples and inter-judge reliabilities is provided in the manual developed by Himmelhoch et al. (1973), a brief review of the test criteria for the five thought disorder measures utilized in this study is presented in Appendix 1, and the complete list of 38 objects of this Object Sorting Test version is in Appendix 2.

Associative Interference

Performance decrement in schizophrenic, relative to normal subjects, may depend almost entirely on how the schizophrenics attend to specific stimuli and how they inhibit or exclude responses not called for on a given task

(Lang & Buss, 1965). A general interference theory of schizophrenic deficit assumes that

> . . . when a schizophrenic is faced with a task, he cannot attend properly or in a sustained fashion, maintain a set, or change the set quickly when necessary. His ongoing response tendencies suffer interference from irrelevant, external cues and from 'internal' stimuli which consist of deviant thoughts and associations. These irrelevant, distracting, mediated stimuli prevent him from maintaining a clear focus on the task at hand, and the result is psychological deficit. (Buss & Lang, 1965, p. 20)

Especially noteworthy in terms of its empirical support is the associative interference hypothesis of Chapman and associates (Chapman & Chapman, 1965; Chapman, Chapman, & Miller, 1964). The hypothesis states that the schizophrenic thought disorder stems from an excessive yielding to normal response biases ("response bias" being defined as a predisposition toward making a particular one of the various possible kinds of responses that may be made to a given stimulus). Having recognized the tendency toward certain kinds of verbal errors in normal people under exceptional conditions such as lack of sleep, fatigue, sensory deprivation, hallucinogenic drugs, and the like, Chapman et al. (1964, see below) contended that manifestations of disordered thought in normals closely resemble those found in most schizophrenic patients. In other words, schizophrenic subjects make the same kind of

errors that normal subjects do, but schizophrenics make more of them more often. A typical example of a response bias is the response on a sorting or vocabulary task that contains strong associations to the stimulus at hand. For instance, the schizophrenic, when confronted with a multi-meaning word on a vocabulary test, follows a response bias that tends to favor the commonly preferred meaning of that word regardless of the context which may clearly require the use of a less preferred word meaning (Chapman et al., 1964; Chapman & Chapman, 1965). Response biases are mediated, according to the authors, by denotative meaning responses,[2] and the relative strength of these meaning responses can be obtained from normal judges. The Chapman hypothesis is supported by a series of experiments using words with multiple meanings. Such words have been shown to produce errors in their interpretations by drug-free, chronic schizophrenics.

In one experiment (Chapman et al., 1964), normal nonhospitalized subjects and long-term schizophrenics were presented with vocabulary items (homographs) in which the context determined the correct meaning response. In some

---

[2] A meaning response refers to a "hypothetical internal event which mediates a person's overt behavioral response to a word" (Chapman et al., 1964, p. 52).

instances the correct response called for by the context involved the stronger (or preferred) meaning of the word, while in other instances, the correct response called for the word's weaker (or less preferred) meaning. As predicted, the schizophrenics approximated the performance of normal subjects when the correct response depended on the stronger meaning of the word, but made significantly more errors when the correct response required use of its weaker meaning. An example of an item where schizophrenics performed as well as normals was:

> The professor loaned his pen to Barbara.
> This means
> (a) He loaned her a pick-up truck
> (b) He loaned her a writing implement
> (c) He loaned her a fenced enclosure

In this context, the correct response (b) involves the commonly preferred denotative meaning of "pen." On the other hand, schizophrenic patients made more errors than normals by responding to the stronger but contextually incorrect meaning when presented by the following item:

> When the farmer bought a herd of cattle he needed a new pen.
> This means
> (a) He needed a new writing implement
> (b) He needed a new fenced enclosure
> (c) He needed a new pick-up truck

Here, the correct answer is alternative (b) which involves the weaker denotative meaning of "pen." Alternative (a), which involves the stronger meaning of the word is incorrect

in this context and may be seen as an associative distractor. Finally, alternative (c) is both incorrect and irrelevant and is included for control purposes. The schizophrenic errors of misinterpretation were presumably mediated by a response bias toward the stronger meaning of words even though strong meaning responses were wrong. The schizophrenic patients, as opposed to normals, were either insensitive to contextual cues indicating appropriateness of the weaker meaning response or they were unable to inhibit the stronger meaning response regardless of whether or not it was recognized as appropriate.

Another Chapman et al. (1964) experiment dealt with errors of exclusion from common concepts. Schizophrenics, by relying on the stronger common meaning responses to a conceptual class name (and at the same time ignoring the weaker meaning responses), were expected to make more errors than normals when required to sort out cards into conceptual categories having more than one meaning. In the experimental task, the subjects were given cards containing names of animate, inanimate, and irrelevant objects and were asked to sort the cards into four categories marked as "Things that have (a) head, (b) legs, (c) teeth, and (d) skin." The animate items included words like "rat," "dog," "cow," "lion," "horse," and "man," whereas the inanimate items consisted of words such as "pin," "nail,"

and "match" for the concept 'Things that have a head;' "chair," "bed," and "table" for the concept 'Things that have legs;' "saw," "rake," and "comb" for the concept 'Things that have teeth;' and finally "prune," "potato," and "banana" for the concept 'Things that have skin.' Earlier, a group of student judges had interpreted the four concepts primarily in terms of animate meaning; accordingly, it was predicted that schizophrenics, more than normals, would select items with animate class names at the expense of inanimate names. The findings supported the hypothesis: there were significantly more exclusions of inanimate examples from the conceptual classes in the schizophrenic sample, while exclusions of animate items were about equal for both normal and schizophrenic subjects.

A third study in the Chapman et al. (1964) series showed that strong contextual cues can help schizophrenics make responses that are mediated by the weaker meanings of words, and consequently, to reduce their error rate to the level of normal subjects. Schizophrenics were matched with normals on vocabulary (Stanford-Binet), and were given a multiple-choice vocabulary test for words of double meaning. The subjects were asked to choose the correct meaning (strong or weak) under conditions where the other meaning did not appear in the same context. In the two examples that

follow, there is only one correct response available which is either the weak or the strong meaning:

The word BEAR may mean		The word BEAR may mean	
(a)	to carry	(a)	a sharp end
(b)	to command	(b)	an animal
(c)	neither of the above	(c)	neither of the above
(d)	I don't know	(d)	I don't know

There were minimal differences between error rates of schizophrenics and normals (both groups appeared less accurate on the weaker meaning responses), the implication being that schizophrenic patients can respond to weaker meanings in situations where the stronger meaning is absent, and thus cannot intrude.

Chapman and Chapman (1965) presented further supportive evidence for the notion that schizophrenics rely on the stronger (more preferred) normal meaning responses in their interpretation and use of words. The investigators obtained a measure of the degree of similarity between pairs of words from college students, and administered these word pairs, varying from high to low similarity to schizophrenic and normal individuals. Schizophrenics considered word pairs that shared preferred meaning to be synonymous to a greater extent than they did word pairs that shared nonpreferred meaning: for example, the words "pig" and "dog," which share preferred meaning ("animal"), were more likely to be accepted as synonymous than the words "news-

paper" and "magazine" which have nonpreferred meaning in common (their respective preferred meanings are "informative" and "reading material"). Normal subjects did not exhibit this tendency.

Accentuation of normal response biases in schizophrenic patients had been noted even in earlier studies. Thus, Chapman and Taylor (1957) and Chapman (1961) reported on schizophrenics' tendency to regard words (names of common concepts) of similar meaning as synonymous. The schizophrenics, for example, broadened their conceptualization of the "fruit" category by including incorrect, though similar, names of vegetables. Similarly, Moran (1953) found that paranoid schizophrenic patients gave a larger number of imprecise synonyms to a word than did nonpsychiatric patients. Burstein (1961) and Blumberg and Giller (1965) found schizophrenic patients confusing antonyms and homonyms (both regarded as associates) with synonyms.

It is worthy of note that in his reviews on cognitive abnormalities, Payne (1970, 1973) while discussing the Chapman and Chapman (1965) findings, pointed out that schizophrenics' reliance on

> . . . the strongest meaning in a hierarchy of possible meanings may well be the essence of verbal concreteness . . .
> (Payne, 1960, p. 64; cf. Willner, 1965)

Likewise, Chapman et al. (1964) suggested that the abstract-concrete dimension lends itself to interpretation in terms of their theory. The schizophrenics' sortings, the authors asserted, should be mediated by the strongest normal meaning responses to the objects regardless of whether or not the responses may be considered abstract or concrete.

At least two studies have focused on clarifying contrasting predictions derived from the Chapmans' response bias theory and the 'response-interference' theory of Broen and Storms (1967). Boland and Chapman (1971) showed that nonmedicated chronic schizoprehnics, but not normal subjects, displayed a heightened intrusion of associates on a multiple-choice vocabulary test in which the available incorrect alternative included a strong associate to the stimulus word. In a study designed to compare the performance of male schizophrenic inpatients and alcoholic outpatients, Roberts and Schuham (1974) modified the Chapmans' (1958) card sorting test (by adding a medium-associative distractor to the low and high distraction conditions), and found that the schizophrenics made more errors than the alcoholics on all levels of distraction. In addition, the schizophrenics' associative error scores closely approximated a straight line function which was seen as supporting the hypothetical hierarchical responding central to the response bias notion.

More recently, Mourer (1973) tested predictions derived from Chapman's theory regarding the conditions under which schizophrenic patients show excessive errors in semantic generalization. Drug-free chronic male schizophrenics and psychiatric aides were presented with a list of words on a memory drum and asked to press a button marked 'yes' or 'no' depending on whether the words appeared in a previously presented list. Generalized errors were defined as incorrect inclusions of words *not* initially shown. The word pairs were equated in terms of strength of shared meaning responses as either weak or strong, and also equated on rated similarity into moderate and low status. As predicted, the schizophrenics, unlike the normal subjects, erred more on test words sharing strong meaning responses with training list words than on words sharing weak meaning responses.

Miller (1974) provided further, although qualified, experimental support for what he called 'primacy response bias,' i.e., an inclination to select the primary (strongest or preferred) meanings of multiple-meaning words. The study used a 24-noun homograph test (cf. Benjamin & Watt, 1969) that could be scored for errors in terms of primary-secondary and concrete-abstract meanings, and controlled for two levels of ambiguity. Since the total errors of acute and chronic schizophrenic male inpatients

were comparable over all four main error categories, these two groups were combined and compared with hospital employees matched for vocabulary, educational level, and parental social class. Miller found that the schizophrenics and normals responded similarly to highly ambiguous items; on items of low ambiguity, the schizophrenics had higher overall error scores. Furthermore, the schizophrenics tended to choose an abstract interpretation on items where a concrete interpretation would be more appropriate: they made, in contrast to normals, significantly more abstract than concrete errors which may represent, according to Miller, autistic or idiosyncratic thinking.

Other relevant data on language related behavior within the normal response bias frame of reference were obtained by Blaney (1974). In addition to Chapman's semantic (lexical) ambiguity strongest meaning test (Chapman et al., 1964), Blaney administered his own newly devised test in which semantically ambiguous statements were replaced by statements of different syntactical structures to groups of male schizophrenic, nonschizophrenic psychiatric, and hospital staff subjects. Overall, no significant differences among any groups were found on either instrument. Dividing the schizophrenic group on the basis of length of hospitalization, Blaney observed that patients hospitalized more than 5 years showed significantly greater

stronger meaning bias on lexical ambiguity tasks than did patients hospitalized 2 years or less. These short-term schizophrenics, on the other hand, made more errors than long-term schizophrenics on the structural ambiguity test. Higher error scores on Chapman's lexical ambiguity test were also found in disorganized schizophrenic patients, while the relatively nonpsychotic schizophrenics had significantly higher error rates on Blaney's structural ambiguity test. The above findings suggest, as the author put it, that the semantic/lexical stronger meaning bias

> . . . is largely a function of schizophrenics' chronicity/disorganization rather than of schizophrenia or schizotypy regardless of state. (Blaney, 1974, p. 29)

Rattan and Chapman's (1973) demonstration that chronic schizophrenics were susceptible to the effects of associative distractors in their vocabulary (word definition) performance was achieved by means of two experimental tasks matched in terms of discriminating power. As the development of tasks matched on discriminating power introduced in the Rattan and Chapman study signalled an important methodological advance in the measurement of differential cognitive deficits, its rationale as well as findings of some studies that have utilized the above principle are presented in greater detail in the next section. Only one investigation that gave an impetus for the present inquiry is described at this point.

Using Rattan and Chapman's matched multiple-choice vocabulary subtests, Klinka and Papageorgis (1976) addressed themselves to the question of whether susceptibility to distractors is peculiar to schizophrenic disorder or can be also found in other disorders. They selected samples of short- and long-term schizophrenic, nonschizophrenic, and nonpsychiatric patients and detected heightened susceptibility to associative intrusions in all groups of long-term patients regardless of diagnosis. Short-term patients, with the possible exception of schizophrenics, did not show such a tendency. A prolonged hospital stay and/or chronicity of illness thus appeared to be implicated in at least this form of disordered thinking which apparently is not unique to schizophrenia. (Other studies, e.g., Hamsher and Arnold (1976) and Harrow and Quinlan (1977) have also reported findings that 'schizophrenic' deficits are not unique to schizophrenic psychoses, and Miller's (1975) review has similarly indicated cognitive deficits in affective disorders.)

Thus it appears that the weight of empirical evidence generally favors the Chapman's theory although not unequivocally so. Deckner and Blanton (1969), for instance, tested the hypothesis that schizophrenics are unable to use weak contextual cues to the same degree as normal subjects. The investigators used a cloze procedure in

which every fifth, eighth, or tenth word was deleted from three passages of first and third grade difficulty. Male schizophrenic (good and poor premorbid) and male general medical patients were asked to determine an appropriate word to replace the one omitted. They hypothesized that schizophrenics should be unaffected by changes in context, whereas the medical patients should be better able to guess the appropriate word with more words between deletions. Despite the finding that schizophrenic patients performed poorly at every level of context, there was no interaction between groups and context. Thus, the experiment did not provide support for the notion that schizophrenics are less influenced by context than non-schizophrenics.

Similarly, Neuringer and associates (Neuringer, Fiske, & Goldstein, 1969; Neuringer, Fiske, Schmidt, & Goldstein, 1972) failed to replicate the Chapman et al. (1964) findings of strong meaning vocabulary biases in schizophrenics. In two separate investigations using chronic male medicated schizophrenics and nonpsychotic psychiatric patient controls, the schizophrenics' biases toward strong-meaning definitions were not significant. In addition, Neuringer et al. (1972) also developed a Similarities Test which allowed choices between the strong meaning associate alone and the strong and weak meaning associates together.

For example:

BAT may be like

A. MITT

B. MITT and MOCKINGBIRD

C. None of the above

Schizophrenics did not display a tendency to choose the strong meaning associate presented by itself (i.e., alternative "A" in the example).

Other investigators have suggested that the observed effects based on the Chapman theory are probably applicable only to certain schizophrenic subtypes or may not be necessarily unique to schizophrenic psychoses (e.g., Broen, 1968; Hamsher & Arnold, 1976; Klinka & Papageorgis, 1976; Rice, 1970). Still others have added significant qualifications to the theory (e.g., Blaney, 1974; Davis & Blaney, 1976; Miller, 1974), or have objected to the multiple-choice format of the tasks and their relative lack of safeguards against responses based on guessing and partial knowledge (Schwartz, 1978), or have argued from the psycholinguistic position and have pointed out the theory's limitations in terms of generalizability (e.g., Miller, 1965; Pavy, 1968).

Psychometric Considerations

As touched upon in Chapter 1, Chapman and Chapman's (1973a, b; 1978) penetrating critique of methodology in measurement of cognitive deficits and their suggestions about how to avoid artifactual findings in studies of hypothesized specific differential deficits, have made a considerable impact on every serious investigator of disordered thought in schizophrenia. In essence, their argument rests on the fact that demonstration of poorer performance by schizophrenics, relative to normal subjects, on any particular task is of little value because schizophrenic subjects are known to be deficient on virtually all tasks requiring a voluntary response. In other words, the schizophrenics suffer from a generalized overall deficit in cognitive functioning or performance. Meaningful measurement of a specific hypothesized cognitive deficit therefore requires the use of at least two measures, one of which deals with the specific deficit in question. The hypothesized deficit would be confirmed only if the discrepancy of the schizophrenics' performance on the two tasks exceeds the discrepancy shown by control subjects.

The extent to which scores of schizophrenic subjects differ from those of control subjects on a particular experimental task, the argument proceeds, depends on

the discriminating power of the instrument (i.e., power to differentiate the more able from the less able subjects, or power to distinguish two groups that differ in the ability measured by the test). Since the discriminating power of a test is basically a function of item difficulty and reliability, experimental and control tasks have to be equated, using normal individuals of varying abilities as a standardization group, on coefficient alpha,[3] mean item difficulty, variance and shape of distribution of item difficulty, and shape of the distribution of task scores. Only with such a match, that is, with tests of identical discriminating power, can specific differential deficit be genuinely separated from generalized deficit of the schizophrenic subjects, and/or artifactual deficits, mistakenly inferred, avoided. Moreover, the use of equivalent tasks makes unnecessary a matching of groups on certain variables, such as education and premorbid or current intelligence because the matching of tasks rules out generalized cognitive deficit as a source of specific differential performance deficit.

Most recently, Chapman and Chapman (1978) pointed out that matching on 'true-score' variance obviates the need

---

[3]The coefficient alpha is the average value of all possible split-half reliability coefficients, representing an internal consistency index of reliability.

for separate matching on reliability and item difficulty. The 'true-score' refers to the portion of the score which is replicable (reliable), not to the ability which the subject truly possesses. Matching on all the test variables, the authors state, can be achieved for most pairs of tests by giving large, and preferably equal, numbers of items of the two types to normal subjects of differing ability levels and selecting pairs of items of the same difficulty and item-scale correlation.

Rattan and Chapman's (1973) test for associative intrusions exemplifies the above psychometric requirements (for a brief test description with item examples, see Chapter 3, 'Method'). In their study, the investigators administered two closely matched multiple-choice vocabulary subtests, standardized on normal groups of firemen and prison inmates, to chronic schizophrenic patients withdrawn from drug therapy. One of the subtests contained distractor items associated with the word to be defined among the alternatives, whereas the other subtest had no such distractors. It was found that schizophrenics not only made more errors than normals on both subtests, but more importantly, they erred more on the with-associates subtest than on the subtest without associates. As general deficit was controlled by matching the subtests on discriminating power, the schizophrenics' less accurate per-

formance on the subtest with distractors could be attributed to a specific differential deficit, namely, to a greater susceptibility to associative intrusions.

In studies that followed, other presumed schizophrenic deficits were either confirmed or refuted by means of tasks equated on discriminating power. Thus schizophrenic response to affective, as opposed to neutral stimuli, was shown to have been spurious as both newly-admitted and long-term schizophrenic patients' performance on matched vocabulary tests yielded comparable scores (Chapman, Chapman, & Daut, 1974). Similarly, no differences were found when affect-laden analogies were compared to affectively neutral ones (Chapman & Chapman, 1975a). Other studies using the same methodology include Chapman and Chapman (1975b), Chapman, Chapman, and Daut (1976), Raulin and Chapman (1976), Oltmans and Neale (1976), and Davis and Blaney (1976).

Undoubtedly, the introduction of psychometrically sophisticated instruments to the study of schizophrenic performance deficits represents a significant methodological advance in this area of research which is being responded to by an increasing number of investigators. Both new and revised studies could, in turn, lead toward a clearer understanding and reassessment of psychological deficits in schizophrenia over the entire range of the phenomena of thought disorder.

Psychopharmacological Issues

Evaluation of cognitive performance in schizophrenic subjects who are receiving psychoactive medication may pose serious methodological drawbacks (Chapman & Chapman, 1973b; Chapman, 1977; Lang & Buss, 1965; Spohn, 1973). Essentially, differences on test scores between drug-free subjects and those receiving some form of chemotherapy may be attributable to the drug effects. Drug-free schizophrenics, on the other hand, are unrepresentative of the schizophrenic population usually seen in institutions. A large portion of schizophrenic patients, when withdrawn from psychoactive drugs, worsen in their psychotic symptomatology (Chapman, 1963), and may no longer be capable of performing adequately on cognitive tasks. Denial of medication to such patients would, moreover, be unethical. Further, patients who can be removed from psychoactive drugs without noticeable change in their mental status are probably relatively undisturbed to begin with. Consequently, caution in interpreting findings based on studies involving medicated patients is called for, as the results are, strictly speaking, generalizable only to those schizophrenic patients who are under similar antipsychotic medication.

The previous statement remains valid even though some earlier work, already described (e.g., Klinka & Papageorgis, 1976), suggests that psychoactive drugs do not necessarily affect some of the measures used; comparable vocabulary interference performance scores have been obtained from chronic drug-free (Rattan & Chapman, 1973) and chronic medicated (Klinka & Papageorgis, 1976) schizophrenic inpatients. It may also be noted that investigations on the effects of antipsychotic drugs on disordered thought of schizophrenics (or other psychotic patients) have been so far inconclusive. Chapman and Knowles (1964), for instance, tested chronic schizophrenics on a conceptual breadth card-sorting test[4] and found that phenothiazine treatment significantly reduced errors of overinclusion but increased propensity for random errors. Spohn, Lacoursiere, Thompson, and Coyne (1977), however, failed to replicate the results on a similar sample of chronic schizophrenics using an alternative measure of conceptual breadth, although they demonstrated positive phenothiazine effects on psychophysiological responses and attention-perception measures. Further, Goldstein, Judd,

---

[4]Scored for three types of errors: overinclusion errors, reflecting a tendency to sort class items by overly broad concepts; exclusion errors, representing excessively narrow sorting concepts; and random errors, indicating indifference to tasks and overall decline in intellectual efficiency.

Rodnick, and LaPolla (1969) have found poor premorbid schizophrenics to improve (but cf. Payne, 1972) and good premorbid schizophrenics not to improve or to get worse on selected psychophysiological and behavioral measures in response to phenothiazine drugs. Studies by Goldberg and associates (Goldberg, Klerman, & Cole, 1965; Goldberg, Schooler, & Mattson, 1967) and by the Goldstein team (Goldstein, Judd, Rodnick, & LaPolla, 1969; Judd, Goldstein, Rodnick, & Jackson, 1973) have documented, in addition, the value of separating paranoid from nonparanoid schizophrenics in evaluating psychoactive medication effects. The above investigators reported a different rate of change on a variety of behavioral, perceptual, and cognitive measures following phenothiazine drug administration for patients divided according to paranoid/nonparanoid status. Such differential responding to drug treatment allows for speculation that process and reactive as well as paranoid and nonparanoid schizophrenics may suffer from distinct types of schizophrenia.

Thus, it appears that neuroleptic therapy is not beneficial to all schizophrenic patients. Those schizophrenics who profit from phenothiazine treatment may differ not only in terms of making fewer errors, but also in making qualitatively different errors on a given cognitive task. In situations where drug withdrawal cannot be

achieved (notwithstanding the possibility of forming a biased subpopulation of schizophrenics), or where the investigator is not in charge of assigning patients to medicated/nonmedicated status (with medicated status likely involving assignment of different dosages) on a random basis, it is necessary to record the patients' present pharmacological regimen in full (Spohn, 1973).

Chapter 3

Method

As stated in Chapter 1, the present investigation was designed to compare the performance of chronic schizophrenic and nonpsychiatric inpatients and outpatients on certain measures of concept formation and vocabulary performance. It was predicted that chronic patients with prolonged institutionalization would manifest a greater propensity to disordered thought than would comparably chronic patients with relatively brief inpatient experience. Further, it was predicted that nonparanoid schizophrenics would exhibit greater performance deficits than paranoid schizophrenics. The present chapter deals with a detailed description of the subjects and the way that they were selected, the measuring instruments, and the procedures.

Subjects

The subject sample of the present study consisted of a total of 90 male and female psychiatric or medical inpatients or outpatients residing in the greater Vancouver or greater Victoria areas of British Columbia, Canada. With four exceptions (the exceptions consisted of two

native-Indian females, and one black and one Asiatic male), all these subjects were Caucasians of European ancestry. Specifically, hospitalized psychiatric patients were obtained from Riverview Hospital, Port Coquitlam, British Columbia, which is the largest psychiatric hospital in the Vancouver region. Psychiatric outpatients were clients of the Strathcona Community Care Team, which is part of the Greater Vancouver Mental Health Services. Nonpsychiatric inpatients were from Gorge Road Hospital in Victoria and from Pearson Hospital in Vancouver. Finally, nonhospitalized nonpsychiatric subjects were all residents of Victoria. The age range of the subjects was 20-60 years (two female subjects in the nonpsychiatric nonhospitalized group, however, were 63 and 66 years old). There were no restrictions concerning the subjects' marital and socio-economic status. On the other hand, to be eligible for participation in the study, subjects had to be native speakers of English and to have had at least six years of formal school attendance. All individuals with a known history of alcohol or other drug abuse or with a suspected organic brain syndrome or mental retardation were excluded from the study. All subject subgroups were also subdivided according to their present hospitalization status into *hospitalized* groups (with at least 2 years of continuous stay in an institution since their last admission) and *nonhospitalized* groups (with previous single or multiple

hospital stays that did not exceed a total of 6 months).

Psychiatric (Schizophrenic) Subjects

All psychiatric subjects in the sample had official diagnoses of schizophrenia, both initially and on all subsequent assessment occasions. In terms of traditional subtypes of schizophrenia, "paranoid," and "chronic undifferentiated" were the most common in both the inpatient and outpatient groups. In order to ensure a certain level of replicability and homogeneity in the study sample, all schizophrenic subjects were further screened by means of the Research Diagnostic Criteria of Spitzer, Endicott, and Robins (1975, 1978; see the Behavioral Checklist, Appendix 3). Only those subjects who met the Research Diagnostic Criteria requirements for definite or probable schizophrenia were retained in the study. Specifically, 49 (82%) schizophrenic subjects met the Research Diagnostic Criteria requirements for "definite" schizophrenia at the time of their participation in the study; the remaining 11 schizophrenic subjects (of whom 6 were hospitalized and 5 nonhospitalized) met the same criteria for "probable" schizophrenia at the time of their participation in the study, but were still classified as simple or residual schizophrenics and had manifested clearly schizotypal[1] characteristics for at least 5 years. In effect, *all*

schizophrenic subjects belonged to the *chronic* category: "chronic" schizophrenia, according to the Research Diagnostic Criteria subtyping based on the course of the illness, refers to the more or less continuous presence of the core symptoms over more than two years, whereas the acute stage is defined by clear-cut episodes of schizophrenia with symptom remission in-between attacks.

Additionally, the schizophrenic subjects were further subclassified into paranoid and nonparanoid subgroups. The *paranoid* subgroup was composed of those individuals who (a) had an official hospital diagnosis of paranoid subtype, and who (b) met the Research Diagnostic Criteria requirements for paranoid subtype, and who (c) were assigned a total of at least 6 points (out of a possible 20) from the four 5-point scale items dealing with delusions of the Venables and O'Connor (1959) short scale for rating paranoid schizophrenia (see the Belief Rating Sheet, Appendix 4). The *nonparanoid* subgroup included subjects who did not meet *all three* of the above criteria. Thus, the assignment of subjects into the paranoid and nonparanoid subgroups resulted in a stringently defined paranoid sub-

---

[1] "Schizotypy" refers to eccentric behavior, marked social withdrawal, blunted or inappropriate affect, mild indices of formal thought disorder, and unusual thoughts or perceptual experiences.

group and in a less stringently defined nonparanoid subgroup. In other words, the nonparanoid subjects included some who either qualified for paranoid diagnosis only in terms of the Research Diagnostic Criteria or who could be considered "paranoid" by virtue of scoring over 6 points on the Venables and O'Connor scale. Comparison summaries between clearly nonparanoid subjects (n=23) and 'nonparanoid' subjects with evidence of some paranoid features (n=7) are presented in Appendix 5. It suffices here to report that the performance of the less stringently defined nonparanoids on the dependent measures was not significantly different from the performance of the more stringently defined nonparanoids. Likewise nonsignificant differences (Appendix 6) were found in performance comparisons within the paranoid subgroup, i.e., between subjects with lower and higher degree of paranoid symptomatology in terms of their scores on the Venables and O'Connor scale. Eighteen paranoid schizophrenic subjects who scored between 6 and 8 points on the Venables and O'Connor scale constituted the less stringently defined paranoids, whereas the remaining 12 subjects with scores in excess of 8 scale points were viewed as "exemplary" paranoids. In any event, it should be noted that the analyses of paranoid-nonparanoid differences reported in the next chapter are based on a conservative definition of the variable.

The schizophrenic subjects' premorbid socio-sexual adjustment was determined with reference to the Harris (1975) scale of premorbid adjustment, which is an abbreviated version of the widely used Phillips (1953) scale of premorbid adjustment (see parts B-E of the Background Information Sheet, Appendix 7). Reliability of these assessments was evaluated by having 16 randomly selected patients (equally representative of the various hospitalization and diagnosis subgroups) rated independently by the investigator and a second rater. Pearson product-moment correlation coefficients between the ratings of the two raters on premorbid sexual adjustment, premorbid social-personal adjustment, and their composite, overall premorbid adjustment, were all in excess of .90. The raters' agreement within one scale point was found to be in the 62.5--87.5% range. Assignment of a subject to the "good" premorbid category required scores of 0, 1, or 2 on both subscales (maximum 4 for the total scale), while assignment to the "poor" premorbid category required scores of 4, 5, or 6 on either subscale (minimum 6 for the total scale). Subjects with a score of 3 on either subscale or with a total scale score of 5 were considered as "borderline" cases. With these procedures, the total sample of schizophrenic subjects was found to consist of 41 (68%) "poor" premorbids, 13 (22%) "borderline" cases, and

6 (10%) "good" premorbids. Interestingly, 4 of the non-hospitalized paranoid subjects were good premorbids, while no good premorbid subjects were identified among the hospitalized nonparanoid subjects.

The schizophrenic subjects were also rated for their current overall severity of disturbance level by means of the 100-point Global Assessment Scale (Endicott, Spitzer, Fleiss, & Cohen, 1976; see Appendix 8). The rating of each subject was the average of two ratings assigned by two independent raters. One of these raters was the subject's primary therapist (i.e., a psychiatrist, nurse, or social worker); the other rater was also a member of the therapeutic team. Thus, each given pair of ratings on the Global Assessment Scale usually involved a different pair of raters. Consequently, a one-way analysis of variance was used to determine the intraclass correlation coefficient (Shrout & Fleiss, 1979). The coefficient was .68. The four schizophrenic subgroups (hospitalized and nonhospitalized, paranoid and nonparanoid) did not differ in terms of the overall severity of current disturbance ($F(3,56)=2.13$, n.s.). The schizophrenics' overall mean was 52.46, and the four subgroup means were dispersed only over two of the ten descriptive intervals of the Global Assessment Scale. (Even so, following planned orthogonal comparisons among means, it was found that the

mean Global Assessment Scale ratings of the nonhospitalized paranoid schizophrenics was higher and differed significantly ($p<.05$) from the combined mean of the other three schizophrenic subgroups.)

Nonpsychiatric Subjects

The 30 nonpsychiatric subjects were physically disabled individuals suffering for the most part from multiple sclerosis (14 subjects, or 47%) and irreversible damage to the spinal cord that resulted in paraplegic or quadriplegic conditions (10 subjects, or 33%). The remaining 6 subjects had been diagnosed as advanced rheumatoid arthritis (2 cases), Friedreich's ataxia (2 cases, 1 with diabetes), osteogenesis imperfecta (1 case, permanently institutionalized), and amputated leg (1 case). All subjects showed generally adequate social functioning, within the limits imposed by their physical handicap, and were judged to be free of central nervous system impairment that would be sufficient to interfere with cognitive performance.

Characteristics of the Six Experimental Subgroups

Table 1 shows the breakdown of the six experimental subgroups (paranoid schizophrenic, nonparanoid schizophrenic, nonpsychiatric; each either hospitalized or nonhospitalized) in terms of mean age in years, mean years

Table 1

Diagnostic Category, Length and Severity of Illness, Length of Hospitalization, and Demographic Variables For All 90 Subjects[a]

Diagnostic Category	Currently Hospitalized(H) Or Not (NH) n=15 per group	Mean Years Hospitalization	Mean Years Length of Illness	Mean Rated Severity of Current Disturbance	Mean Age (Years)	Mean Education (Years)	Gender[b]		Marital Status[b]			Premorbid Adjustment[b]		
							Male	Female	Single	Married	Other	Good	Borderline	Poor
Paranoid Schizophrenia	H	15.80 (7.75)	21.86 (8.43)	51.30 (14.79)	43.06 (9.26)	10.06 (1.58)	8	7	13	0	2	1	2	12
	NH	-	15.06 (5.19)	59.13 (12.98)	38.20 (7.16)	9.53 (2.11)	12	3	12	0	3	4	5	6
Nonparanoid Schizophrenia	H	13.88 (9.98)	23.46 (7.28)	47.60 (12.57)	43.46 (8.81)	9.46 (1.76)	10	5	14	0	1	0	1	14
	NH	-	16.06 (6.80)	51.83 (10.48)	38.13 (9.76)	8.93 (1.80)	8	7	11	1	3	1	5	9
Nonpsychiatric Subjects	H	14.10 (7.92)	18.20 (9.55)	-	41.26 (12.52)	9.66 (2.86)	6	9	9	3	3	-	-	-
	NH	-	13.06 (8.66)	-	37.86 (15.19)	13.73 (2.20)	6	9	7	7	1	-	-	-

[a] Standard deviations in parentheses.

b Number of subjects per category.

of formal schooling (education), gender, and marital status. Table 1 also shows mean total length of illness in years, and where appropriate, mean length of current hospitalization in years, mean ratings of severity of current condition (Global Assessment Scale), and premorbid status. It will be noted that the various groups are not uniformly equivalent in terms of some of the above variables. Analyses of these subject characteristics and statistical treatments of the dependent measures that were suggested by these analyses are reported in the Results chapter. An attempt was also made to determine the subjects' socioeconomic status by means of the Blishen Occupational Class Scale (Blishen, 1958). Unfortunately, in too many instances, subjects had either never held a job or their employment history could not be determined. The available but incomplete data suggest that psychiatric subjects had been predominantly semi-skilled and unskilled workers (roughly corresponding to Blishen's class 6 or 7), while nonpsychiatric subjects, and especially those living outside institutions occupied a variety of positions (classes 1 through 7).

Finally, most of the schizophrenic subjects were receiving various types of psychoactive medication, especially phenothiazine compounds. As to the duration of drug treatment, the schizophrenic patients had been under

moderate to heavy psychotropic treatment intermittently throughout the course of their illness. Hospitalized nonpsychiatric patients were invariably on minor tranquilizers. Drug intake between-group comparisons as well as relationships between the drug regimen and level of performance on the dependent variable measures are presented in the Results and in Appendices 9.2 and 9.3. The detailed drug status of the subjects in terms of the presence or absence of antipsychotic (or other) medication, type of medication, and daily dosage level, including chlorpromazine equivalence estimates, is given in Appendix 9.1.

Materials

The two instruments that provided the dependent variable measures of the study were the Rattan and Chapman (1973) associative interference vocabulary test, and the Goldstein and Scheerer (1941) Object Sorting Test as modified by Harrow, Himmelhoch, Tucker, Hersh, and Quinlan (1972).

The associative interference vocabulary test consists of 140 randomly ordered multiple-choice vocabulary definition items. It requires subjects to choose and circle the alternative which is closest in meaning to the stimulus word. Included are two subtests, with 60 items in each. One of the subtests (D), includes one

alternative which provides the correct answer (a synonym), and another alternative which serves as an associative distractor. The other two alternatives are incorrect. For example, POOL means the same as: A. PUDDLE (correct answer); B. COLD (incorrect and irrelevant); C. SWIM (incorrect and associative distractor); D. NONE OF THE ABOVE. The other subtest (ND) contains no associative distractors among the alternatives. For example: SCALE means the same as: A. PIN (incorrect and irrelevant); B. YELL (incorrect and irrelevant); C. CLIMB (correct answer); D. NONE OF THE ABOVE. The subjects' accuracy scores (total number correct out of 60) on the D subtest are compared to their accuracy scores on the ND subtest. A lower accuracy score on the D subtest is assumed to reflect susceptibility to associative intrusions. The two subtests were constructed by Rattan and Chapman so that they are closely matched, in terms of the performance of normal subjects, on distribution of scores and of item difficulty, on means and standard deviations of scores, on standard deviation of item difficulty, and on reliability. Thus, the D and ND subtests have been deemed to be equivalent in discriminating power, a feature which is essential for the assessment of any hypothesized *specific* cognitive deficit in psychiatric patients (Chapman & Chapman, 1973a, 1973b). Details about the

construction and psychometric properties of the two subtests of the associative interference vocabulary test have been given by Rattan and Chapman (1973). The remaining 20 items of the test are fillers, designed to provide a check on random response tendencies by the subjects. The alternatives are neither correct answers nor associative distractors, and the only "correct" choice is "None of the above." The word 'HORIZON,' for example, is obviously unrelated to its three other alternatives CARD, SILO, and MILDEW.

The Object Sorting Test (Harrow et al., 1972) involves the successive presentation to the subject of seven "starting objects" (e.g., a metal fork, a red rubber ball) from a set of 38 objects of similar common use (for the complete list, see the Object Sorting Test Scoring Sheet, Appendix 1). The subject is asked to sort out all the other objects from the set that belong with the starting object. Upon the completion of each sorting, the subject is asked to give reasons for the selections. As described in the previous chapter, five performance measures based on the Object Sorting Test sortings were used in this study. These were behavioral overinclusion, conceptual overinclusion, idiosyncratic or bizarre thinking, concrete thinking, and underinclusive thinking. For the most part, these measures are not independent of

each other. In addition, these measures (except for behavioral overinclusion which represents the total number of objects sorted with all seven starting objects) are obtained by means of ratings. First, each sorting is rated on a 1-5 scale for each of the four types of thought disorder. Then the actual score for each type is obtained in terms of a composite rating of the total performance by each subject during all seven sortings (cf. Himmelhoch, Harrow, Tucker, and Hersh, 1973). To assess the reliability of these composite ratings, the protocols from 42 subjects (about 47% of the total sample and about equally representative of each subsample) were independently scored by a second rater, trained in the use of the scoring criteria, who was unaware of the subgroup in which each subject belonged. This procedure yielded acceptable levels of interrater reliabilities in terms of product-moment correlation coefficients: conceptual overinclusion, r=.87; idiosyncratic thinking, r=.78; concrete thinking, r=.75; and underinclusive thinking, r=.91. Alternatively, the raters' disagreements beyond one scale point were 0% for conceptual overinclusion, 9.6% for idiosyncratic thinking, 2.4% for concrete thinking, and 4.8% for underinclusive thinking.

Procedure

After securing the approval of the subjects' therapists, all subjects who had met the selection criteria and who had tentatively agreed to participate in the study were approached individually at their respective institutions, community care centre, or in their homes or places of gathering. The investigator briefly informed each subject about the nature of the study, which was described as a "study on the use or misuse of the English language and of the ability to sort some objects of common use." Efforts were made to establish rapport and to answer any questions about the testing. The Informed Consent Form (see Appendix 10) was presented, explained, and subjects were asked to sign it. (Nonhospitalized psychiatric patients and their primary therapists were requested to sign an additional, "Authorization for Release of Information," form). Eleven (12% of the original sample) potential subjects refused to take part in the experiment at this time; they would have been distributed about equally among the various experimental subgroups.

Upon obtaining the subjects' consent to participate in the study, the associative interference vocabulary test and the Object Sorting Test were administered, in counterbalanced order, with about half the subjects responding to

the vocabulary test first and the other half of the subjects responding first to the Object Sorting Test. As a rule, a single session was sufficient for the administration of both tests; in a few cases, however, two testing sessions were necessary because of the subject's expressed fatigue or because either the subject or the investigator had other engagements (6 subjects, i.e., approximately 7%, participated in two testing sessions).

The associative interference vocabulary test items were mimeographed in easily readable form, in capital letters and with only 8 items to a page. The subject was asked to "circle the word which is closest in meaning to the first word given" for each item. Typically, the investigator read the instructions to the subject while the latter followed the same instructions as they appeared on the cover sheet of the test booklet. The subject then practiced on a sample item. Further questions were solicited and explanations were given whenever necessary. The subject then proceeded with the test, which is not timed. After the first 8 items were completed, the investigator checked the responses to make sure that the instructions were fully comprehended by the subject; if necessary, the instructions were repeated and clarified. The subjects were allowed, but not encouraged, to take brief rest periods during the testing. Testing time

ranged between 20-140 minutes, the average being just slightly under one hour. The scoring was done by the investigator.

The Object Sorting Test was introduced by setting out objects before the subjects and asking them whether there were any objects that they could not recognize. Of the 38 objects, the sink stopper, red circle, clapper, and block with nail were specifically pointed out. After answering any questions brought up by the subject, the instructions continued as follows: "Now I'm going to take the sink stopper and place it in the box. What I want you to do is to choose from among these objects those you feel go with the sink stopper and place them in the box. Then I'll ask you why you have chosen them." Upon putting the sink stopper--first of the seven starting objects--in the box, the investigator recorded the subject's sorting behavior and wrote down all verbalizations during both the sorting and the subsequent inquiry. When the subject had indicated that the sorting was complete, the investigator asked: "Why do these objects go with the sink stopper (or fork, or pipe, etc.)?", or "Why do all these belong together?"

For the second starting object (fork), the investigator placed it in the box and then asked: "Now, what goes with the fork?" The remaining starting objects,

however, were not named. The investigator placed each in the box and then stated simply: "What goes with this?" or "Now, do the same for this one."

Some subjects appeared to hesitate before sorting with the first or with the first two starting objects. In such cases, all the instructions were repeated together with additional questions such as "What might go with the sink stopper (fork)?", or "What could belong with the sink stopper (fork)?" If the subject continued to appear unable to find any object to sort with the starting object, further encouragement was given, and the following question(s) were asked in order as necessary: "What is it you are looking for to go with the sink stopper (fork)?"; "Is there anything here that could go with it?"; "Well, if you had to pick something here, what might you pick to go with it?" It should be noted that only twice (2 subjects were involved with one instance each) did it become necessary to force the issue in this manner, and these instances were scored as underinclusiveness. Refusals to sort with starting objects 3-7 were accepted as such. The investigator responded by saying: "That's all right. A lot of people can't see anything for that one. Let's try this one" (holding up the next starting object).

Inquiry about the reasons for each sorting was kept at a minimum. Requests for a brief explanation or simple

direct questions were asked only if the subjects' verbalization was too difficult to hear, understand, or appeared to be vague. Also, all questions by subjects about how they should make their selections were answered noncommittally: "It's up to you. Just put in what you feel goes with it."

The average sorting time for all seven sortings was about 15 minutes. The investigator obtained the behavioral overinclusion scores by counting the total number of objects sorted with all seven starting objects. The remaining indices were obtained by ratings on a 9-point scale (1-5 with half steps, i.e., 1, 1.5, 2, 2.5, etc.). Reliability was established in the manner indicated previously under 'Materials.'

Slight departures from the standard testing procedure described above took place in those instances where the subject's vision and/or motor coordination were impaired. In such cases, the investigator read aloud each vocabulary item along with the subject and circled the alternative indicated by the subject. In the case of the Object Sorting Test, the investigator picked and placed in the box the objects indicated by the subject.

Chapter 4

Results

The main dependent variables of the study were (1) the number of correct answers given by the subjects on the two vocabulary subtests and (2) the ratings on the five object sorting performance measures. Because, however, the subjects in the various diagnostic subgroups were not as closely matched as would have been desirable (see Table 1, page 59), differences were analyzed, and the analyses of the dependent measures were modified accordingly. This chapter begins with analyses of subject characteristics. Wherever it was deemed necessary, relationships between subject characteristics and dependent variable measures were established. The second part of the chapter presents the results of the main analyses.

Differences in Characteristics of the Experimental Subgroups

In terms of age, the overall mean of the sample was 40.32 years (N=90). A two-way analysis of variance (diagnostic category by hospitalization status) yielded one significant main effect ($F(1,84)=3.99$, $p<.05$) for hospitalization status, while the other main effect and the interaction were nonsignificant. Inspection of

group means (Table 1, page 59) showed that patients in the nonhospitalized samples were younger than their institutionalized counterparts (the means were 38.06 and 42.86 years, respectively). With a single exception, none of the correlations between age and the measures of thought disorder reached statistical significance (Table 2). Thought disorder indices included difference scores on the associative interference vocabulary test (number correct on the subtest without distractors *minus* number correct on the subtest with distractors[1]), and the ratings on the five object sorting measures. Since only one significant correlation ($r=-.233$, $p<.05$) was found (between age and underinclusive thinking), the evidence for a relationship between age and magnitude of disordered thought was judged to be meager.

The total group of subjects consisted of 50 males and 40 females. As shown in Table 1, males and females were about equally divided within the subgroups, except for the fact that the nonhospitalized paranoid sample was predominantly male ($\chi^2=4.3$, $p<.05$).

---

[1]Where score on the subtest with distractors exceeds the score on the subtest without distractors, the resultant difference score is considered to be zero.

Table 2

Correlation Coefficients Between Age, Chronicity, and Education and the Dependent Variable Measures (N=90)

	Age	Chronicity	Education
Vocabulary Differential Score	.098	.050	-.270*
Behavioral Overinclusion	.145	-.155	.157
Conceptual Overinclusion	.005	.058	-.023
Idiosyncratic Thinking	.021	.170	-.020
Concrete Thinking	.012	.074	-.191
Underinclusive Thinking	-.233*	.050	-.217*

*$p < .05$

Mean differences in length of current institutionalization (defined as continuous stay in hospital since last admission) for the three hospitalized groups were not statistically significant ($F(2,42)=.24$,n.s.). The overall mean for these three groups was 14.62 years ($N=90$).

Total length of illness or chronicity (defined as length of illness in years since the time when the disorder in question was first recognized and recorded by a professional) has considerable bearing on the analyses and interpretation of the results of the present study. The overall mean was 17.95 years ($N=90$), clearly indicating that the study subjects were indeed "chronic." Table 1, however, shows that the experimental groups, though in every case chronic by any practical criteria, were not very closely matched in terms of years of length of illness since onset. A two-way analysis of variance (diagnostic category by hospitalization status) resulted in a significant main effect ($F(1,84)=15.46$, $p<.0002$) for hospitalization status. Nonsignificant effects were found for diagnostic category ($F(2,84)=2.21$,n.s.) and for the interaction ($F(2,84)=.17$,n.s., Table 3.1). The significant hospitalization main effect is the result of shorter length of illness in the nonhospitalized as opposed to the currently hospitalized subjects (the means are 14.72 and 21.17 years, respectively). In addition, post hoc comparisons

Table 3.1

Summary of Analysis of Variance of the Chronicity Variable

Source of Variation	SS	df	MS	F	p
Diagnostic Groups (DG)	268.02	2	134.01	2.21	.1130
Hospitalization Status (HOSP)	934.44	1	934.44	15.46	.0002
DG x HOSP	20.68	2	10.34	.17	.8418
Error	5076.66	84	60.43		

among means (Table 3.2) showed that nonhospitalized non-psychiatric subjects had been ill for a shorter period of time than the two groups (paranoid and nonparanoid) of hospitalized psychiatric patients ($p<.05$ or beyond; the respective means are 13.06 vs. 21.86 and 23.46 years). The comparisons further showed that nonhospitalized paranoid schizophrenic patients had been ill for a shorter period of time compared to their hospitalized nonparanoid counterparts ($p<.05$; the respective means are 15.06 and 23.46). Despite the inequality of the subgroups in terms of length of illness, none of the correlations between length of illness and the indices of thought disorder reached statistical significance (Table 2), and thus indicated that the magnitude of thought disorder varies rather independently from chronicity of illness.

In terms of education (defined as number of years completed in school, including, where applicable, post-secondary education), the overall mean was 10.22 years ($N=90$). In a two-way analysis of variance both main effects and the interaction were found to be significant: diagnostic groups ($F(2,84)=11.87$, $p<.0000$); hospitalization status ($F(1,84)=5.22$, $p<.0235$); and diagnostic groups by hospitalization status ($F(2,84)=12.28$, $p<.0000$). Subsequent pairwise contrasts (Table 4), however, indicated that only the nonhospitalized nonpsychiatric group (mean of 13.73 years)

Table 3.2

Tukey's Pairwise Contrasts Among Means on the Chronicity Variable

($\underline{n}$=15 per cell)

		$\underline{M}_6$	$\underline{M}_2$	$\underline{M}_4$	$\underline{M}_5$	$\underline{M}_1$	$\underline{M}_3$
Nonhospitalized Nonpsychiatric	$\underline{M}_6$=13.06	-	2.00	3.00	5.14	8.80*	10.40**
Nonhospitalized Paranoid	$\underline{M}_2$=15.06		-	1.00	3.14	6.80	8.40*
Nonhospitalized Nonparanoid	$\underline{M}_4$=16.06			-	2.14	5.80	7.40
Hospitalized Nonpsychiatric	$\underline{M}_5$=18.20				-	3.66	5.26
Hospitalized Paranoid	$\underline{M}_1$=21.86					-	1.60
Hospitalized Nonparanoid	$\underline{M}_3$=23.46						-

HSD=8.28 * ($\underline{p}$<.05)

9.90 ** ($\underline{p}$<.01)

Table 4

Tukey's Pairwise Contrasts Among Means on the Education Variable

(n=15 per cell)

		M_4	M_3	M_2	M_5	M_1	M_6
Nonhospitalized Nonparanoid	M_4=8.93	-	.53	.60	.73	1.13	4.80**
Hospitalized Nonparanoid	M_3=9.46		-	.07	.20	.60	4.27**
Nonhospitalized Paranoid	M_2=9.53			-	.13	.76	4.20**
Hospitalized Nonpsychiatric	M_5=9.66				-	.46	4.07**
Hospitalized Paranoid	M_1=10.06					-	3.67**
Nonhospitalized Nonpsychiatric	M_5=13.73						-

HSD= 2.64 **(p<.01)

was significantly different ($p<.01$) from each of the other study groups. It is noteworthy that this group contained 10 individuals (67%) who had attended college or university; 4 of these 10 had college degrees. The only other individuals who attended college were 2 hospitalized nonpsychiatric subjects and 1 nonhospitalized paranoid schizophrenic subject; none of these three had received a degree. Thus, with the exception of the nonhospitalized nonpsychiatric subjects who were more educated, the remaining five subgroups were quite comparable in terms of educational level. This may be also taken to mean that the subgroups are reasonably matched on a rough index of premorbid intelligence (Chapman & Chapman, 1973a), particularly in view of the fact that their ages were fairly comparable. Of the six correlations between education and the dependent variables (Table 2), two yielded statistically significant coefficients: Underinclusive thinking, $r=-.217$ ($p<.05$), and vocabulary differential score, $r=-.270$ ($p<.05$). The remaining correlations between educational level and object sorting measures were nonsignificant. Incidentally, Chapman and Chapman (1977) reported a nonsignficant correlation of .03 between education and vocabulary differential deficit score. Thus, there is only marginal evidence for a negative relationship between educational level and magnitude of disordered thought.

Additionally, the present study yielded two statistically significant correlations between thought disorder measures and the variables of premorbid adjustment and current overall severity of disturbance. First, a significant correlation (r=.30, p<.05) between vocabulary difference score and score on the premorbid socio-sexual adjustment scale indicated, as it may have been expected, that poor premorbid schizophrenics showed more associative interference than schizophrenics with better premorbid functioning. Second, a significant correlation (r=-.37, p<.01) between idiosyncratic thinking scores and ratings on the Global Assessment Scale indicated that schizophrenic patients who were rated as more disturbed were more idiosyncratic (bizarre) in their thinking than globally less impaired schizophrenics.

Medication intake of the psychiatric patients was recorded in approximate daily chlorpromazine equivalents (e.g., Hollister, 1970) in milligrams (Appendix 9.1). Although these daily chlorpromazine or chlorpromazine-equivalent levels were considerably higher in the hospitalized than in the released schizophrenics, the means for the hospitalized groups (700.66 for the paranoid schizophrenic inpatients and 664.66 for the nonparanoid schizophrenic inpatients) did not differ significantly (t(28)= .25, p>.05). Likewise nonsignificant (t(28)=1.48, p>.05)

was the mean difference between the paranoid and non-paranoid schizophrenic outpatients' intake, 156.00 and 230.66 mgs., respectively. Two-tailed t-tests of independent means were used in the above analyses (Appendix 9.2). No meaningful comparison could be made concerning the drug intake of the nonpsychiatric patients because they were taking too many different medications, but no chlorpromazine or other major psychoactive drug. As none of the correlations between measures of disordered thought and the schizophrenics' daily intake of psychoactive medications in chlorpromazine equivalents reached statistical significance (Appendix 9.3), it may be concluded that the amount of antipsychotic medication does not seem to have any sizable differential impact on the variables under investigation.

Main Analyses

Combined Vocabulary and Object Sorting Test Performance

Initially, a 3 x 2 fixed-effects multivariate analysis of covariance was carried out to assess the effects of diagnostic groups and hospitalization status on all vocabulary and concept formation measures. Two covariates, chronicity of illness and accuracy scores on the vocabulary subtest without distractors, were chosen in view of the

subgroup differences on these variables (Tables 3.2 and 12). Wilks' lambda criteria (Bock, 1975) were employed for all multivariate significance tests. In this initial analysis, both main effects and the interaction were found to be significant: diagnostic groups ($F(2,82)=10.40$, $p<.0000$); hospitalization status ($F(1,82)-4.22$, $p<.0010$); and diagnostic groups by hospitalization status ($F(2,82)=1.97$, $p<.0302$). Table 5 summarizes these results. To examine which of the dependent variables contributed most to the rejection of the overall multivariate null hypothesis, another multivariate analysis of covariance of the five object sorting measures alone was performed. This was followed with a series of univariate analyses of covariance which included the object sorting and vocabulary indices.

Object Sorting Test Performance

In order to assess the tenability of the overall multivariate null hypothesis, a 3 x 2 fixed-effects multivariate analysis of covariance of the five object sorting ratings was carried out. The covariate was length of illness (chronicity). This analysis resulted in significant main effects and in a nonsignificant interaction (Table 6). The significant diagnostic group main effect ($F(2,83)=2.496$, $p<.008$) indicated marked differences between some

Table 5

Summary of the Multivariate Analysis of Covariance for All Dependent Measures (Covariates: Accuracy Scores on the Subtest Without Distractors and Chronicity of Illness)

Source of Variation	Wilks' Lambda*	Approximate F-statistic*	Probability
Diagnostic Groups (DG)	.30312 (6,2,82)	10.4082 (12,153)	.0000
Hospitalization (HOSP) Status	.75242 (6,1,82)	4.2228 (6,77)	.0010
DG x HOSP	.75002 (6,2,82)	1.9722 (12,153)	.0302

*Degrees of freedom in parentheses.

Table 6

Summary of the Multivariate Analysis of Covariance of the Object Sorting Test Measures (Covariate: Chronicity)

Source of Variation	Wilks' Lambda*	Approximate F-statistic*	Probability
Diagnostic Groups (DG)	.74571 (5,2,83)	2.4967 (10,158)	.0083
Hospitalization (HOSP) Status	.85430 (5,1,83)	2.6947 (5,79)	.0267
DG x HOSP	.88330 (5,2,83)	1.0114 (10,158)	.4362

*Degrees of freedom in parentheses.

of the diagnostic subgroups, and the significant hospitalization status main effect ($F(1,83)=2.694$, $p<.026$) reflected lower (worse) performance levels of inpatients as opposed to outpatients. The overall sample means were 20.31 for behavioral overinclusion, 1.87 for conceptual overinclusion, 1.39 for idiosyncratic thinking, 1.91 for concrete thinking, and 2.22 for underinclusive thinking ($N=90$). Table 7 shows the covariance-adjusted means for the various subgroups.

Next, for each source row of the multivariate analysis of covariance tables that yielded rejection of the overall multivariate null hypothesis, univariate analyses of covariance were conducted to determine which specific concept formation measures were involved. The five subsequent 2 x 3 factorial analyses of covariance (using chronicity as the covariate) indicated that diagnostic grouping was not significantly related to behavioral overinclusion performance ($F(2,83)=.455$,n.s.) or to concrete thinking performance ($F(2,83)=1.683$,n.s.), but was significantly associated with the subjects' performance on the indices of conceptual overinclusion ($F(2,83)=3.491$, $p<.034$), underinclusive thinking ($F(2,83)=4.520$, $p<.013$), and especially idiosyncratic thinking ($F(2,83)=5.604$, $p<.0053$). Hospitalization status was found to be significantly associated with scores on concrete thinking

Table 7

Covariance-adjusted Means* and Standard Deviations** of Scores on the Object Sorting Test Measures for All Subject Subgroups (n=15 per cell)

	Hospitalized			Nonhospitalized		
	Paranoid	Nonparanoid	Nonpsychiatric	Paranoid	Nonparanoid	Nonpsychiatric
Behavioral Overinclusion	17.30 (7.75)	20.68 (6.40)	20.56 (7.30)	21.74 (13.74)	18.92 (8.41)	22.66 (8.37)
Conceptual Overinclusion	1.98 (.58)	2.11 (.76)	1.70 (.49)	2.03 (.99)	1.93 (.68)	1.49 (.46)
Idiosyncratic Thinking	1.50 (.71)	2.04 (1.01)	1.17 (.31)	1.27 (.65)	1.30 (.49)	1.06 (.18)
Concrete Thinking	2.15 (.44)	2.12 (.47)	1.90 (.57)	1.72 (.50)	1.92 (.56)	1.64 (.59)
Underinclusive Thinking	2.44 (.96)	2.38 (.79)	1.97 (.44)	2.12 (.90)	2.59 (.66)	1.81 (.67)

*For chronicity.

**In parentheses.

performance ($F(1,83)=6.20$, $p<.015$) and idiosyncratic thinking performance ($F(1,83)=6.316$, $p<.013$). None of the interactions reached statistical significance. The summaries of the above analyses are shown in Table 8.

Furthermore, planned orthogonal comparisons among subgroup means showed that ratings on both conceptual overinclusion and underinclusive thinking measures were significantly higher ($p<.05$) for psychiatric (schizophrenic) patients than for nonpsychiatric patients regardless of hospitalization. On the idiosyncratic thinking measure, however, the nonparanoid schizophrenics differed significantly ($p<.05$) from the combined groups of paranoid and nonpsychiatric subjects. Significant differences between inpatients and outpatients in terms of concrete and idiosyncratic thinking could be attributed to the relatively low scores of the nonpsychiatric subjects.

A posteriori pairwise comparisons among means adjusted for chronicity on the idiosyncratic thinking variable (Table 9) revealed that the hospitalized nonparanoid schizophrenic patients scored significantly higher ($p<.05$ or beyond) than did subjects in all but one other subgroup. Only the hospitalized paranoid schizophrenics performed similarly to their nonparanoid counterparts. A posteriori pairwise contrasts among means of the concrete thinking, underinclusive thinking, and conceptual overinclusion

Table 8

Summary of Analyses of Covariance for the Object Sorting Test Measures (Covariate: Chronicity)

Source of Variation	MS	df	F	p
Behavioral Overinclusion				
Diagnostic Groups (DG)	36.858	2	.455	n.s.
Hospitalization (HOSP) Status	48.295	1	.597	n.s.
DG x HOSP	73.446	2	.907	n.s.
Error	80.899	83		
Conceptual Overinclusion				
Diagnostic Groups (DG)	1.656	2	3.491	.0342
Hospitalization (HOSP) Status	.251	1	.530	n.s.
DG x HOSP	.156	2	.329	n.s.
Error	.474	83		
Idiosyncratic Thinking				
Diagnostic Groups (DG)	2.182	2	5.604	.0053
Hospitalization (HOSP) Status	2.460	1	6.316	.0134
DG x HOSP	.836	2	2.148	n.s.
Error	.389	83		
Concrete Thinking				
Diagnostic Groups (DG)	.466	2	1.683	n.s.
Hospitalization (HOSP) Status	1.670	1	6.020	.0155
DG x HOSP	.108	2	.390	n.s.
Error	.277	83		
Underinclusive Thinking				
Diagnostic Groups (DG)	2.615	2	4.520	.0136
Hospitalization (HOSP) Status	.142	1	.246	n.s.
DG x HOSP	.551	2	.952	n.s.
Error	.578	83		

Table 9

Tukey's Pairwise Contrasts Among Sample Means[a] For Idiosyncratic Thinking

(n=15 per cell)

		M_6	M_5	M_2	M_4	M_1	M_3
Nonhospitalized Nonpsychiatric	M_6=1.06	-	.11	.21	.24	.44	.98**
Hospitalized Nonpsychiatric	M_5=1.17		-	.10	.13	.33	.87**
Nonhospitalized Paranoid	M_2=1.27			-	.03	.23	.77*
Nonhospitalized Nonparanoid	M_4=1.30				-	.20	.74*
Hospitalized Paranoid	M_1=1.50					-	.54
Hospitalized Nonparanoid	M_3=2.04						-

HSD=.67 * (p<.05)

.79 ** (p<.01)

[a]Covariance--adjusted for chronicity.

indices were found to be statistically nonsignificant.

In addition to the covariance analyses just reported, the object sorting results were also analyzed by means of multivariate and univariate analyses of variance. The outcomes (in terms of statistical significance for the main effects and interactions) of these analyses were the same as those obtained with the covariance analyses. Appendices 11.1 and 11.2 summarize the variance analyses and Appendix 11.3 shows the original unadjusted means for the object sorting measures.

Vocabulary Performance

The obtained means and standard deviations for the D subtest (with distractors) and the ND subtest (without distractors) accuracy scores on the Rattan and Chapman vocabulary test are shown in Table 10 for all six experimental subgroups. This table also presents the means and standard deviations of actual distractor choices on the D subtest, and corresponding data for correctly answered filler items. It is apparent from these results that the ND accuracy means are higher than the D accuracy means for all subject groups and that some of these differences are considerable. The overall means of the sample were 33.91 for the items without distractors, and 28.56 for the items with distractors ($\underline{N}$=90).

Table 10

Accuracy Means and Standard Deviations* on the Vocabulary Subtests; Means and Standard Deviations* for Distractor Choices and Correctly Answered Filler Items for All Subject Groups (n=15 per cell)

Diagnosis	Hospitalization Status	ND[a] Subtest	D[a] Subtest	Distractors	Fillers
Paranoid Schizophrenics	Hospitalized	29.13 (10.80)	27.86 (9.67)	14.86 (11.49)	15.13 (5.44)
	Nonhospitalized	33.06 (13.35)	30.53 (13.43)	12.26 (13.22)	18.20 (2.04)
Nonparanoid Schizophrenics	Hospitalized	31.13 (9.45)	17.60 (4.10)	30.53 (9.20)	11.86 (6.81)
	Nonhospitalized	32.80 (9.02)	24.53 (12.49)	22.26 (14.41)	16.40 (4.01)
Nonpsychiatric Subjects	Hospitalized	35.26 (11.42)	30.40 (10.86)	16.80 (12.63)	17.46 (2.46)
	Nonhospitalized	42.06 (13.53)	40.46 (10.78)	7.80 (9.29)	18.73 (2.86)

* In parentheses.

[a] ND: Subtest without distractors; D: Subtest with distractors.

Relative strengths of association between accuracy scores on the D and ND subtests for all subgroups are given in terms of Pearson product-moment correlation coefficients (Table 11). It can be seen that all coefficients are significant at or beyond the .05 level and that the degree of association is quite high. This is not surprising given that the D and ND subtests are in fact parallel, with lower accuracy on the D subtest reflecting associative interference.

Since the vocabulary performance accuracy data were to be assessed in terms of the subjects' differential performance involving both the ND and D scores, the ND accuracy scores were initially subjected to an analysis of variance (Table 12) to determine the significance of the subgroup differences on this variable. This two-way factorial analysis of variance (Diagnostic Category by Hospitalization Status) yielded a significant main effect ($F(2,84)=3.962$, $p<.022$) for diagnostic groups, whereas the other main effect and the interaction were nonsignificant. In view of the significant diagnostic group differences, the D accuracy scores were analyzed by means of analysis of covariance using the ND scores as one covariate and, given the substantial subgroup differences on length of illness discussed earlier, chronicity

Table 11

Correlation Coefficients Between the Accuracy Scores on the Vocabulary Subtest With and Without Distractors for All Six Subject Groups (n=15 per cell)

	Hospitalized	Nonhospitalized
Paranoid Schizophrenics	.836**	.956**
Nonparanoid Schizophrenics	.593*	.775**
Nonpsychiatric Subjects	.858**	.916**

* $p < .05$

** $p < .01$

Table 12

Summary of Analysis of Variance for the Vocabulary Subtest Without Distractor Scores

Source of Variation	SS	df	MS	F	p
Diagnostic Groups (DG)	1028.95	2	514.47	3.9624	.0223
Hospitalization (HOSP) Status	384.40	1	384.39	2.9605	.0851
DG x HOSP	99.26	2	49.63	.3823	.6887
Error	10906.66	84	129.84		

as a second covariate.[2] The results of the 3 x 2 (Diagnostic Groups by Hospitalization Status) fixed-effects analysis of covariance are summarized in Table 13, with corresponding covariance-adjusted means in Table 14 for all six experimental subgroups. The significant diagnostic group main effect ($F(2,82)=23.01$, $p<.0000$) indicated that the average number of correct choices on the vocabulary subtest with distractors made by the subjects differed markedly depending on their diagnostic membership. Similarly, the significant hospitalization status main effect ($F(1,82)=7.37$, $p<.0079$) showed, as expected, that institutionalized subjects were less accurate on the subtest with distractors than their released counterparts.

A posteriori pairwise comparisons among subgroups on the D subtest accuracy performance (Table 15) showed that the hospitalized nonparanoid schizophrenics differed significantly ($p<.01$) from every other subgroup except from their nonhospitalized counterparts; and that the nonhospitalized nonparanoid schizophrenic patients' performance was significantly ($p<.01$) lower than that of the nonhospitalized nonpsychiatric subjects.

---

[2]An alternative covariance analysis with only one covariate (ND score) was also carried out. Significance levels were the same as those obtained with the two-covariate analysis reported above (Appendix 12).

Table 13

Summary of Analysis of Covariance for the Vocabulary Subtest With Distractor Scores (Covariates: Vocabulary Subtest Without Distractor Scores and Chronicity)

Source of Variation	SS	df	MS	F	p
Diagnostic Groups (DG)	1597.20	2	798.60	23.01	.0000
Hospitalization (HOSP) Status	255.79	1	255.79	7.37	.0079
DG x HOSP	158.61	2	79.30	2.28	.1059
Error	2844.91	82	34.69		

Table 14

Covariance-adjusted Accuracy Means* and Standard Deviations** for the Vocabulary Subtest With Distractors for All Subject Groups (n=15 per cell)

	Hospitalized	Nonhospitalized
Paranoid Schizophrenics	31.32 (9.67)	31.37 (13.43)
Nonparanoid Schizophrenics	19.40 (4.10)	25.51 (12.49)
Nonpsychiatric Subjects	29.33 (10.86)	34.45 (10.78)

* For two covariates: accuracy scores on the vocabulary subtest without distractors and chronicity

** In parentheses.

Table 15

Tukey's Pairwise Contrasts Among Sample Means* for Scores on the Vocabulary Subtest With Distractors

($\underline{n}$=15 per cell)

		$\underline{M}_3$	$\underline{M}_4$	$\underline{M}_5$	$\underline{M}_1$	$\underline{M}_2$	$\underline{M}_6$
Hospitalized Nonparanoid	$\underline{M}_3$=19.40	-	6.11	9.93**	11.92**	12.97**	15.05**
Nonhospitalized Nonparanoid	$\underline{M}_4$=25.51		-	3.82	5.81	5.86	8.94**
Hospitalized Nonpsychiatric	$\underline{M}_5$=29.33			-	1.99	2.04	5.12
Hospitalized Paranoid	$\underline{M}_1$=31.32				-	.05	3.13
Nonhospitalized Paranoid	$\underline{M}_2$=31.37					-	3.08
Nonhospitalized Nonpsychiatric	$\underline{M}_6$=34.45						-

HSD=7.52 ** $p<.01$

*Covariance-adjusted for accuracy scores on the vocabulary subtest without distractors and chronicity.

Table 16

Summary of Analysis of Covariance of the Distractor Choices on the Vocabulary Subtest With Distractors (Covariate: Accuracy Scores on the Vocabulary Subtest With Distractors)

Source of Variation	SS	df	MS	F	p
Diagnostic Groups (DG)	841.84	2	420.92	4.232	.0175
Hospitalization Status (HOSP)	139.24	1	139.24	1.400	.2384
DG x HOSP	35.26	2	17.63	.177	.8370
Error	8255.07	83	99.45		

Table 17

Covariance-adjusted Means* for Distractor Alternatives on the Vocabulary Subtest With Distractors for All Subject Subgroups (n=15 per cell)

	Hospitalized	Nonhospitalized
Paranoid Schizophrenics	14.44	13.47
Nonparanoid Schizophrenics	23.82	19.80
Nonpsychiatric Subjects	17.92	15.08

*For accuracy scores on the vocabulary subtest with distractors.

Further inspection of Table 10 revealed considerable differences among subgroups in terms of the actually chosen distractor alternative means (the overall mean was 17.60). It is apparent that the means of distractor choices are, to a sizable extent, inversely related to the accuracy means on the D subtest. Specifically, the product-moment correlation coefficient between number of distractor choices and correct scores on the D subtest was found to be -.67 ($p<.01$). A 3 x 2 factorial analysis of covariance, with the D accuracy scores as the covariate, resulted in a significant main effect ($F(2,83)=4.23$, $p<.017$) for diagnostic groups (Table 16). The main effect of hospitalization status and the interaction were not significant. The covariance-adjusted means of the distractor choices for all six subject subgroups are given in Table 17. Based on the significant ($p<.01$) orthogonal comparison differences between the nonparanoid schizophrenics' performance and that of the combined groups of paranoid and nonpsychiatric patients, it appears that the nonparanoid schizophrenics, as opposed to the paranoid or nonpsychiatric subjects, are more likely to choose distractor alternatives than correct or incorrect but nondistractor alternatives.

Finally, differences among subgroups in terms of filler item accuracy scores were analyzed in a two-way analysis of variance (Table 18). This analysis yielded

Table 18

Summary of Analysis of Variance for the Vocabulary Test Filler Item Accuracy Scores

Source of Variation	SS	df	MS	F	p
Diagnostic Groups (DG)	235.26	2	127.63	6.96	.01
Hospitalization Status (HOSP)	205.50	1	205.50	11.21	.01
DG x HOSP	45.08	2	22.54	1.22	n.s.
Error	1539.76	84	18.33		

significant main effects for diagnostic groups ($F(2,84)=6.96$, $p<.01$) and hospitalization status ($F(1,84)=11.21$, $p<.01$) and a nonsignificant interaction. Subsequent pairwise comparisons among filler item accuracy means (Table 19) showed that the hospitalized nonparanoid schizophrenics differed significantly ($p<.05$ or beyond) from all other subgroups except from the hospitalized paranoid schizophrenic patients. It may be reasoned that institutionalized nonparanoid schizophrenics tend to respond at random not only on the filler items, but also on the other and more critical vocabulary items.

Taken together, the analyses of associative interference vocabulary performance suggest that the nonparanoid schizophrenics, especially if institutionalized, perform less well on the vocabulary test indices. Unlike the paranoid schizophrenics, who performed similarly to the physically ill subjects, the nonparanoid schizophrenics, by virtue of making distractor errors, gave fewer correct responses on the subtest with distractors than on the subtest without distractors. A prolonged hospital stay, hypothesized to be implicated in heightened responsiveness to associative distractors in all institutionalized groups, appears to be specifically related to the differential performance of the nonparanoid schizophrenic patients. The relationship of prolonged hospitalization to heightened

Table 19

Tukey's Pairwise Contrasts Among Sample Means for Accuracy Scores on Filler Items

(n=15 per cell)

		M_3	M_1	M_4	M_5	M_2	M_6
Hospitalized Nonparanoid	M_3=11.66	-	3.47	4.74*	5.80**	6.54**	7.07**
Hospitalized Paranoid	M_1=15.13		-	1.27	2.33	3.07	3.60
Nonhospitalized Nonparanoid	M_4=16.40			-	1.06	1.80	2.33
Hospitalized Nonpsychiatric	M_5=17.46				-	.74	1.27
Nonhospitalized Paranoid	M_2=18.20					-	.53
Nonhospitalized Nonpsychiatric	M_6=18.73						-

HSD=4.57 *p<.05

5.46 **p<.01

susceptibility to distractors in paranoid and nonpsychiatric patients, on the other hand, is much weaker.

Other Analyses

The results thus far have dealt with mean differences between patient groups. In order to determine the actual number (percentage) of subjects in the various subgroups who exhibited a rather pronounced susceptibility to associative intrusions, a combined criterion of the ND minus D accuracy score $\geq$ 9 and proportion of actual distractor choices to total D subtest errors $\left(\frac{Distractors}{60-D}\right) \geq .5$ was adopted. This criterion was selected in accord with the post hoc observation that none of the nonhospitalized nonpsychiatric subjects produced a ND - D difference greater than 9 points *and* chose twice as many distractors than correct alternatives on the subtest with distractors. On the basis of this double criterion, 9 (60 per cent) of the hospitalized nonparanoid schizophrenics and 6 (40 per cent) of the nonhospitalized nonparanoid schizophrenics could be classified as especially prone to associative distractors; the number of subjects who could be thus classified in the remaining four subgroups ranged between 1 - 3 (6.6 - 20 per cent). Thus, differential vocabulary performance and, by implication, differential susceptibility to associative dis-

tractors, appears to discriminate effectively between the paranoid and nonparanoid schizophrenic groups (χ^2=11.42, p<.001) as well as between the institutionalized paranoid and nonparanoid schizophrenic groups (χ^2=7.03, p<.01).

A similar procedure was used with the index of idiosyncratic thinking from the object sorting measures with an arbitrary optional cut-off point of 2.5. This differentiated between the hospitalized and released patient groups (χ^2=5.07, p<.05) and between the hospitalized and released schizophrenic groups (χ^2=5.45, p<.05). The above criterion also successfully differentiated the paranoid from the nonparanoid schizophrenic groups within the institutionalized subsample: 2 (13.3 per cent) of the paranoid inpatients and 7 (46.6 per cent) of the nonparanoid inpatients exhibited more frequent and/or more severe instances of bizarre thinking (χ^2=3.96, p<.05).

Thus, both associative intrusions and idiosyncratic thinking appear once again able to discriminate between diagnostic subgroups. These results reinforce the conclusions from the main analyses, although it must be stressed that the cut-off points used were selected for optimal discrimination between groups and require cross-validation before they can be of any practical use.

Chapter 5

Discussion

This chapter begins with a brief appraisal of the degree to which the present study did control potentially influencing variables that otherwise could have invalidated or at least seriously compromised the interpretation of the findings. The second section presents the main results as these relate to the major hypotheses of the study. Further sections deal with a comparison of present findings to findings of earlier studies, and with the ability of the various measures used in this investigation to discriminate between subject groups. The remaining sections touch upon the influence of psychoactive medication and the nature of control subjects as possible limiting factors of the study. Finally, some practical implications are brought forward.

Group Comparability

Considerable effort was made to match the experimental subgroups in terms of several possibly influential background characteristics. In the first place, it may be noted that the subgroups were adequately matched on length of hospitalization (for institutionalized subgroups), and

that they also approached equivalence as to their gender representation, age, education, and socio-economic status, although the last was not precisely determined for lack of information. In effect, however, one of the subgroups (the nonhospitalized paranoid schizophrenics) contained more males than females, and the nonhospitalized non-psychiatric subjects were more educated than subjects in other subgroups. Additionally, the hospitalized subjects were older than their nonhospitalized counterparts. None of these variables, however, was deemed to have had any appreciable effects on the dependent measures under investigation (see the correlations reported in the previous chapter).

Premorbid adjustment indices revealed the predominance of "poor" premorbids (41 cases) among the schizophrenic patients, with only 6 subjects rated as "good" premorbids, and the remaining 13 subjects categorized as "borderline" cases. This is hardly surprising given the chronic status of all subjects, but it did make comparisons in terms of premorbid adjustment within the schizophrenic sample impractical. The schizophrenic subgroups were, however, matched on the overall severity of current disturbance, except for the released paranoid schizophrenics who were rated as significantly less disturbed. It is also noteworthy that 9 of these 15 nonhospitalized paranoid

schizophrenics belonged to either the "good" or the "borderline" premorbid adjustment category.

The problem of diagnostic accuracy regarding schizophrenia and its paranoid/nonparanoid subtypes was largely avoided by the use of conservative inclusion criteria (Research Diagnostic Criteria and Venables & O'Connor Scale) in conjunction with hospital diagnoses. Thus, 49 subjects were judged to have a definite diagnosis of schizophrenia and the remaining 11 subjects met the requirements for probable schizophrenia according to the Research Diagnostic Criteria. Still, some possible sampling problems may have arisen as a result of possible disappearance of paranoid symptoms with chronicity (Depue & Woodburn, 1975; Strauss, 1973), or perhaps as a result of amelioration in severity of symptoms with length of illness and/or institutionalization (cf. Bleuler, 1973; Weiner, 1966). It should also be kept in mind that the present definition of paranoid schizophrenia was quite stringent.

Given the objectives of the present investigation, the crucial variable, length of illness (chronicity), unfortunately could not, within the constraints of subject selection, be held constant. Inequalities between some of the subgroups, especially between the released paranoid schizophrenic and the hospitalized nonparanoid schizophrenic patients, suggested the use of covariance techniques

in the analyses of the dependent variable measures. However, in view of the minimal effects exerted by chronicity on both vocabulary and concept formation scores, it may be concluded that this important variable was controlled (compare the analyses of covariance presented in the previous chapter to the analyses of variance in Appendices 11.1 and 11.2, and Appendix 12). Once again, it must be stressed that the subjects participating in the study were in absolute terms chronic, i.e., ill for almost 18 years on the average with a range of 5 - 36 years, and that within this limit, chronicity differences were relatively small.

Thus, matching of the subjects in the various subgroups for potentially influencing variables was successful in certain respects and not quite successful in others. These latter instances, and especially those where statistical control could not be applied, suggest some caution concerning the interpretation of the data.

Main Results

With regard to the general guiding hypotheses, as they were proposed in Chapter 1, the results of the present study provide qualified support for all hypotheses.

Hypothesis 1a had predicted greater susceptibility to associative intrusions in vocabulary performance for hospitalized patients, regardless of diagnosis. Support for

this hypothesis was found in the case of institutionalized nonparanoid schizophrenics who were indeed more susceptible to distractors than their noninstitutionalized counterparts. On the other hand, there were no significant differences between hospitalized and released paranoid schizophrenics, and between hospitalized and released nonpsychiatric patients in vocabulary performance (Table 15).

Hypothesis 1b had predicted a similar difference between hospitalized and nonhospitalized patients in terms of concept formation performance. The hypothesis received support for measures of idiosyncratic thinking and concrete thinking, but was not supported for the remaining indices of concept formation (i.e., behavioral overinclusion, conceptual overinclusion, and underinclusive thinking). Pairwise comparisons showed that the significant differences involved higher levels of idiosyncratic thinking (Table 9) in hospitalized nonparanoid schizophrenics when these subjects were compared to all other subject subgroups with the exception of the hospitalized paranoid patients. No significant contrast relevant to this hypothesis was found in the case of the concrete thinking index. Thus, hypothesis 1b was supported primarily in terms of the differential performance of the institutionalized nonparanoid schizophrenic patients in their idiosyncratic thinking tendencies.

Hypothesis 2a had predicted greater susceptibility to associative vocabulary intrusions for nonparanoid schizophrenics relative to the paranoid schizophrenics and the nonpsychiatric patients, again regardless of hospitalization status. This hypothesis was supported to some extent. The nonparanoid schizophrenics were more susceptible to distractors than the other two diagnostic groups. Also, as had been anticipated, the performance of the paranoid schizophrenics was quite similar to that of the nonpsychiatric patients who in fact did show the least susceptibility to associative distractors. Pairwise contracts (Table 15) indicated that the hospitalized nonparanoid schizophrenics were more susceptible to distractors than either hospitalized or nonhospitalized paranoid schizophrenics. Both hospitalized and released paranoid schizophrenic patients outperformed their hospitalized nonparanoid counterparts, but the difference between either paranoid subgroup and the released nonparanoid schizophrenics fell short of statistical significance.

Hypothesis 2b had predicted a greater deficit in concept formation for nonparanoid schizophrenic patients. This hypothesis received support only in terms of the idiosyncratic thinking index. Whereas the nonparanoid schizophrenic inpatients were significantly more bizarre

in their thinking than were the paranoid schizophrenic inpatients (Table 9), the performance of the latter subgroup was similar to that of the nonpsychiatric inpatients. Other comparisons relevant to this hypothesis failed to reach statistical significance.

Although no interactions between diagnostic categories and hospitalization status were predicted, one significant interaction was obtained in the multivariate analysis of covariance that included all six dependent variable measures (Table 5). However, no interactions were found in the univariate covariance analyses involving vocabulary scores alone, concept formation ratings alone, and in the multivariate analysis of covariance of concept formation measures. It may be that the one obtained interaction resulted from contributions of all dependent measures and their cumulative effects.

Thus, summarizing the discussion up to this point, the present data do not allow unequivocal conclusions as to the major question whether disordered thought in chronic schizophrenic patients is the result of a long-term illness or of prolonged and continuous stay in hospital. In the light of the above findings it appears that neither of these propositions can provide an entirely satisfactory answer, even though both length of illness and length of hospitalization variables are related to cognitive functioning

of institutionalized schizophrenic patients. Apparently, the answer would require reformulation of the experimental question in terms of particular subtypes of schizophrenics, particular indices of thought disorder, and particular measuring instruments.

Accordingly, it can be stated that the long-term nonparanoid schizophrenic inpatients (more than outpatients) are prone to associative interference as measured by the Chapman vocabulary test and exhibit idiosyncratic thinking as determined by object sorting tasks. These patients are also more likely to resort to guessing on vocabulary items. The hospitalized paranoid schizophrenics, on the other hand, are relatively free of associative intrusions, and experience significantly less bizarre ideation than the nonparanoid schizophrenics. In other words, the ability of the *hospitalized nonparanoid schizophrenic patients* to withstand interference from associative distractors on a forced-choice vocabulary task and to ward-off forming concepts in a personally peculiar manner or for illogical or socially unshared reasons may be adversely affected by prolonged hospitalization. Differential performance scores on the vocabulary subtests and the idiosyncratic index of the Object Sorting Test therefore appear to be better suited for the appraisal of long-term cognitive deficit than other (e.g., the remaining Object Sorting

Test measures) indices, especially in schizophrenics who are not paranoid.

While differences in performance between long-term paranoid and nonparanoid schizophrenics evidently do exist, the extent to which thought pathology is unique to schizophrenia also requires some discussion. Previous data (e.g., Harrow & Quinlan, 1977; Klinka & Papageorgis, 1976; Miller, 1975) have indicated the presence of cognitive deficits in nonschizophrenic samples. Additionally, Harrow and Quinlan pointed out that acute disturbance affects the level of thought pathology in all psychiatric, and not only schizophrenic, patients. The distinction between mild and severe levels of disordered thought was also considered important since the more severe thought disorder was found more often in schizophrenics whereas milder levels characterized both nonschizophrenic and some acutely disturbed schizophrenic patients. The present data suggest that institutionalized nonparanoid schizophrenics perform at significantly elevated levels on certain measures of thought disorder. The remaining groups of paranoid and physically ill patients are more or less comparable to each other. Depending on one's definition of "thought disorder," it is either limited to a subgroup of these chronic schizophrenics or it is to be found in schizophrenic and nonpsychiatric patients, albeit with greater severity among some schizophrenics.

Comparison to Findings of Earlier Studies

The obtained support for hypotheses 1a and 2a suggests that the present findings in effect replicate vocabulary performance results previously reported with comparable samples of schizophrenic patients (Klinka & Papageorgis, 1976; Rattan & Chapman, 1973). Furthermore (Table 20), the vocabulary subtest means from the present study are similar to means reported in the earlier investigations. Table 20 compares data from the present sample of long-term hospitalized schizophrenic patients to data from chronic schizophrenics reported previously. It can be seen that mean accuracy scores on the two subtests (with the exception of the paranoid patients) are reasonably similar and that the differential accuracy between the two subtests is consistently obtained in all investigations. In addition, actual distractor choice means are proportionally and inversely related to the accuracy means of the subtest with associative distractors. Thus, the decreased accuracy on this subtest appears to be mainly the result of subjects' actually choosing the associative distractor alternatives. It is also noteworthy that the means between investigations are comparable despite the nonmedicated status of the Rattan and Chapman sample. The findings further suggest that paranoid schizophrenics should be

Table 20

Accuracy and Distractor Mean Scores of Long-term Hospitalized Schizophrenic Patients on the Multiple-choice Vocabulary Test

	Klinka, 1980			Klinka and Papageorgis, 1976	Rattan and Chapman, 1973
	Paranoid Schizophrenics (n=15)	Nonparanoid Schizophrenics (n=15)	Paranoid and Nonparanoid Schizophrenics combined (N=30)	Medicated (mixed) Schizophrenics (N=14)	Nonmedicated (mixed) Schizophrenics (N=42)
ND[a] subtest	29.13	31.13	30.13	23.92	28.00
D[a] subtest	27.86	17.60	22.73	17.78	22.43
Distractors	14.86	30.53	22.69	27.94	21.79

[a] ND: Subtest without distractors; D: Subtest with distractors.

viewed as a distinct group from other schizophrenic patients.

With regard to Object Sorting Test indices, the most appropriate data available for comparison with the present data are means on behavioral overinclusion, conceptual overinclusion, and idiosyncratic thinking obtained by Harrow, Tucker, Himmelhoch, and Putnam (1972). Table 21 shows data relevant to this comparison. It should be noted that the Harrow et al. sample was composed of female schizophrenics with an average length of current hospitalization of 9.8 years. Despite the differences between the two samples, the means for idiosyncratic thinking and conceptual overinclusion are quite similar, and are particularly so in the case of the nonparanoid schizophrenic patients. Again, the paranoid schizophrenic patients appear to represent a group that is distinct from other schizophrenic patients.

Ability of the Various Measures to Discriminate Between Groups

There seems to be little reason to doubt the utility of the Rattan and Chapman vocabulary subtests for studies that evaluate cognitive deficits. The mean differences between the hospitalized nonparanoid schizophrenics and all other groups were, with only one exception, significant (Table 15), as were the relevant *chi*-square comparisons

Table 21

Mean Rating Scores on Long-term Hospitalized Schizophrenic Patients on Some Concept Formation Measures

	Klinka, 1980			Harrow et al., 1972
	Paranoid Schizophrenics (n=15)	Nonparanoid Schizophrenics (n=15)	Paranoid and Nonparanoid Schizophrenics combined (N=30)	Female (mixed) Schizophrenics (N=31)
Behavioral Overinclusion	16.86	20.06	18.46	30.61
Conceptual Overinclusion	1.96	2.10	2.03	2.45
Idiosyncratic Thinking	1.50	2.03	1.76	2.19

reported in the last section of the previous chapter.

The measure of behavioral overinclusion, in contrast, failed to differentiate between groups: mean scores were quite similar and relatively low. It seems that this index, if elevated, may indeed measure patients' excessive behavioral output rather than the quality of (schizophrenic) thinking. Low scores obtained on behavioral overinclusion then can be plausibly explained, in line with Harrow, Tucker, Himmelhoch, and Putnam (1972), in terms of the subjects' reduced mental and motor activities. Characteristics of apathy and withdrawal, frequently observed in patients with prolonged hospitalization, are certainly not inconsistent with the above suggestion. Likewise, lowered motivational and energy levels are, speculatively speaking, major reasons behind comparatively low behavioral overinclusion scores of nonhospitalized yet still chronically ill subjects.

Conceptual overinclusiveness was found to be elevated for both paranoid and nonparanoid schizophrenics regardless of their hospitalization status, and slightly elevated for hospitalized physically ill patients. Thus, this index may be useful for evaluating certain aspects of disturbed thinking in schizophrenic patients (Harrow, Harkavy, Bromet, & Tucker, 1973), but does not appear to be particularly suitable for comparison of hospitalization

effects in long-term schizophrenic patients.

The index of idiosyncratic thinking, on the other hand, was helpful in differentiating among various subgroups. The mean differences between the hospitalized nonparanoid schizophrenics and all other subgroups were, again with only one exception, significant (Table 9). Also significant were the relevant *chi*-square contrasts presented earlier.

Comparison of the present findings to related post-hospital data of acutely hospitalized schizophrenics by Harrow et al. (1973) lend further, though qualified, support to the Harrow team's contention concerning consistency of selected thought disorder indices over time. It is probable that conceptual overinclusiveness, besides being a function of acute pathology, is a permanent characteristic of disturbed thinking for a subgroup of acute schizophrenics. Idiosyncratic components, however, have a greater chance of continuing to characterize the cognitive activity of acutely disturbed schizophrenics, but only when these patients bear primarily a nonparanoid diagnosis and remain institutionalized.

Finally, based on the present results, the measures of concrete and underinclusive thinking appear to be of rather limited utility. Although the ability to generate abstract categories on object sorting tasks seemed better preserved

in nonhospitalized than in hospitalized subjects, the subgroup differences were nonsignificant. Further refinement of the concrete thinking index is therefore needed before it may prove its usefulness in discriminating between various modes of cognitive functioning. As to the schizophrenic subgroups' mean scores on the underinclusive thinking measure, they were higher relative to scores on the conceptual overinclusion measure. If the two measures are viewed as extremes of a dimension measuring "inclusiveness," then it may be argued, in accord with Andreasen and Powers (1976), that schizophrenic patients tend to be disturbed in the direction of underinclusiveness more than in terms of conceptual overinclusion. This matter certainly warrants further investigation.

Influence of Psychoactive Medication

With the exception of 5 nonpsychiatric patients who were completely drug-free at the time of testing, the present study dealt with medicated subjects. All psychiatric (schizophrenic) patients were on either a single type or on various combinations of phenothiazines or similarly-acting compounds, frequently supplemented with medication against side-effects. Nonpsychiatric patients were taking small dosages of minor tranquilizers, predominantly as muscle relaxants, and/or specific drugs on

an individual basis, such as analgesics, sedatives, antihypertensives, and antibiotics, multivitamins, etc. (Appendix 9.1).

As stated previously, daily drug intake of schizophrenic inpatients was significantly ($p<.05$) higher than that of schizophrenic outpatients, but there were no significant differences within the hospitalized and within the outpatient subgroups. In view of the low and nonsignificant relationships obtained between the daily amounts of psychoactive medication and the subjects' performance on all dependent measures, it seems that psychoactive drugs probably have a negligible differential effect on the thought disorder indices employed in this study. The present findings, however, may be generalized only to schizophrenic patients under similar antipsychotic drug regimens.

Nature of Control Subjects

The control nonpsychiatric subjects in the present investigation included cases of multiple sclerosis (14 subjects), and Friedreich's ataxia (2 subjects). The inclusion of such cases and perhaps even of patients with permanent spinal injuries may be questioned in light of one of the criteria set up for subject selection, i.e., the exclusion of subjects with past or present signs of organicity.

While earlier studies (e.g., Parsons, Stewart, & Arenberg, 1957; Jambor, 1969) did report evidence suggestive of impairment of conceptual thinking and/or intellectual efficiency, Reitan, Reed, and Dyken (1971) found that multiple sclerosis patients, in contrast to matched medical patients, showed deficiency on a number of tests demanding precise motor functioning, but were relatively mildly impaired in tasks requiring abstract reasoning and logical analysis (cf. Ionik, 1978; Karagan, 1979). Inconsistencies in research findings with regard to estimates of intellectual decrement in the multiple sclerosis subjects may, to a large extent, depend on the particular tests used; and also to some extent on selection criteria for control groups, and hospitalization status. Furthermore, the insidious onset of the multiple sclerosis symptoms, in addition to impeding diagnosis, precludes proper determination of the commencement of the disease and, therefore, of length of illness. Finally, as the physical symptoms characteristically follow different courses and fluctuate with time, or in severity in some cases, so may cognitive functioning.

In any case, it has been shown that physically ill patients (with the multiple sclerosis patients about equally distributed among hospitalized and nonhospitalized groups) in the present investigation were clearly less

likely to display cognitive impairment than schizophrenic patients. The performance of nonpsychiatric nonhospitalized patients most likely resembles that of healthy normal control subjects. The possible distortion in the data through the inclusion of the multiple sclerosis patients thus may be dismissed in view of the obtained performance levels of both nonpsychiatric samples which indicated minimal intellectual deterioration and/or disordered thought.

The decision to include such patients was also dictated by practical considerations: there simply were not enough control candidates elsewhere suited for matching with long-term schizophrenic patients. Still, only those individuals suffering from demyelinating disease or irreversible spinal cord damage who were judged by hospital staff to be socially adjusted and intellectually intact--within the limits imposed by their condition--served as nonpsychiatric controls in this investigation. (These same criteria were also critical for the selection of other nonpsychiatric control subjects).

Thus, even though some noticeable capriciousness and irritability were seen in some of the control subjects, no subject presented evidence of personality disturbance beyond what could be clearly understood as a straightforward consequence of efforts to adjust to a debilitating physical illness.

Practical Implications

Bearing in mind that the present investigation has dealt only with a few selected aspects of thought disorder in schizophrenia and that, significant as these aspects may be, they clearly represent a very limited area of this disorder, it is still possible to venture a few tentative conclusions which contain some practical implications.

In the first place, as the findings from the nonparanoid schizophrenics make clear, disordered thinking is a characteristic of some long-term schizophrenics even when their hospital stay has been quite brief, relatively speaking. Thus, disordered thought, as defined by the measures used in the present investigation, cannot be entirely attributed to the effects of prolonged hospitalization. At the same time, however, disordered thinking is more pronounced in those nonparanoid schizophrenics who have spent many years in hospital. One possible interpretation would be that lengthy hospitalization aggravates an already existing characteristic in nonparanoid schizophrenics who may be for some reason particularly vulnerable to hospitalization effects or at least lack the invulnerability that may characterize paranoid schizophrenics (see below). In any event, from the practical standpoint, it would appear especially important to attempt to keep hospitalization

of nonparanoid schizophrenics to a minimum consistent with the requirements of treatment and other broader societal considerations.

Secondly, the picture that emerges concerning paranoid schizophrenics is quite different. Again bearing in mind the limitations of the variables examined in the present study, chronic paranoid schizophrenics appear to be only minimally affected by certain forms of disordered thought and in this sense are quite different from nonparanoid schizophrenics. Morover, paranoid schizophrenic patients do not seem to be adversely affected by prolonged hospitalization. The reasons for this are unclear, however, it may be simply that no illness process specific to the aspects of thought disorder under consideration exists in these patients to begin with and, hence, there is little likelihood of aggravation of what may have never existed or did exist only temporarily during an early, acute phase of the psychosis. Alternatively, the paranoid schizophrenics may be particularly able to resist the adverse effects of prolonged institutionalization by means of their greater alertness, suspiciousness, lack of cooperation, and delusional beliefs. In any event, once more the practical implication is that adverse effects of institutionalization should be of less relative concern in the case of paranoid schizophrenic patients.

The findings of the present study have also provided evidence that some aspects of thought disorder (susceptibility to associative intrusions, tendencies toward idiosyncratic or bizarre concept formation) are more characteristic of long-term schizophrenic psychoses than are other aspects (e.g., behavioral overinclusion). Both associative distractor susceptibility and idiosyncratic thinking can cause considerable departures from consensually defined perceptions of reality and socially expected patterns of interpersonal communication. Therapeutic efforts directed at these specific deficits would be most useful especially in the case of nonparanoid schizophrenic patients regardless of hospitalization status. For instance, communication to such patients should probably emphasize brevity and unequivocality while avoiding vagueness, equivocality, and metaphorical language. In a more general vein, the importance of keeping meaningful communication channels between patients and their immediate social environments open, as a part of resocialization efforts (Paul, 1968), appears quite obvious.

Finally, an obvious but still necessary further note of caution must be added. All the differences in vocabulary and conceptual performance that were obtained in the present study are clearly differences between *groups* of patients. They do not necessarily apply to single individuals within

any of these groups, and, hence, by themselves have probably little utility for individual diagnostic assignments.

Chapter 6

Summary and Conclusions

The present study was designed to investigate susceptibility to interference from associative distractors and certain concept formation peculiarities in samples of long-term schizophrenic and nonpsychiatric patients that consisted of hospitalized and nonhospitalized subjects. Ninety patients in the three basic groups, i.e., paranoid schizophrenic, nonparanoid schizophrenic, and non-psychiatric patients were selected according to their hospitalization status (inpatients with minimally 2 years of continuous stay in hospital, and outpatients with single or multiple hospital admissions not exceeding 6 months) so that six subgroups were formed each containing an equal number of subjects (n=15). Since the subgroups were comparable on some but not quite equivalent on other variables of potential influence (current severity of illness, chronicity), statistical controls were introduced in the analyses, and the data were interpreted with certain specified reservations.

Main objectives of the study included separation of chronicity (length of illness) from length of hospitalization, specification of differential task performance in

relation to diagnosis, and the assessment of effects of institutionalization on the above cognitive performance measures. All subjects were individually tested with the multiple-choice vocabulary test of associative interference and with the Object Sorting Test. As had been hypothesized, the nonparanoid hospitalized schizophrenics were found to be far more susceptible to vocabulary associative interference than the hospitalized paranoid schizophrenics or the hospitalized nonpsychiatric patients. Even among nonhospitalized patients, the nonparanoid schizophrenics showed greater susceptibility to associative distractors than the other two groups. In terms of concept formation indices derived from the Object Sorting Test, the nonparanoid schizophrenic inpatients showed instances of idiosyncratic thinking significantly more often than patients in every other subgroup.

Thus, the results of the present investigation indicated that:

(a) certain measures of thought disorder (vocabulary associative interference and idiosyncratic thinking) are better suited for the assessment of long-term cognitive deficits than other measures (e.g., overinclusion);

(b) prolonged institutional stay has an adverse but quite specific relationship to the cognitive perform-

ance of *some* chronic patients; specifically, this adverse relationship characterizes nonparanoid schizophrenics, while there is only minimal evidence for its presence among stringently defined paranoid schizophrenic patients.

Directions for Further Research

While the present investigation generally confirmed the utility of some of the measures used, it also raises questions about the suitability of others and/or their inherent limitations.

Thus, a reasonable first step for future research should involve the development of additional indices of thought processes or conceptual styles that are suitable for use with both normal and psychiatrically disturbed individuals. Categories of disordered verbalization, based on free speech samples, as described by Siegel, Harrow, Reilly, and Tucker (1976), are one example of such measures. In cases where new test devices are contemplated, careful consideration should probably be given to the structure of natural language rather than focusing on single, isolated words as is clearly the case with the vocabulary used in the present study. Pavy (1968) rightly argued that placing an emphasis on misinterpretation of ambiguous words, mediated by response bias, limits

the generalizability of findings. Following Miller's (1965) argument, Pavy went on to state that

> . . . the meaning of an utterance is not the linear sum of the meanings of the words that comprise it. This implies that studies which restrict themselves to the meaning of isolated words are dealing with a quite unnatural situation and are probably of very limited value . . . the pen in 'fountain pen' and the pen in 'cattle pen' are very different pens. (Pavy, 1968, p. 172).

In this perspective, newly developed psychometric instruments should seriously consider issues of transformational grammar, colloquial phrasing (cf. Miller, 1974) and perhaps of further separation of the morphemic and/or syntactical (cf. Blaney, 1974) from lexical characteristics of language. Combined efforts of experimental psychopathologists and psycholinguists interested in verbal behavior thus appear necessary in future research of what is known as "formal thought disorder."

Further improvement in subject selection, particularly if investigations are to be conducted by means of a cross-sectional design, is also needed. In view of the complexities of institutionalization variables, the inclusion of other chronic groups is called for; similarly, tighter control of already recognized variables of importance such as patients' cooperativeness (capability and willingness to let themselves be tested), current severity of illness, premorbid adjustment, drug status, and diagnostic subtype is recommended. Differentiation of potential

subjects along lines of marital, socio-economic (occupational), and urban/rural status may also be worth pursuing as well as attempts to operationalize some of the more elusive variables, e.g., ability to withstand social pressures of an institution, motivation for discharge or reasons behind sustained hospitalization, the degree of participation in hospital or community based programs, and the like.

Admittedly, the most methodologically sound and therefore preferable investigations of institutionalization effects should take the form of longitudinal studies of first admission cohorts, as suggested by Strauss (1973), with repeated measurements on a wide range of indices of cognitive functions with known psychometric properties.

BIBLIOGRAPHY

American Psychiatric Association. *Diagnostic and statistical manual of mental disorders* (2nd ed.). Washington, D.C.: American Psychiatric Association, 1968.

American Psychiatric Association. *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington, D.C.: American Psychiatric Association, 1980.

Andreasen, N.C., & Powers, P.S. Psychosis, thought disorder, and regression. *American Journal of Psychiatry*, 1976, *133*, 5, 522-526.

Barton, R. *Institutional neurosis*. Bristol, Eng.: Wright, 1959.

Belknap, I. *Human problems of a state mental hospital*. New York: McGraw-Hill, 1956.

Benjamin, J.D. A method for distinguishing and evaluating formal thinking disorders in schizophrenia. In J.S. Kasanin (Ed.), *Language and thought in schizophrenia*. Berkeley: University of California Press, 1944.

Benjamin, T.B. & Watt, N.F. Psychopathology and semantic interpretation of ambiguous words. *Journal of Abnormal Psychology*, 1969, *74*, 706-714.

Bettelheim, B. Individual and mass behavior in extreme situations. *Journal of Abnormal and Social Psychology*, 1943, *38*, 417-452.

Bettelheim, B., & Sylvester, E. A therapeutic milieu. *American Journal of Orthopsychiatry*, 1948, *18*, 191-206.

Bigelow, D.A., & Beiser, M. *Rehabilitation for the chronically mentally ill: A community program*. Unpublished manuscript, Greater Vancouver Mental Health Service, 1977.

Blaney, P.H. Two studies on the language behavior of schizophrenics. *Journal of Abnormal Psychology*, 1974, *83*, 23-31.

Bleuler, E. *Dementia praecox or the group of schizophrenias*, (J. Zinkin, trans.). New York: International Universities Press, 1950.

Bleuler, M. *The long-term course of the schizophrenic psychoses.* Paper presented as the third Aubrey Lewis Lecture at the Institute of Psychiatry, London, November 14, 1973.

Blishen, B.R. Construction and use of an occupational class scale. *Canadian Journal of Economical and Political Science*, 1958, *24*, 519-531.

Blumberg, S., & Giller, D.W. Some verbal aspects of primary-process thought: A partial replication. *Journal of Personality and Social Psychology*, 1965, *1*, 517-520.

Bock, R.D. *Multivariate Statistical Methods in Behavioral Research.* New York: McGraw-Hill, 1975.

Boland, T.G. & Chapman, L.J. Conflicting predictions from Broen's and Chapman's theories of schizophrenic thought disorder. *Journal of Abnormal Psychology*, 1971, *78*, 52-58.

Bolles, M. & Goldstein, K. A study of the impairment of 'abstract behavior' in schizophrenic patients. *Psychiatric Quarterly*, 1938, *12*, 42-65.

Braginsky, B.M. & Braginsky, D.D. Schizophrenic patients in the psychiatric interview: An experimental study of their effectiveness at manipulation. *Journal of Consulting Psychology*, 1967, *31*, 543-547.

Broen, W.E., Jr. *Schizophrenia: Research and theory.* New York: Academic Press, 1968.

Broen, W.E., Jr., & Storms, L.H. A theory of response interference in schizophrenia. In B.A. Maher (Ed.), *Progress in experimental personality research* (Vol. 4). New York: Academic Press, 1967.

Bromet, E. & Harrow, M. Behavioral overinclusion as a prognostic index in schizophrenic disorders. *Journal of Abnormal Psychology*, 1973, *82*, 345-349.

Burstein, A.G. Some verbal aspects of primary process thought in schizophrenia. *Journal of Abnormal and Social Psychology*, 1961, *62*, 155-157.

Buss, A.H. & Lang, P.J. Psychological deficit in schizophrenia: I. Affect, reinforcement, and concept attainment. *Journal of Abnormal Psychology*, 1965, *70*, 2-24.

Cameron, N. Reasoning, regression and communication in schizophrenics. *Psychological Monographs*, 1938, *50*, (1, Whole No. 221).

Cameron, N. Experimental analysis of schizophrenic thinking. In J.S. Kasanin (Ed.), *Language and thought in schizophrenia*. Berkeley: University of California Press, 1944.

Cameron, N. & Magaret, A. *Behavior Pathology*. Cambridge, Mass.: Riverside Press, 1951.

Chapman, L.J. Intrusion of associative responses into schizophrenic conceptual performance. *Journal of Abnormal and Social Psychology*, 1958, *56*, 374-379.

Chapman, L.J. A reinterpretation of some pathological disturbances in conceptual breadth. *Journal of Abnormal and Social Psychology*, 1961, *62*, 514-519.

Chapman, L.J. The problem of selecting drug-free schizophrenics for research. *Journal of Consulting Psychology*, 1963, *27*, 540-542.

Chapman, L.J., & Chapman, J.P. The interpretation of words in schizophrenia. *Journal of Personality and Social Psychology*, 1965, *1*, 135-146.

Chapman, L.J. & Chapman, J.P. *Disordered thought in schizophrenia*. New York: Appleton-Century-Crofts, 1973. (a)

Chapman, L.J. & Chapman, J.P. Problems in the measurement of cognitive deficit. *Psychological Bulletin*, 1973, *79*, 380-385. (b)

Chapman, L.J. & Chapman, J.P. Schizophrenic cognitive deficit as a function of scoring standards. *Journal of Abnormal Psychology*, 1975, *84*, 114-121. (a)

Chapman, J.J. & Chapman, J.P. Schizophrenic reasoning about affect-laden material. *Archives of General Psychiatry*, 1975, *32*, 1233-1236. (b)

Chapman, L.J. & Chapman, J.P. Selection of subjects in studies of schizophrenic cognition. *Journal of Abnormal Psychology*, 1977, *86*, 10-15.

Chapman, L.J. & Chapman, J.P. The measurement of differential deficit. *Journal of Psychiatric Research*, 1978 *14*, 303-311.

Chapman, L.J. & Knowles, R.R. The effects of phenothiazine on disordered thought in schizophrenia. *Journal of Consulting Psychology*, 1964, *28*, 165-169.

Chapman, L.J. & Taylor, J.A. Breadth of deviate concepts used by schizophrenics. *Journal of Abnormal and Social Psychology*, 1957, *54*, 118-123.

Chapman, L.J., Chapman, J.P., & Daut, R.L. Schizophrenic response to affectivity in word definition. *Journal of Abnormal Psychology*, 1974, *83*, 616-622.

Chapman, L.J., Chapman, J.P., & Daut, R.L. Schizophrenic inability to disattend from strong aspects of meaning. *Journal of Abnormal Psychology*, 1976, *85*, 35-40.

Chapman, L.J., Chapman, J.P., & Miller, G.A. A theory of verbal behavior in schizophrenia. In B.A. Maher (Ed.), *Progress in experimental personality research* (Vol. 1). New York: Academic Press, 1964.

Davis, K.M., & Blaney, P.H. Overinclusion and self-editing in schizophrenia. *Journal of Abnormal Psychology*, 1976, *85*, 51-60.

Deckner, C.W. & Blanton, R.L. Effect of context and strength of association on schizophrenic verbal behavior. *Journal of Abnormal Psychology*, 1969, *74*, 348-351.

Depue, R.A., & Woodburn, L. Disappearance of paranoid symptoms with chronicity. *Journal of Abnormal Psychology*, 1975, *84*, 84-86.

Endicott, J., Spitzer, R.L., Fleiss, J.L., & Cohen, J. The global assessment scale. A procedure for measuring overall severity of psychiatric disturbance. *Archives of General Psychiatry*, 1976, *33*, 766-771.

Foulds, G.A., Hope, K., McPherson, F.M., & Mayo, P.R. Cognitive disorder among the schizophrenics. II. Differences between the subcategories. *British Journal of Psychiatry*, 1967, *113*, 1369-1374.

Gathercole, C.E. A note on some tests of overinclusive thinking. *British Journal of Medical Psychology*, 1965, *38*, 59-62.

Goffman, E. *Asylums: Essays on the social situation of mental patients and other inmates*. New York: Anchor Books, 1961.

Goldberg, S.C., Klerman, G.L., & Cole, J.O. Changes in schizophrenic psychopathology and ward behavior: A function of phenothiazine treatment. *British Journal of Psychiatry*, 1965, *111*, 120-133.

Goldberg, S.C., Schooler, N.T., & Mattson, N. Paranoid and withdrawal symptoms in schizophrenia: Differential symptom reduction over time. *Journal of Nervous and Mental Disease*, 1967, *145*, 158-162.

Goldstein, K. Methodological approach to the study of schizophrenic thought disorder. In J.S. Kasanin (Ed.), *Language and thought in schizophrenia*. Berkeley: University of California Press, 1944.

Goldstein, M.J. Further data concerning the relation between premorbid adjustment and paranoid symptomatology. *Schizophrenia Bulletin*, 1978, *4*, 236-243.

Goldstein, G. & Halperin, K.M. Neurophyschological differences among subtypes of schizophrenia. *Journal of Abnormal Psychology*, 1977, *86*, 34-40.

Goldstein, K., & Scheerer, M. Abstract and concrete behavior: An experimental study with special tests. *Psychological Monographs*, 1941, *53*, (2, Whole No. 239).

Goldstein, M.J., Judd, L.L., Rodnick, E.H., & LaPolla, A. Psychophysiological and behavioral effects of phenothiazine in acute schizophrenics as a function of premorbid status. *Journal of Psychiatric Research*, 1969, *6*, 271-287.

Gordon, H.L., & Groth, C. Mental patients wanting to stay in the hospital. *Archives of General Psychiatry*, 1961, *4*, 124-130.

Haggerty, A.D. The effects of long-term hospitalization or institutionalization upon the language development of children. *Journal of Genetic Psychology*, 1959, *94*, 205-209.

Hamsher, K. de S., & Arnold, K.O. A test of Chapman's theory of schizophrenic thought disorder. *Journal of Abnormal Psychology*, 1976, *85*, 296-302.

Harris, J.G. Jr. An abbreviated form of the Phillips rating scale of premorbid adjustment in schizophrenia. *Journal of Abnormal Psychology*, 1975, *84*, 129-137.

Harrow, M. & Quinlan, D. Is disordered thinking unique to schizophrenia? *Archives of General Psychiatry*, 1977, *34*, 15-21.

Harrow, M., Bromet, E., & Quinlan, D. Predictors of post-hospital adjustment in schizophrenia. *Journal of Nervous and Mental Disease*, 1974, *158*, 25-36.

Harrow, M., Tucker, G., & Shield, P. Stimulus overinclusion in schizophrenic disorders. *Archives of General Psychiatry*, 1972, *27*, 40-45.

Harrow, M., Harkavy, K., Bromet, E., & Tucker, G.J. A longitudinal study of schizophrenic thinking. *Archives of General Psychiatry*, 1973, *28*, 179-182.

Harrow, M., Tucker, G., Himmelhoch, J., & Putnam, N. Jr. Schizophrenic 'thought disorders' after the acute phase. *American Journal of Psychiatry*, 1972, *128*, 824-829.

Harrow, M., Himmelhoch, J., Tucker, G., Hersch, J. & Quinlan, D. Overinclusive thinking in acute schizophrenic patients. *Journal of Abnormal Psychology*, 1972, *79*, 161-168.

Himmelhoch, J., Harrow, M., Tucker, G.J., & Hersh, J. *Manual for assessment of selected aspects of thinking: Object Sorting Test.* ASIS/NAPS # 02206. New York: Microfiche Publications, 1973.

Hollister, L.E. Choice of antipsychotic drugs. *American Journal of Psychiatry*, 1970, *127*, 186-190.

Ionik, R.J. Neuropsychological stability in multiple sclerosis. *Journal of Consulting and Clinical Psychology*, 1978, *46*, 913-923.

Jambor, K.E. Cognitive functioning in multiple sclerosis. *British Journal of Psychiatry*, 1969, *115*, 765-775.

Johannsen, W.J. & O'Connell, M.J. Institutionalization and perceptual decrement in chronic schizophrenia. *Perceptual and Motor Skills*, 1965, *21*, 244-246.

Johannsen, W.J., Friedman, S.H., & Liccione, J.V. Visual perception as a function of chronicity in schizophrenia. *British Journal of Psychiatry*, 1964, *110*, 561-570.

Judd, L.L., Goldstein, M.J., Rodnick, E.H., & Jackson, N.L.P., Jr. Phenothiazine effects in good premorbid schizophrenics divided into paranoid-nonparanoid status. *Archives of General Psychiatry, 29*, 207-211.

Karagan, N.J. Intellectual functioning in Duchenne muscular dystrophy: A review. *Psychological Bulletin*, 1979, *86*, 250-259.

Kasanin, J. & Hanfmann, F. An experimental study of concept formation in schizophrenia. *American Journal of Psychiatry*, 1938, *95*, 35-52.

Klinka, J. & Papageorgis, D. Associative intrusions in the vocabulary performance of schizophrenic and other patients. *British Journal of Psychiatry*, 1976, *129*, 584-591.

Klonoff, H., McDougall, G., Clark, C., Kramer, P., & Horgan, J. The neuropsychological, psychiatric, and physical effects of prolonged and severe stress: 30 years later. *Journal of Nervous and Mental Disease*, 1976, *163*, 246-252.

Knight, R.A., Roff, J.D., Barrnett, J., & Moss, J.L. Concurrent and predictive validity of thought disorder and affectivity: A 22-year follow-up of acute schizophrenics. *Journal of Abnormal Psychology*, 1979, *88*, 1-12.

Kraepelin, E. *Dementia praecox and paraphrenia*, (R.M. Barclay, trans.). Edinburgh: E. & S. Livingstone, 1919.

Lang, P.J., & Buss, A.H. Psychological deficit in schizophrenia: II. Interference and activation. *Journal of Abnormal Psychology*, 1965, *70*, 77-106.

Lovibond, S.H. The Object Sorting Test and conceptual thinking in schizophrenia. *Australian Journal of Psychology*, 1953, *5*, 52-70.

Ludwig, A.M. & Farrelly, F. The code of chronicity. *Archives of General Psychiatry*, 1966, *15*, 562-568.

Maher, B.A. *Principles of psychopathology*. New York: McGraw-Hill, 1966.

McGaughran, L.S. Predicting language behavior from object sorting. *Journal of Abnormal and Social Psychology*, 1954, *49*, 183-195.

McGaughran, L.S., & Moran, L.J. "Conceptual Level" vs. "conceptual area" analysis of object-sorting behavior of schizophrenic and nonpsychiatric groups. *Journal of Abnormal and Social Psychology*, 1956, *52*, 43-50.

McKinney, M.C. Effects of length of hospitalization, frequency of penalty, and amount of penalty on the probability learning of schizophrenics. *Journal of Abnormal Psychology*, 1973, *82*, 357-362.

Mednick, S.A., McNeil, T.F. Current methodology in research on the etiology of schizophrenia: Serious difficulties which suggest the use of the high-risk group method. *Psychological Bulletin*, 1968, *70*, 6, 681-693.

Miller, B. Semantic misinterpretations of ambiguous communications in schizophrenia. *Archives of General Psychiatry*, 1974, *30*, 435-440.

Miller, G.A. Some preliminaries to psycholinguistics. *American Psychologist*, 1965, *20*, 15-20.

Miller, W.R. Psychological deficit in depression. *Psychological Bulletin*, 1975, *82*, 238-260.

Moran, L.J. Vocabulary knowledge and usage of normal and schizophrenic subjects. *Psychological Monographs*, 1953, *67*, (20, Whole No. 370).

Moran, L.J., Gorham, D.R., & Holtzman, W.H. Vocabulary knowledge and usage of schizophrenic subjects: A six-year follow-up. *Journal of Abnormal and Social Psychology*, 1960, *61*, 246-254.

Mourer, S.A. A prediction of patterns of schizophrenic error resulting from semantic generalization. *Journal of Abnormal Psychology*, 1973, *81*, 250-254.

Neuringer, C., Fiske, J.P., Schmidt, M.W., & Goldstein, G. Adherence to strong verbal meaning definition in schizophrenics. *Journal of Genetic Psychology*, 1972, *121*, 315-323.

Neuringer, C., Goldstein, G., & Fiske, J.P. Schizophrenic adherence to strong meaning associations. *Perceptual and Motor Skills*, 1969, *29*, 394.

Oltmanns, T.F. & Neale, J.M. Schizophrenic performance when distractors are present: Attentional deficit or differential task difficulty? *Journal of Abnormal Psychology*, 1975, *84*, 205-209.

Parsons, O.A., Stewart, K.D. & Arenberg, D. Impairment of abstracting ability in multiple sclerosis. *Journal of Nervous and Mental Disease*, 1957, *125*, 221-225.

Paul, G.L. Chronic mental patient: Current status-future directions. *Psychological Bulletin*, 1969, *71*, 81-94.

Pavy, D. Verbal behavior in schizophrenia: A review of recent studies. *Psychological Bulletin*, 1968, *70*, 164-178.

Payne, R.W. An object classification test as a measure of overinclusive thinking in schizophrenic patients. *British Journal of Social and Clinical Psychology*, 1962, *1*, 213-221.

Payne, R.W. The long-term prognostic implications of overinclusive thinking in mental patients: A follow-up study using objective tests. *Proceedings of the IV World Congress of Psychiatry, Madrid, 1966*. New York: Excerpta Medica Foundation, 1968.

Payne, R.W. Disorders of thinking. In C.G. Costello (Ed.), *Symptoms of psychopathology: A handbook*. New York: Wiley, 1970.

Payne, R.W. Cognitive defects in schizophrenia. In J. Hellmuth (Ed.), *Cognitive studies (Vol. 2), Deficits in cognition*. New York: Brunner/Mazel, 1971.

Payne, R.W. The effects of drugs on objective measures of thought disorder in schizophrenic patients. *Psychopharmacologia*, 1972, *24*, 147-158.

Payne, R.W. Cognitive abnormalities. In H.J. Eysenck (Ed.), *Handbook of Abnormal Psychology*. (2nd ed.) London: Pitman, 1973.

Payne, R.W., & Friedlander, D. A short battery of simple tests for measuring overinclusive thinking. *Journal of Mental Science*, 1962, *108*, 362-367.

Payne, R.W., & Hewlett, J.H.G. Thought disorder in psychotic patients. In H.J. Eysenck (Ed.), *Experiments in Personality (Vol. 2)*. London: Routledge & Kegan Paul, 1960.

Payne, R.W., Ancevich, S.S., & Laverty, S.G. Overinclusive thinking in symptom-free schizophrenics. *Canadian Psychiatric Association Journal*, 1963, *8*, 225-234.

Payne, R.W., Matussek, P., & George, E.I. An experimental study of schizophrenic thought disorder. *Journal of Mental Science*, 1959, *105*, 627-652.

Payne, R.W., Friedlander, D., Laverty, S.G., & Haden, P. Overinclusive thought disorder in chronic schizophrenics and its response to 'Proketazine'. *Journal of Mental Science*, 1959, *105*, 627-652.

Payne, R.W., Hawks, D.V., Friendlander, D., & Hart, S.D. The diagnostic significance of overinclusive thinking in an unselected psychiatric population. *British Journal of Psychiatry*, 1972, *120*, 173-182.

Phillips, L. Case history data and prognosis in schizophrenia. *Journal of Nervous and Mental Disease*, 1953, *117*, 515-525.

Pokorny, A.D., Thornby, J., Kaplan, H.B. & Ball, D. Prediction of chronicity in psychiatric patients. *Archives of General Psychiatry*, 1976, *33*, 932-937.

Ralph, D.E., & McCarthy, J.F. Who are paranoid schizophrenics: A brief comment. *Psychological Reports*, 1968, *22*, 193-194.

Rapaport, D., Gill, M., & Schafer, R. *Diagnostic Psychological Testing*. Chicago: Year Book Publishers, 1945.

Rattan, R.B. & Chapman, L.J. Associative intrusions in schizophrenic verbal behaviour. *Journal of Abnormal Psychology*, 1973, *82*, 169-173.

Raulin, M.L., & Chapman, L.J. Schizophrenic recall and contextual constraint. *Journal of Abnormal Psychology*, 1976, *85*, 151-155.

Reitan, R.M., Reed, J.C., & Dyken, M.L. Cognitive, psychomotor and motor correlates of multiple sclerosis. *Journal of Nervous and Mental Disease*, 1971, *153*, 218-224.

Rice, J.K. Disordered language as related to autonomic responsivity and the process-reactive distinction. *Journal of Abnormal Psychology*, 1970, *76*, 50-54.

Ritzler, B.A., & Smith, M. The problem of diagnostic criteria in the study of the paranoid subclassification of schizophrenia. *Schizophrenia Bulletin*, 1976, *2*, 209-217.

Roberts, M.A., & Schuham, A.I. Word associations of schizophrenics and alcoholics as a function of strength of associative distractor. *Journal of Abnormal Psychology*, 1974, *83*, 426-431.

Schein, E.H. Reaction patterns to severe chronic stress in American army prisoners of war of the Chinese. *Journal of Scoial Issues*, 1957, *13*, 21-30.

Schwartz, S. Language and cognition in schizophrenia: A review and synthesis. In S. Schwartz (Ed.), *Language and cognition in schizophrenia*. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1978.

Shakow, D. Segmental set: A theory of the formal psychological deficit in schizophrenia. *Archives of General Psychiatry*, 1962, *6*, 1-17.

Shrout, P.E., & Fleiss, J.L. Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin*, 1979, *86*, 420-428.

Siegel, A., Harrow, M., Reilly, F.E., & Tucker, G.J. Loose associations and disordered speech patterns in chronic schizophrenia. *Journal of Nervous and Mental Disease*, 1976, *162*, 105-112.

Silverman, J. Scanning control mechanism and 'cognitive filtering' in paranoid and nonparanoid schizophrenia. *Journal of Consulting Psychology*, 1964, *28*, 385-393.

Silverman, J., Berg, P.S.D., & Kantor, R. Some perceptual correlates of institutionalization. *Journal of Nervous and Mental Disease*, 1965, *141*, 651-657.

Smith, A. Mental deterioration in chronic schizophrenia. *Journal of Nervous and Mental Disease*, 1964, *139*, 479-487.

Spitzer, R.L., Endicott, J., & Robins, E. *Research diagnostic criteria for a selected group of functional disorders.* Unpublished manuscript, Biometric Research, New York State Psychiatric Institute, 1975.

Spitzer, R.L., Endicott, J., & Robins, E. The research diagnostic criteria: Rationale and reliability. *Archives of General Psychiatry*, 1978, *35*, 773-782.

Spohn, H.E. The case for reporting the drug status of patient subjects in experimental studies of schizophrenic psychopathology. *Journal of Abnormal Psychology*, 1973, *82*, 102-106.

Spohn, H.E., Lacoursiere, R.B., Thompson, K., & Coyne, L. Phenothiazine effects on psychological and physiological dysfunction in chronic schizophrenics. *Archives of General Psychiatry*, 1977, *34*, 633-644.

Strauss, M.E. Behavior differences between acute and chronic schizophrenics: Course of psychosis, effects of institutionalization, or sampling biases? *Psychological Bulletin*, 1973, *79*, 271-279.

Sullivan, H.S. The language of schizophrenia. In J.S. Kasanin (Ed.), *Language and thought in schizophrenia.* Berkeley: University of California Press, 1944.

Test, M.A., & Stein, L.I. Community treatment of the chronic patient: Research overview. *Schizophrenia Bulletin*, 1978, *4*, 350-364.

Tutko, T.A., & Spence, J.T. The performance of process and reactive schizophrenics and brain injured subjects on a conceptual task. *Journal of Abnormal and Social Psychology*, 1962, *65*, 387-394.

Ullmann, L.P. *Institution and outcome.* Oxford: Pergamon Press, 1967.

Venables, P.H., & O'Connor, N. A short scale for rating paranoid schizophrenia. *Journal of Mental Science*, 1959, *105*, 815-818.

Vigotsky, L.S. Thought in schizophrenia. *Archives of Neurology and Psychiatry*, 1934, *31*, 1063-1077.

Vigotsky, L.S. *Thought and language* (E. Hanfmann & G. Vakar, Ed. and trans.). Cambridge and New York: M.I.T.-Wiley, 1962.

Weiner, I.B. *Psychodiagnosis in schizophrenia*. New York: Wiley, 1966.

Wild, C., Singer, M., Rosman, B., Ricci, J., & Lidz, T. Measuring disordered styles of thinking. *Archives of General Psychiatry*, 1965, *13*, 471-476.

Willner, A. Impairment of knowledge of unusual meanings of familiar words in brain damage and schizophrenia. *Journal of Abnormal Psychology*, 1965, *70*, 405-411.

Wing, J.K. Institutionalism in mental hospitals. *British Journal of Social and Clinical Psychology*, 1962, *1*, 38-51.

Wright, D.W. Impairment in abstract conceptualization in schizophrenia. *Psychological Bulletin*, 1975, *82*, 120-127.

Wynne, R.D. The influence of hospitalization on the verbal behavior of chronic schizophrenics. *British Journal of Psychiatry*, 1963, *109*, 380-389.

Yarrow, L.J. Maternal deprivation: Toward an empirical and conceptual reevaluation. *Psychological Bulletin*, 1961, *58*, 459-490.

APPENDIX 1

Object Sorting Test Criteria

Object Sorting Test Criteria

Behavioral Overinclusion. This is the total number of objects sorted with all seven starting objects, irrespective of the quality of thinking.

Conceptual Overinclusion. A score of 1 represents normal, logical sortings whereas a score of 5 indicates maximal overinclusiveness. Sorting behavior leading to high ratings includes inability to form or maintain a category, the use of vague or unrelated concepts to arrange groups, arbitrarily changing starting objects, and "force-fitting" objects into a category into which they do not belong.

Idiosyncratic Thinking. A score of 1 is assigned for no bizarre responses in sortings and a score of 5 for extremely bizarre responding, such as engaging in strange, inappropriate behavior toward the investigator or test, using the starting object in reference to personal experience, or using it as a cue understandable only to the subject.

Concrete Thinking. This type of behavior receives a score of 1 if no concreteness is noted and a score of 5 for extreme concreteness. Concrete thinking is manifested by the subjects' inability to extract an abstract dimension from the starting object, by tendencies to change the name

of the starting object, and by stimulus-bound responding ("chaining") in which the final selection of objects has no relationship to the starting object.

Underinclusive Thinking. A score of 1 represents no underinclusiveness whereas a score of 5 represents maximal evidence of underinclusive thinking. High scores for this measure are assigned to subjects who are unable to sort at all in response to some of the starting objects, who do not complete sortings, and who repeatedly use the same categorizing principle.

APPENDIX 2

Scoring Sheet of the Object Sorting Test

Scoring Sheet of the Object Sorting Test

Patient # _____ Date _____

Conceptual overinclusion ____ Idiosyncratic thinking ____

Concrete thinking ____ Underinclusive thinking ____ Total # objects ____

Objects	starting points						
	1	2	3	4	5	6	7
1. Fork							
2. Knife							
3. Spoon							
4. Toy Fork							
5. Toy Knife							
6. Toy Spoon							
7. Red Rubber Ball							
8. Red Wax Apple							
9. Red Paper Circle							
10. Red Saucer							
11. Red Poker Chip							
12. Yellow Poker Chip							
13. Toy China Dog							
14. Toy Clapper							
15. Bicycle Bell							
16. Toy Screwdriver							
17. Toy Saw							
18. Toy File							
19. Toy Hammer							
20. Screwdriver							
21. Pliers							
22. Block with Nail							
23. Sink Stopper							
24. Padlock							
25. Padlock with 2 Keys							
26. Rubber Cigar							
27. Bubble Gum Cigar							
28. Candy Cigarettes							
29. Cigarette							
30. Cigar							
31. Pipe							
32. Matchbox							
33. Red Candle							
34. White Candle							
35. Sugar Cube							
36. Sugar Cube							
37. Cork							
38. Eraser							
Totals							

Comments

verbalization - sets - behavior.

1. Sink Stopper

2. Fork

3. Pipe

4. Bicycle Bell

5. Red Paper Circle

6. Pliers

7. Red Rubber Ball

APPENDIX 3

Behavior Checklist

Patient # _____ Name of Rater: _____

Date: _____

Behaviour Checklist

Part I

A. Duration of present illness: _____ weeks

(if duration or anticipated duration is less than 2 weeks, do NOT continue).

B. Symptoms present (in all cases circle either "yes" or "no"):
(definition numbers refer to the RDC Critical Terms: please consult).

1a.	Thought Broadcasting (Definition #2)	Yes	No
1b.	Thought Insertion (Definition #3)	Yes	No
1c.	Thought Withdrawal (Definition #4)	Yes	No
2a.	Delusions of Control (Definition #5)	Yes	No
2b.	Other Bizarre Delusions (Definition #6)	Yes	No
2c.	Multiple Delusions (Definition #7)	Yes	No
3.	Delusions other than Persecutory or Jealousy lasting at least one week	Yes	No
4.	Delusions of any type IF accompanied by hallucinations of any type for at least one week	Yes	No
5.	Auditory Hallucinations in which Either a voice keeps up a running commentary on the subject's behaviours or thoughts as they occur, OR two or more voices converse with each other	Yes	No
6.	Non-Affective Verbal Hallucinations spoken to the Subject (Definition #10).	Yes	No
7a.	Hallucinations of Any Type throughout the day for several days.	Yes	No
7b.	Hallucinations of any type intermittently for at least a month.	Yes	No
8.	Definite instances of formal thought disorder (Definition #1) as follows:		
	a. Incoherence	Yes	No
	b. Loosening of associations	Yes	No
	c. Illogical thinking	Yes	No
	d. Poverty of content of speech	Yes	No
	e. Delusions involving the Von Domarus Principle	Yes	No
9.	Obvious Catatonic Motor Behaviour (Definition #9)	Yes	No

(Note: If all Section B ratings have been "No", do not continue with the experiment).

C. Patient exhibits significant mood disturbances* that are a prominent part of the illness Yes No

* Refers to distinct periods of either dysphoric (depressed, hopeless, sad, etc.) or elevated or irritated mood

APPENDIX 4

Belief Rating Sheet

BELIEF RATING SHEET

A. Throughout the active period of the illness, the clinical picture is dominated by the relative persistence of or preoccupation with one or more of the following:

1. Persecutory delusions: Yes No
2. Grandiose delusions: Yes No
3. Delusions of jealousy: Yes No
4. Hallucinations with a persecutory or grandiose content: Yes No

B. 1. Does patient tend to suspect or to believe on slight evidence or without good reason that people and external forces are trying to or now do influence his/her behavior and control his/her thinking?

1	2	3	4	5
no unjustified suspicions	Will admit suspicion when pressed	Easily admits suspicion	Openly states others are trying to control	Has firm conviction that is influenced or controlled.

2. Does patient tend to suspect or to believe on slight evidence or without good reason that some people talk about, refer to, or watch him/her?

1	2	3	4	5
No unjustified suspicions	Will admit suspicion	Easily admits suspicion	Openly states that is being watched	Has firm conviction of being watched

3. Does patient tend to suspect or to believe on slight evidence or without good reason that some people are against him/her (persecuting, conspiring, cheating, depriving, punishing) in various ways?

1	2	3	4	5
no unjustified suspicions expressed	when pressed expressed belief that is conspired against	Frequently inclined to suspect	frank inclination to believe in persecution	strongly expressed conviction of persecution

4. Does patient have an exaggeratedly high opinion of self or an unjustified belief or conviction of having unusual ability, knowledge, power, wealth or status?

1	2	3	4	5
no expressed high opinion of self	when pressed expresses a high opinion of self	frequently expresses a high opinion of self	open conviction of unusual power, wealth, etc.	strongly expressed conviction of grandiose or fantastic power, wealth, etc.

APPENDIX 5

Comparison of Dependent Variable Measure Means Between the Two Nonparanoid Schizophrenic Subsamples

Appendix 5

Comparison of Dependent Variable Measure Means Between the Two Nonparanoid Schizophrenic Subsamples

	Group (n=23) "clearly non-paranoid"	Group (n=7) "nonparanoid with mild paranoid signs"	two-tailed t-tests for independent means
Vocabulary Difference Score	$M = 11.69$ $s^2=66.58$	$M = 8.28$	$t(28)=.97$
Behavioral Overinclusion	$M = 20.39$ $s^2=35.01$	$M = 17.00$	$t(28)=1.33$
Conceptual Overinclusion	$M = 2.10$ $s^2=.497$	$M = 1.71$	$t(28)=1.29$
Idiosyncratic Thinking	$M = 1.76$ $s^2=.742$	$M = 1.35$	$t(28)=1.10$
Concrete Thinking	$M = 2.10$ $s^2=.246$	$M = 1.78$	$t(28)=1.51$
Underinclusive Thinking	$M = 2.47$ $s^2=.544$	$M = 2.50$	$t(28)=.09$

For $df=28$, a $t=2.048$ is required for significance at the .05 level.

APPENDIX 6

Comparison of Dependent Variable Measure Means Between the Two Paranoid Schizophrenic Subsamples

Appendix 6

Comparison of Dependent Variable Measure Means Between the Two Paranoid Schizophrenic Subsamples

	Group (n=18) "paranoids"	Group (n=12) "exemplary paranoid"	two-tailed t-tests for independent means
Vocabulary Difference Score	$M = 2.77$ $s^2=14.71$	$M = 3.41$	$t(28)=.45$
Behavioral Overinclusion	$M = 21.11$ $s^2=127.35$	$M = 17.00$	$t(28)=.98$
Conceptual Overinclusion	$M = 2.16$ $s^2=.616$	$M = 1.75$	$t(28)=1.40$
Idiosyncratic Thinking	$M = 1.36$ $s^2=.476$	$M = 1.41$	$t(28)=.20$
Concrete Thinking	$M = 2.00$ $s^2=.256$	$M = 1.83$	$t(28)=.90$
Underinclusive Thinking	$M = 2.19$ $s^2=.874$	$M = 2.41$	$t(28)=.63$

For $df=28$, a $t=2.048$ is required for significance at the .05 level.

APPENDIX 7

Background Information Sheet

BACKGROUND INFORMATION SHEET

PART A.

1. Patient #: _____. Native language English Yes No (circle)

2. Sex (circle): M F

3. Age (years): _____ (date of birth): _____

4. Education (circle): last grade completed 6 7 8 9 10 11 12
   college, vocational school, etc. 1 2 3 4
   degree: _____

5. Psychiatric history in family: _____

   _____

6. Father's occupation: _____

7. Patient's occupation prior to first hospitalization: _____

7a. Average income: _____

8. Present marital state (circle): married separated divorced
   (details to be completed in Parts B,C,D and E that follow). single widowed

9. Psychiatric first admission? (circle): YES NO

   If "Yes", (a) admission date: _____ Diagnosis: _____
   (b) date seen for testing: _____

10. Psychiatric Re-admission? (circle): YES NO

    If "Yes", (a) admission date: _____ Diagnosis: _____
    (b) date seen for testing: _____
    (c) date of first psychiatric admission: _____
    diagnosis: _____
    (d) how many previous psychiatric hospitalizations?: _____
    diagnoses: _____

    _____

    _____

10. Psychiatric Re-admission? (cont'd):

(e) estimated total time spent as psychiatric inpatient

i) during past three years: _____ months

ii) since first hospitalization: _____ months.

11. Present therapy: _____

12. Drug regimen? YES NO. (circle). If "Yes",

a) medication	_____	_____	_____
b) amount in Mg per day	_____	_____	_____
c) Chlorpromazine equivalent	_____	_____	_____
d) started date	_____	_____	_____
e) e) discontinued date	_____	_____	_____

PART B.

1. Married now and living with spouse? YES NO (circle)

Note: If "YES", continue on items 2 or 3 of Part B, then complete Part E;
If "NO", complete item 4 of Part B or Part C or D, whichever is appropriate, then complete Part E.

2. Married only once (or remarried only one time as a consequence of death of spouse) and living as a unit? YES NO.

If "NO", go to item 3.

If "YES", adequate heterosexual relations achieved? YES NO.

If "NO", a) low sexual drive? (either partner) YES NO.

b) difficult sexual relations? (either partner) YES NO

c) extramarital affairs? (either partner) YES NO

3. Married more than once but maintained a home in one marriage for at least 5 years? YES NO.

If "NO", go to item 4.

If "YES", adequate sexual relations achieved during at least one marriage? YES NO.

If "NO", sexual life chronically inadequate? YES NO.

4a. Married but apparently permanently separated
divorced (circle one).
widowed
without remarriage?

4b. A home with (any) spouse was maintained during a marriage for a period:
less than 5 years. at least 5 years. (circle).

PART C.

1. Single (i.e., never married), age 20-29 years? YES NO.

   Note: If "NO", go to Part D and E;

   If "YES", complete this Part (C) to an applicable degree, then complete Part E.

2. Has or has had at least one long-term (minimum: 6 months) "love affair" or engagement? YES NO.

   If "NO" go to item 3;

   If "YES", engaged now or at any time in the past? YES NO.

3. Has or has had short-term heterosexual or social dating experience with one or more partners? YES NO

   If "NO" go to the next item

4. Has or has had casual sexual or social relationships with persons of either sex, with no deep emotional meaning? YES NO.

   If "NO" go to the next item

5. Has or has had sexual and/or social relationships primarily with the same sex but has or may have had occasional heterosexual contacts or dating experiences? YES NO.

   If "NO" go to the next item

6. Has or has had minimal sexual or social interest in either men or women? YES NO

PART D.

1. Single (i.e., never married), age 30 or over? YES NO.

   If "YES" complete this Part (D) to an applicable degree, then complete Part E.

2. Engaged now or at any time in the past or has or has had a long-term (at least 2 years) relationship with one person of the opposite sex ("love affair")? YES NO.

   If "NO" go to the next item.

3. Has or has had short-term heterosexual or social dating experience with one or more partners? YES NO.

   If "NO" go to the next item.

4. Has or has had sexual and/or social relationships primarily with the same sex but has or may have had occasional heterosexual contacts or dating experiences? YES NO.

PART D (cont'd):

5. Has or has had minimal sexual or social interest in either men or women?

YES NO.

PART E.

1. The first three items concern formally designated groups, clubs, organizations, or athletic teams in senior high school, vocational school, college, or in young adulthood:

   a) Is or was a leader or officer? YES NO

   b) Is or was an active and interested participant? YES NO

   c) Is or was a nominal member only? YES NO

2. The next three items refer to the period from adolescence through early adulthood (i.e., after childhood):

   a) Had only a few casual or close friends? YES NO

   b) Had no real friends, only a few superficial relationships or attachments to others? YES NO

   c) Was quiet, seclusive; preferred to be alone; showed minimal efforts to maintain any contacts at all with others? YES NO

3. From early childhood no desire to be with playmates, peers or others? YES NO

APPENDIX 8

Global Assessment Scale (GAS)

Global Assessment Scale (GAS)

Robert L. Spitzer,M.D., Miriam Gibbon,M.S.W., Jean Endicott,Ph.D.

Rate the subject's lowest level of functioning in the last week by selecting the lowest range which describes his functioning on a hypothetical continuum of mental health-illness. For example, a subject whose "behavior is considerably influenced by delusions" (range 21-30), should be given a rating in that range even though he has "major impairment in several areas" (range 31-40). Use intermediary levels when appropriate (e.g., 35,58.62). Rate actual functioning independent of whether or not subject is receiving and may be helped by medication or some other form of treatment.

Patient # _____

Admission Date _____ Date of Rating _____ Rater _____

GAS Rating: _____

100 No symptoms, superior functioning in a wide range of activities, life's
| problems never seem to get out of hand, is sought out by others because
91 of his warmth and integrity.

90 Transient symptoms may occur, but good functioning all areas, interested and
| involved in a wide range of activities, socially effective, generally satisfied
81 with life, "everyday" worries that only occasionally get out of hand.

80 Minimal symptoms may be present but no more than slight impairment in function-
| ing, varying degrees of "everyday" worries and problems that sometimes get out
71 of hand.

70 Some mild symptoms (e.g., depressive mood or mild insomnia) OR some difficulty
| in several areas of functioning, but generally functioning pretty well, has
| some meaningful interpersonal relationships and most untrained people would
61 not consider him "sick".

60 Moderate symptoms OR generally functioning with some difficulty (e.g., few
| friends and flat affect, depressed mood and pathological self-doubt, euphoric
51 mood and pressure of speech, moderately severe antisocial behavior).

50 Any serious symptomatology or impairment in functioning that most clinicians
| would think obviously requires treatment or attention (e.g., suicidal pre-
| occupation or gesture, severe obsessional rituals, frequent anxiety attacks,
41 serious antisocial behavior, compulsive drinking).

...continued

167

40 | 31 Major impairment in several areas, such as work, family relations, judgment, thinking or mood (e.g., depressed woman avoids friends, neglects family, unable to do housework), OR some impairment in reality testing or communication (e.g., speech is at times obscure, illogical or irrelevant), OR single serious suicide attempt.

30 | 21 Unable to function in almost all areas (e.g., stays in bed all day), OR behavior is considerably influenced by either delusions or hallucinations, OR serious impairment in communication (e.g., sometimes incoherent or unresponsive) or judgment (e.g., acts grossly inappropriately).

20 | 11 Needs some supervision to prevent hurting self or others, or to maintain minimal personal hygiene (e.g., repeated suicide attempts, frequently violent, manic excitement, smears feces), OR gross impairment in communication (e.g, largely incoherent or mute).

10 | 1 Needs constant supervision for several days to prevent hurting self or others, or makes no attempt to maintain minimal personal hygiene (e.g., requires an intensive care unit with special observation by staff).

APPENDIX 9

Appendix 9.1

Drug Status of Subjects:* Paranoid Hospitalized (n=15)

Subject	Medication	Daily Amount (mg)	Weekly or Bi-weekly Amount (mg)	Daily Chlorpromazine Equivalent (mg)	Note
	Methotrimeprazine	150			
1	Benzhexol	5			
	Fluphenazine Decanoate		50 q 2 weeks	375	
2	Chlorpromazine	850		850	
	Chlorpromazine	800			
3	Fluphenazine Decanoate		37.5 q 2 weeks	930	
	(Chlorpromazine)				100 prn
	Haloperidol	30			
	Methotrimeprazine	50			
4	(Chlorpromazine)			675	100 prn
	(Benztropine Mesylate)				2 prn
	Haloperidol	40			
5	Benztropine Mesylate	2		975	
	Fluphenazine Decanoate		50 q 2 weeks		
6	Methotrimeprazine	50		65	
	Chlorpromazine	600			
	Haloperidol	45			
7	(Benztropine Mesylate)	2		1585	
	Fluphenazine Enanthate		25 q 2 weeks		
	(Chlorpromazine)				100 prn

*Estimates of equivalent doses are based on Hollister's (1970) conversion table for major antipsychotic drugs and their relative potency/sedative effects. For example, 5 Mg of Trifluoperazine (Stelazine) is as potent as 100 Mg of Chlorpromazine (Thorazine).

Drug Status of Subjects: Paranoid Hospitalized (n=15) (Continued)

Subject	Medication	Daily Amount (mg)	Weekly or Bi-weekly Amount (mg)	Daily Chlorpromazine Equivalent (mg)	Note
8	Chlorpromazine Benztropine Mesylate Fluphenazine Enanthate Ferrous Gluconate Folic Acid	600 2 900 15	12.5 q 1 week	685	
9	Trifluoperazine	15		300	
10	Fluphenazine Thioridazine	10 300		800	
11	Haloperidol Benztropine Mesylate Fluphenazine Decanoate (Chlorpromazine)	10 2 	37.5 q 2 weeks	630	 100 prn
12	Methotrimeprazine Orphenadrine Trifluoperazine	200 100 15		565	
13	Chlorpromazine Haloperidol Benztropine Mesylate	400 15 2		1150	
14	Thioridazine (Benztropine Mesylate) Fluphenazine Decanoate	300 2 	50 q 2 weeks	475	
15	Haloperidol Benztropine Mesylate Diazepam	9 2 20		450	

Drug Status of Subjects: Paranoid Nonhospitalized (n=15)

Subject	Medication	Daily Amount (mg)	Weekly or Bi-weekly Amount (mg)	Daily Chlorpromazine Equivalent (mg)	Note
1	Thioridazine Methotrimeprazine	200 100		335	
2	Fluspirilene		5 q 1 week	35	
3	Fluphenazine Decanoate		25 q 4 weeks	45	
4	Thioridazine	100		100	
5	Chlorpromazine Imipramine	50 75		50	
6	Pimozide	4		200	
7	Fluphenazine Decanoate		12.5 q 4 weeks	25	
8	Trifluoperazine	15		300	
9	Trifluoperazine Benztropine Mesylate	15 2		300	
10	Methotrimeprazine	50		65	
11	Mesoridazine Benztropine Mesylate Fluphenazine Decanoate	40 2	 25 q 2 weeks	140	
12	Thioridazine Flurazepam	75 30		75	

Drug Status of Subjects: Paranoid Nonhospitalized (n=15) (Continued)

Subject	Medication	Daily Amount (mg)	Weekly or Bi-weekly Amount (mg)	Daily Chlorpromazine Equivalent (mg)	Note
13	Chlorpromazine Benztropine Mesylate Fluphenazine Decanoate	300 2	 25 q 2 weeks	385	
14	Trifluoperazine (Benztropine Mesylate)	10		200	2 prn
15	Fluphenazine Decanoate		25 q 2 weeks		

Drug Status of Subjects: Nonparanoid Hospitalized (n=15)

Subject	Medication	Daily Amount (mg)	Weekly or Bi-weekly Amount (mg)	Daily Chlorpromazine Equivalent (mg)	Note
1	Methotrimeprazine Fluphenazine Decanoate	150	50 q 3 weeks	220	
2	Chlorpromazine	800		800	
3	Methotrimeprazine Procyclidine HCl Fluphenazine Decanoate	150 5	50 q 2 weeks	375	
4	Chlorpromazine Benztropine Mesylate Haloperidol	700 2 10		1200	
5	Haloperidol Benztropine Mesylate Fluphenazine Decanoate (Chlorpromazine)	10 4	37.5 q 2 weeks	630	 100 prn
6	Methotrimeprazine Benztropine Mesylate Haloperidol Fluphenazine Decanoate	100 2 10	37.5 q 2 weeks		
7	Chlorpromazine (Benztropine Mesylate) (Chlorpromazine)	1000		1000	 2 prn 75 prn
8	Chlorpromazine Procyclidine HCl Fluphenazine Decanoate (Chlorpromazine)	600 10	25 q 2 weeks	685	 100 prn

Drug Status of Subjects: Nonparanoid Hospitalized (n=15) (Continued)

Subject	Medication	Daily Amount (mg)	Weekly or Bi-weekly Amount (mg)	Daily Chlorpromazine Equivalent (mg)	Note
9	Chlorpromazine	400		400	
	Fluphenazine Enanthate		25 q 2 weeks		
	Benztropine Mesylate	2			
10	Lithium Citrate	2250		85	
	(Haloperidol)				5 prn
	Methotrimeprazine	50			
	Benztropine Mesylate	2			
11	Fluphenazine Enanthate		25 q 2 weeks	160	
	(Chlorpromazine)				75 prn
12	Trifluoperazine	10		200	
	Procyclidine HCl	5			
	Haloperidol	20			
13	Benztropine Mesylate	4		1085	
	Fluphenazine Decanoate		25 q 2 weeks		
	Methotrimeprazine	100			
	Haloperidol	60			
14	Procyclidine HCl	20		1275	
	Diazepam	30			
	(Benztropine Mesylate				2 prn
15	Chlorpromazine	1100		1100	

Drug Status of Subjects: Nonparanoid Nonhospitalized (n=15)

Subject	Medication	Daily Amount (mg)	Weekly or Bi-weekly Amount (mg)	Daily Chlorpromazine Equivalent (mg)	Note
1	Fluphenazine Decanoate		25 q 4 weeks	45	
2	Fluphenazine Decanoate (Benztropine Mesylate)		37.5 q 3 weeks	85	2 prn
3	Haloperidol	3		150	
4	Chlorpromazine Fluphenazine Decanoate	100	25 q 2 weeks	185	
5	Methotrimeprazine Haloperidol	50 10		565	
6	Thioridazine	150		150	
7	Haloperidol Fluspirilene Benztropine Mesylate	7	8 q 1 week	400	1 prn
8	Chlorpromazine	400			
9	Chlorpromazine	150			
10	Haloperidol Flurazepam Lithium Carbonate	6 60 1200		300	
11	Chlorpromazine	300		300	
12	Fluphenazine Decanoate		25 q 2 weeks	85	

Drug Status of Subjects: Nonparanoid Nonhospitalized (n=15)

Subject	Medication	Daily Amount (mg)	Weekly or Bi-weekly Amount (mg)	Daily Chlorpromazine Equivalent (mg)	Note
13	Thioridazine Benztropine Mesylate Fluphenazine Decanoate	300 4	 25 q 2 weeks	385	
14	Trifluoperazine Fluphenazine Decanoate	10	 12.5 q 2 weeks	245	
15	Fluspirilene		2 q 1 week	15	

Drug Status of Nonpsychiatric Subjects

Hospitalized (n=15)			Nonhospitalized (n=15)		
Subject	Medication	Daily Amount (mg)	Subject	Medication	Daily Amount (mg)
1	Diazepam (Chloral Hydrate)	10 .5 g prn	1	Bethanechol Chloride (Diazepam)	30 5 prn
2	(Secobarbital Sodium)	500 prn	2	Multivitamins	
3	-		3	Multivitamins	
4	Lactulose syrup	20 g	4	-	
5	(Diazepam)	5 prn	5	Dexamethasone	2
6	Diazepam	5	6	Chlordiazepoxide	15
7	-		7	(Diazepam)	10 prn
8	Cloxacillin Sodium	750	8	(Diazepam)	5 prn
9	(Chloral Hydrate)	1 g prn	9	Naproxen	500
10	Diazepam (Chloral Hydrate)	5 .5 g prn	10	Tolmetin Sodium	600
11	Propoxyphene Napsylate Clazacillin Sodium	300 750	11	Diazepam	40
12	Diazepam	5	12	Diazepam	10
13	-		13	Dantrolene Sodium	150
14	Multivitamins		14	-	
15	Metorpolol Tartrate Insulin	100	15	(Diazepam)	5 prn

Appendix 9.2

Comparison of Daily Chlorpromazine Equivalent Means* Between Schizophrenic Subsamples

	Paranoid	Nonparanoid	two-tailed t-tests for independent means
Hospitalized (n=30)	M = 700.66	M = 664.66	t(28)=.25
	s^2=152743.45		
Nonhospitalized (n=30)	M = 156.00	M = 230.66	t(28)=1.48
	s^2=19867.84		

For df=28, a t=2.048 is required for significance at the .05 level.

* Amounts in mg

Appendix 9.3

Correlation Coefficients Between Daily Chlorpromazine Equivalents and Dependent Variable Measures (N=60)

	Daily Chlorpromazine Equivalents in mg
Vocabulary Difference Score	-.047
Behavioral Overinclusion	-.144
Conceptual Overinclusion	-.022
Idiosyncratic Thinking	.101
Concrete Thinking	.243
Underinclusive Thinking	.102

Note: All r's are statistically nonsignificant.

APPENDIX 10

Consent Form

THE UNIVERSITY OF BRITISH COLUMBIA

Department of Psychology

Consent

I, _____ , do hereby give my consent to the administration of a vocabulary test and an object sorting test that are called for in the study on the use/misuse of the English language and on the ability to sort some objects of common use.

I understand a) that participation in the study involves no risks or discomforts;

b) that my participation is voluntary and that I may withdraw at any time;

c) that refusal to participate in the study or withdrawal from the study will in no way interfere with the treatment which I will receive, and

d) that all information personally identifying me as a participant in this study will remain strictly confidential.

Signed: _____

Client

Signed: _____

Primary Therapist

Date: _____

APPENDIX 11

Appendix 11.1

Summary of the Multivariate Analysis of Variance of the Object Sorting Test Measures

Source of Variation	Wilks' Lambda*	Approximate F-statistic*	Probability
Diagnostic Groups (DG)	.74008 (5,2,84)	2.5986 (10,160)	.0060
Hospitalization Status (HOSP)	.84938 (5,1,84)	2.8372 (5,80)	.0207
DG x HOSP	.88348 (5,2,84)	1.0225 (10,160)	.4269

* Degrees of freedom in parentheses.

Appendix 11.2

Summary of Analyses of Variance for the Object Sorting Test Measures

Source of Variation	MS	df	F	p
Behavioral Overinclusion				
Diagnostic Groups (DG)	54.577	2	.676	n.s.
Hospitalization (HOSP) Status	120.177	1	1.489	n.s.
DG x HOSP	71.244	2	.883	n.s.
Error	80.684	84		
Conceptual Overinclusion				
Diagnostic Groups (DG	1.669	2	3.559	.0321
Hospitalization (HOSP) Status	.225	1	.479	n.s.
DG x HOSP	.158	2	.337	n.s.
Error	.469	84		
Idiosyncratic Thinking				
Diagnostic Groups (DG)	2.269	2	5.895	.0042
Hospitalization (HOSP) Status	2.844	1	7.389	.0078
DG x HOSP	.836	2	2.172	n.s.
Error	.384	84		
Concrete Thinking				
Diagnostic Groups (DG)	.419	2	1.523	n.s.
Hospitalization (HOSP) Status	1.599	1	5.809	.0173
DG x HOSP	.108	2	.393	n.s.
Error	2.75	84		
Underinclusive Thinking				
Diagnostic Groups (DG)	2.636	2	4.606	.0126
Hospitalization (HOSP) Status	.099	1	.174	n.s.
DG x HOSP	.558	2	.975	n.s.
Error	.572	84		

Appendix 11.3

Means and Standard Deviations* of Scores on the Object Sorting Test Measures for All Subject Subgroups (n=15 per cell)

	Hospitalized			Nonhospitalized		
	Paranoid	Nonparanoid	Nonpsychiatric	Paranoid	Nonparanoid	Nonpsychiatric
Behavioral Overinclusion	16.87 (7.75)	20.07 (6.40)	20.53 (7.30)	22.07 (13.74)	19.13 (8.41)	23.20 (8.37)
Conceptual Overinclusion	1.97 (.58)	2.10 (.76)	1.70 (.49)	2.03 (.99)	1.93 (.68)	1.50 (.46)
Idiosyncratic Thinking	1.50 (.71)	2.03 (1.01)	1.17 (.31)	1.27 (.65)	1.30 (.49)	1.07 (.18)
Concrete Thinking	2.13 (.44)	2.10 (.47)	1.90 (.57)	1.73 (.50)	1.93 (.56)	1.67 (.59)
Underinclusive Thinking	2.43 (.96)	2.37 (.79)	1.97 (.44)	2.13 (.90)	2.60 (.66)	1.83 (.67)

*In parentheses.

APPENDIX 12

Summary of Analysis of Covariance for the Vocabulary Subtest With Distractor Scores

Appendix 12

Summary of Analysis of Covariance for the Vocabulary Subtest With Distractor Scores (Covariate: The Vocabulary Subtest Without Distractors Scores)

Source of Variation	SS	df	MS	F	p
Diagnostic Groups (DG)	1584.41	2	792.20	22.94	.0000
Hospitalization (HOSP) Status	240.14	1	240.14	6.95	.0097
DG x HOSP	159.63	2	79.81	2.31	.1033
Error	2865.49	83	34.52		