The Differential Diagnosis of Early Schizophrenia
by
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THE DIFFERENTIAL DIAGNOSIS
OF EARLY SCHIZOPHRENIA

Abstract

The object of this study was to investigate the adequacy of a test battery for the differential diagnosis of early schizophrenia. A test battery consisting of a physiological test of autonomic nervous system reactivity, psychological tests of abstract-concrete attitude and the Sc (schizophrenia) scale of the Minnesota Multiphasic Personality Inventory was administered to an experimental group of 50 early schizophrenics and a control group of 50 patients suffering a functional disorder other than schizophrenia. Each subject of both groups was on his (her) first admission to a psychiatric institution. The groups were matched on the basis of age, sex and IQ. The test battery was found to statistically differentiate the two groups at the 2 per cent level and beyond, indicating that the test battery is adequate for differential diagnosis of early schizophrenia.

No relationship was established for the expected correlation between autonomic nervous system hyporeactivity, impairment on tests of abstract-concrete attitude and an abnormal trend in the schizoid direction as measured by the Sc scale of the MMPI. It had been suggested that associative and affective functions in schizophrenia are impaired in a related fashion. The hypothesis that combination of loss of abstraction ability, schizoid personality trend and physiological phenomenon interpreted as "release" of the autonomic nervous system from higher (cortical) control was not confirmed.
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CHAPTER I

INTRODUCTION AND STATEMENT OF THE PROBLEM

In the typical psychiatric setting, the clinical psychologist is called upon to contribute differential diagnostic material through interpretation of psychological tests. To him falls the task of exploring the intellectual and personality functioning of the subject in artificial life situations in the hope that the subject's responses are related in some meaningful way to the "dynamics" of his maladjustment.

In its broadest aspects, diagnosis is the process of relating raw data gleaned through various clinical tools to some system of personality theory. In particular, diagnostic material is important for its provision of research data for the purpose of developing and refining proposed theoretical frameworks.

Unfortunately, the most immediate practical application of diagnostic information is usually the typing of the psychiatric casualty in a Kraepelinian category -- a satisfying, albeit a sterile, approach for many clinicians. A more extended approach attempts to gather information through the use of clinical devices which will help to explain the subject's problem in relation to his behavior.

When a coherent picture of the subject's behavioural trends is established, it furnishes a guide to the selection and planning of therapeutic measures. Prognostic studies are relatively new in the fields of psychiatry and clinical psychology, but are definitely related to diagnostic workups, which furnish fruitful material
regarding the prediction of outcome of therapeutic methods. Diagnostic material is also a progress indicator in that the psychologist seeks to understand the present dynamics of the problem through describing the presenting symptoms, attempting to understand the etiology of the problem, and relating both as seen over a temporal span.

The job of the clinician becomes all the more onerous when one considers the fluctuating status of psychiatric classificatory systems, the unreliability of current diagnoses, and the multi-dimensional clinical syndromes presented by the majority of psychiatric patients. However unsatisfactory our knowledge of the why's and wherefore's of mental illness, there is a pressing practical need for the alleviation of the suffering engendered by maladjustment -- especially when it attains proportions necessitating commitment to a mental institution. The onus is upon the clinician to undertake constant research to study how valid his clinical devices are in diagnosing the problems presented by the psychiatric patient. Until the clinician does so, he must live with the uncomfortable knowledge that his faith in his interpretations is unjustified.

Of particular concern to many in the psychiatric setting is the problem of differential diagnosis of early schizophrenic reactions from other nosological groups, such as manic-depressive reactions, psychoneuroses, etc.. Notwithstanding the many possibly untenable assumptions of psychiatric diagnosis and crudeness of the psychological instruments -- it was decided to delineate as clearly as possible a three-way approach to the study of schizophrenia. It is the purpose, then, of this study to employ physiological and psychological tests in
a diagnostic test battery which would differentiate a schizophrenic group from a non-schizophrenic group.

More explicitly, the main hypothesis to be tested in this investigation can be stated as follows:

(1) A test battery consisting of a physiological test of autonomic nervous system reactivity, psychological tests of abstract-concrete attitude, and the Sc (schizophrenia) scale of the Minnesota Multiphasic Personality Inventory would serve as a useful tool in the differential diagnosis of a schizophrenic group from a non-schizophrenic group.

In employing the test battery chosen, it would also be possible to study the relationship between autonomic nervous system reactivity, abstract-concrete behavior (presumably revealing one type of thought disorder) and performance on an objective personality scale, the Minnesota Multiphasic Personality Inventory, in both a schizophrenic and non-schizophrenic group.

To clarify the foregoing statement, the following related hypothesis are suggested:

(2) In a group of mental patients, there is a positive relationship between impairment of autonomic nervous system reactivity and impairment of abstract-concrete attitude.

(3) The more hyporeactive the autonomic nervous system of the schizophrenic group (i.e. the lower the physiological score), the higher the score on the Sc (schizophrenia)
scale of the Minnesota Multiphasic Personality Inventory.

The greater the evidence of impairment on tests of abstract-concrete attitude in the schizophrenic group, the higher the score on the Sc scale of the Minnesota Multiphasic Personality Inventory.

While the tests were chosen primarily because of their potential value in discriminating the schizophrenic group from the non-schizophrenic group, the following practical considerations also governed their choice:

(a) objectivity: provision for quantitative scores for statistical evaluation of results;
(b) ease of administration, especially for use with disturbed subjects;
(c) interest appeal;
(d) economy of time.

Included in the diagnostic battery (to be described in greater detail in Chapter II, "Theoretical Background"), were the following tests:

I. Physiological test: using a drug, mecholyl, which measures autonomic nervous system reactivity in a simple procedure in which blood pressure response indicates hyporeactive or hyperreactive autonomic response.

II. Psychological tests:
A. Tests of abstract-concrete attitude.
   (1) Goldstein-Scheerer Object Sorting Test (Active), using norms as developed by Rapaport (77, p. 424).
(2) Goldstein-Scheerer Object Sorting Test (Passive), using norms as developed by Rapaport (77, p. 439).

(3) Similarities subtest of the Wechsler Bellevue Adult Intelligence Scale, Form I.

(4) Block Design subtest of the Wechsler-Bellevue Adult Intelligence Scale, Form I.

(5) Benjamin Proverbs.

B. The Minnesota Multiphasic Personality Inventory.
CHAPTER II

THEORETICAL BACKGROUND AND RELEVANT STUDIES

The Classification Problem of Schizophrenia.

For the purposes of this study, the term schizophrenia is used to include a group of psychotic reactions in which there are fundamental disturbances in reality relationships and in emotional and intellectual processes. Although the specific symptoms are legion and vary greatly from one individual to another, patients seem to have in common an apathy or indifference to the events of reality and a splitting of thought from its normal affect.

As it is generally understood now, the disorder usually develops slowly; often the early symptoms are not at all obvious. The early clinical picture is often dominated by neurotic symptoms, such as continual somatic complaints for which there is no related organic pathology. At a later stage, the more important symptoms typically include a gradual withdrawal from reality, emotional blunting and distortion, disintegration and fragmentation of thought processes, together with bizarre delusions and hallucinations, various stereotyped symbolic motor acts, and a deterioration of personal habits and moral controls, and so on in an infinite variety of symptoms.

Clinically, schizophrenic patients, as a group, manifest abnormalities of emotional life in the form of apathy or incongruous affective trends along with abnormalities of thought and speech of the kind just described. And yet, there are such tremendous individual differences among them that sometimes any two schizophrenic patients
selected at random may seem more different than alike. The classification of these differences has been a difficult problem for many years, and various schemes have been adopted in different countries at different times. Most of the contemporary schemes of classification are outgrowths of Kraepelin's system. This classification recognizes six groups of schizophrenic reactions: the latent, simple, hebephrenic, catatonic, paranoid, and unclassified types. Many cases, as might be expected, can be disposed of diagnostically in terms of this scheme of classification. Such cases correspond to the textbook description with sufficient accuracy to eliminate debates about correctness of diagnoses at hospital staff conferences. Unfortunately, however, there is often considerable debate and uncertainty about other cases. For example, some cases exhibit symptoms of manic-depressive psychoses as well as schizophrenia. In this country, the term "schizo-affective psychosis" has been proposed for this elusive syndrome.

This diagnostic uncertainty has troubled many psychopathologists, and has caused some of them to question the soundness of this mode of approach to an understanding of functional mental disorder. This approach, they hold, might have relevance for disease due to a definite etiological agent like the typhoid bacillus. Such a disease can be classed as a clinical entity. But in their opinion the traditional medical notion of a clinical entity is too rigid an approach to encompass the changes characteristic of functional disturbances. Static concepts are poor intellectual tools for dealing with the dynamics of personal conflict and, although the foregoing sixfold classification provides a convenient hospital vocabulary, its usefulness as a means of under-
standing the psychology of the individual schizophrenic patient may be questioned. In fact, it is doubtful that it is accurate as a descriptive classification of schizophrenic patients in general.

Cameron (23) considers all of the Kraepelinian types to be remote from clinical reality. In his opinion, the symptoms supposedly unique to each clinically "pure" type can be observed in "almost any schizophrenic person if he is sick long enough" (23, p. 468). Nevertheless, as he points out, scrapping Kraepelin's system renders it necessary to supply a substitute classification, for the profusion of schizophrenic manifestations would be too bewildering.

One interesting and possibly fruitful approach to diagnoses would be the isolation of factors common to schizophrenic disorders by factor analytic methods and quantified multiple diagnostic procedures. Several such studies have been reported in recent publications. Guertin (43) investigated the occurrence of 52 different symptoms in a group of 100 diagnosed schizophrenic patients. Factor analysis of these symptoms showed 6 factors: excitement-hostility; psychomotor retardation and withdrawal; guilt-conflict; persecuted-suspicious; personality-disorganization; confused-withdrawal. Holzberg and Wittenborn (60) used a quantified multiple diagnostic procedure in the classification of symptomatology presented by psychiatric patients, yielding a presumably reliable and valid description of the patient's mental disorder. A rating scale for use by psychiatrists in research which permits the quantitative expression of a patient's incapacity due to psychotic symptoms in terms of defined criteria was devised by Goodrich (43). A very decided advantage of such a scale lies in obtaining quantitative
values which may be statistically compared with other research data. However, diagnostic tests based upon factor-analytic methods have not as yet become available to the clinician, so that, in spite of concern and dissatisfaction with the Kraepelinian approach to mental disorder, since this outmoded approach is still current in most psychiatric settings, clinical psychologists have had to learn to live and work with it. The problem is how to work most meaningfully within the incumbent framework.

**Diagnostic Reliability.**

Of immediate importance is the question of the adequacy and accuracy of the whole diagnostic conceptual scheme. Does such a scheme do justice to the clinical facts to which it is applied or from which it is derived? The wording of this last question suggests a central difficulty: the relationship between diagnostic concept and the symptoms observed. This issue is not unique to psychiatric diagnoses; it also obtrudes itself in general personality theory whenever the question of personality types is being discussed. Can the typological approach to personality appraisal be employed in a valid and dependable fashion? The artificial and misleading nature of such stereotypes is often quite obvious but it is more germane to our present purpose to ask whether the description of abnormal personalities in terms of diagnostic labels may not involve kindred weaknesses. An added danger lies in the possibility of diagnostician unreliability wherein the diagnostician fails to be on guard against the tendency to attribute to the patient what the category calls for, instead of noting what is exhibited by the patient.
Within certain limits this problem was recently investigated by Ash (2). He had three psychiatrists participate in the examination of 52 patients. There was complete agreement on the part of the three examining psychiatrists in one-fifth of the cases. In discussing his findings, Ash (2, p. 275) reports that "for one-third of the cases in which three psychiatrists participated, one found the client to have a serious personality or mental disorder or deficiency, ... while the other two psychiatrists found the individual to be in the normal range with perhaps some qualifications with respect to a 'predominant personality characteristic'." This sort of result becomes fraught with serious consequences especially if the "serious" diagnoses were to involve commitment proceedings. However, the performance in question looks more creditable when examined from the viewpoint of probability theory. In terms of this comparison the record of Ash's three psychiatrists in reaching complete agreement in twenty per cent of the cases is far beyond chance expectancy.

The individual as a person, and not a type of a diagnostic category, must be the focus of study, if one is to do justice to such uniqueness. Such is the ultimate ideal of the psychologist. In discussing psychodiagnosis as a science, Rosenzweig (82, p. 370) makes this very point by contending that "if one is to learn about the individual it seems probable that one will need to begin with him in all his inner intricacies as the unit of observation and conceptualization...." The same point can be detected in the belief of those contemporary psychological counsellors, like Patterson (74) and Rogers (80) who maintain that psychotherapy may proceed independently of diagnostic
pigeonholing. As ambitious as is this ideal, the exigencies of the practical situation, especially if research is to expand in the psychiatric setting, demand diagnostic information. And within the scope of practicality, a study of the kind proposed within this paper can contribute some needed information.

Physiological studies of schizophrenia.

The basis for linking a physiological test of autonomic nervous system reactivity and abstract-concrete attitude (tentatively excluding the MMPI) extends from both the theorizing of Bleuler and the hypothalamic theory of emotion.

To clarify this connection, it will be recalled that Bleuler (8, p. 204) postulated that "...the basic symptoms of schizophrenia ... associations become weak and disconnected, affects gain dominion over the train of thought and wishes and fears control this trend instead of logical connections." Blocking or impairment of associative processes thus occur when associations approach painful conflict material. Preoccupation with affective factors is alleged to be the principle cause of a poverty of associations.

In dealing with affective factors, it seems obvious that emotion is a function of our entire physiology. Nevertheless, certain parts of the organism are more intimately involved, and involved to a greater degree than others. Of specific interest to the study presented here are the neural structures most intimately involved in emotional behavior and experience: the autonomic nervous system, the hypothalamus, and the cerebral cortex (3, 25, 64, 69).

Recent research has shown that, while the sympathetic nervous
system tends to dominate in emotion, certain reactions remain under dominance of the parasympathetic nervous system so that "emotion is characterized by autonomic function rather than by sympathetic function alone" (95, p. 229). Research has also disclosed that the hypothalamus, once thought to be the center for emotion, does play a role in the motor expressions of emotion, but its role in relation to feeling aspects is widely disputed (37, 64). The hypothalamic theory of emotion supposes that emotional experience is due to hypothalamic discharge. One drawback to this assumption is that expressions aroused by stimulating the hypothalamus are different in important respects from those aroused under emotion-provoking circumstances, indicating that other neural mechanisms must be involved (3, p. 490). Possibly the most important role in affective function is played by the cerebral cortex which contributes to the perception of emotion-provoking situations, to adjustment in emotional reactions after the external stimulus has gone, and to the inhibition of emotional reactions (69).

In very general terms, if this study can demonstrate a correlative impoverishment of both affective factors and associative functions, (assuming that these are measured by the physiological test, the MMPI, and tests of abstract-concrete attitude) it may furnish more evidence for the interpretation that autonomic-hypothalamic-cortical neural chain is somehow interrupted or disordered in schizophrenia. A combination of loss of abstraction ability, pathological personality trends in a schizoid direction, and a physiological phenomenon interpreted as representing a "release" or "interruption" of the autonomic nervous system from higher control makes the following theory tenable:
Intact functional capacity of the cerebral cortex is a prerequisite for abstract thinking, adequate adjustment in terms of personality variables, and proper "firing" of the autonomic nervous system. When association or reverberation pathways are inadequate, thinking is concrete, there is evidence of personality decompensation, and the autonomic nervous system is "released" from higher control and acts relatively independently (24). A similar point of view was expressed by Bleuler (8, 9) who postulated that the primary defect in schizophrenia was a loosening of the associations which in turn led to a split between affect and thought content.

Granted that hypothalamic-cortical imbalance is associated with psychological disorders, is it possible to measure central autonomic reactivity in the human being and thereby obtain objective evidence of an interdependence between mental behavior and reactivity of autonomic centres?

Mention should first be made of the classic study of the etiological significance of constitutional factors reported by the physiologist Hoskins (61, p. 11) who claims that schizophrenia "is a manifestation of disordered biology." From his impressive study, stemmed work on the disordered function of the autonomic nervous system in behavior disorders.

Funkenstein and his collaborators (32, 34, 36) applied adrenalin and mecholyl in psychotic patients and normal controls and recorded at one-minute intervals the effect of these drugs on systolic blood pressure. Depending on the degree of hypertensive and hypotensive effects of these drugs (after stabilization of systolic blood pressure,
usually at the end of 30 minutes), they divided the patients into several groups and were able to establish a relationship between autonomic tests and prognosis regarding electro-shock therapy.

In the same vein, Hill (55), and Solomon and Darrow (85), noted increased autonomic responsiveness with increased clinical improvement of the schizophrenic patient. Gellhorn (37, p. 372) quotes a German reference, Jahn, who showed that schizophrenics, who recovered following insulin treatment show signs of increased autonomic reactivity in response to hypoglycemia, whereas such a change is not evident in patients who benefited by insulin treatment.

In a well-controlled study by Pincus and Hoagland (75), in which they employed six indices of autonomic activation and compared these indices in groups of normal male subjects and schizophrenic male patients having been subjected to a variety of stresses, the data indicated highly significant failure of normal adrenal-autonomic stress responses in the schizophrenic group as compared with the control group.

Numerous other studies (30, 31, 54, 55, 56, 79) support the hypothesis that autonomic nervous system response in the schizophrenic is hyporeactive.

A drug, mecholyl, was chosen in this study as the physiological test of autonomic nervous system reactivity. Mecholyl elicits a sympathetico-adrenal discharge through reflex stimulation of autonomic centers. That is, by reflex excitation of the centers of the sympathetico-adrenal system, mecholyl induces changes similar to those produced by direct stimulation to these centers. This sympathetico-adrenal discharge is measured by the systolic blood pressure. A dosage
of 10 milligrams mecholyl is administered intramuscularly. The systolic blood pressure of the subject is taken at five-minute intervals over a period of thirty minutes, at the end of which time the systolic blood pressure has almost invariably become stabilized. At the end of the thirty-minute interval, a reading is taken in terms of the number of blood pressure units above or below the pre-injection level at which the systolic blood pressure has become stabilized. If the systolic blood pressure is established above the pre-injection level, hyperreactivity of autonomic centers is indicated. This hypertensive effect is recorded in plus units of blood pressure. If the systolic blood pressure is established at the pre-injection level, neither hyperreactivity nor hyporeactivity of autonomic centers is indicated and the effect is recorded as zero change. If the systolic blood pressure is established below the pre-injection level, hyporeactivity of autonomic centers is indicated and this hypotensive effect is recorded in minus units of blood pressure (67, p. 132).

The degree and duration of the hypotensive or hypertensive action of mecholyl and the reflexly-induced discharges of the sympathetico-adrenal system depend on hypothalamic function. Excitation of the hypothalamus normally leads to an activation of the cortex. In this manner, hyporeactivity of autonomic centers as indicated by a drop in systolic blood pressure would indicate a dysfunction in the autonomic-hypothalamic-cortical neural chain (37). This is presumably what happens in schizophrenia.

Pilot studies by Meadow and Funkenstein (33, 67, 68) have demonstrated a positive and significant relationship between abstraction
capacity and blood pressure responses. In one study (67), fifty-eight schizophrenic patients admitted to the Boston Psychopathic Hospital were studied. The sample comprised sixteen males and forty-two females. The ages ranged from 17 to 54 years; the average age was 32.9 years. Cases who had received any form of therapy within a period of three months prior to study were excluded from the sample.

Autonomic nervous system reactivity was tested by Meadow and Funkenstein by means of 1 cc. of normal saline intravenously on the first day, on the second day 0.05 mg. of epinephrine chloride in 0.5 cc. of water intravenously, and on the third and final day, 10 mg. of mecholyl intramuscularly. The systolic blood pressure was observed after normal saline and epinephrine until it returned to its preinjection level; after mecholyl the systolic blood pressure was observed for thirty minutes.

The blood pressure responses after saline were not significant in any of these cases. On the basis of autonomic response as measured by epinephrine and mecholyl, Meadow and Funkenstein divided their patients into three groups as follows:

- **Type A** included subjects with hyporeactive autonomic response (patients with this type of reaction were previously shown to have a poor prognosis) (33).

- **Type B** included subjects with no change in autonomic response (patients with this type of reaction were previously shown to have a fair prognosis) (33).
Type C included subjects with hypertensive autonomic response (patients with this type of reaction were previously shown to have an excellent prognosis) (33).

Psychological tests of abstraction used in the Meadow-Funkenstein study included the Similarities and Block Design subtests of the Wechsler-Bellevue Intelligence Scale (Form I), the object sorting "active" and "passive" tests, and a proverbs abstraction test. In order to test the relationship of abstract thinking to autonomic pattern, the results of abstraction tests of the three groups of schizophrenic patients (autonomic types A, B, C) were compared. These were first equated for age and education. In the analysis of results, it was found that on six of the eight measures (Similarities, Proverbs Abstract, Object Sorting Active Abstract, Object Sorting Passive Abstract, Object Sorting Active Sorting Adequacy Plus, and Object Sorting Passive Verbalization Adequacy Plus), the mean abstraction level of Type A was significantly lower at the 5 per cent level than the mean abstraction levels of Types B and C. On the remaining two measures, the mean of Type A was also lower than the mean of Type C, but the difference did not meet the requisite five per cent level. On five out of the eight measures, the means of Type C were higher than those of Type B. Four of these differences were not statistically significant. The only measure on which the means of Types B and C were separated at the requisite level of significance was that of Proverbs Abstract. Inspection of the distributions of the measures reveals a considerable amount of overlap between the patients of the three autonomic types. The one
exception is the small amount of overlap between Types A and C on the Proverbs Abstract Measure. Inspection of the distributions reveals that there is least overlap between Types A and C. Type B has the greatest range and has a great deal of overlap with the two remaining groups. Meadow and Funkenstein conclude that a relatively marked impairment in abstract thinking in schizophrenia is paralleled by hypo-reactive autonomic response. They suggest two polar types of schizophrenia on the basis of the physiological and psychological tests: one with poor abstraction, disorganization of personality, slight response to autonomic drugs and poor prognosis; the other with good abstraction, good personality organization, marked response to autonomic drugs and relatively good prognosis.

Meadow and Funkenstein do not describe their group in terms of length of stay in the hospital. It is possible that their sample included schizophrenic reactions ranging from earliest manifestations to the most chronic. They do state that Type A patients appeared to be more deteriorated clinically than patients in the other two groups. Since their investigation seems to avoid the implications of duration of schizophrenic illness, it is not comparable to the study presented here. It will be noted under "Experimental Method" that only clinically undeteriorated schizophrenics on their first admission to a psychiatric institution made up the experimental population here.

Abstract-Concrete Attitude.

In recent years there has been a growing tendency to view schizophrenia as a thinking disorder. This impairment of thought processes in schizophrenia has been demonstrated in both verbal tasks
(4, 78, 91, 92), and performance tasks (10, 11, 12, 50, 87) on a test of performance of social concepts by Whiteman (9f). This thought disorder has been characterized by some as an inability to generalize or to form concepts.

It is a generally assumed psychological hypothesis that human thinking, in part, is determined by the strivings, affects, and interests of the individual. In the same way, it is assumed that emotional disturbances and personality disorders -- maladjustment in general -- encroach upon thinking. The aim of concept formation testing, then, is to discover and diagnose the encroachment of maladjustment upon conscious thinking -- more specifically, its encroachment upon the verbal report and performance of the disturbed subject in response to a test situation as compared with the responses of the relatively well-adjusted "normal" person in the same situation.

From experience with patients having cortical lesions, Goldstein and his associates (38, 39, 40, 41, 42, 43) derived a special methodological procedure (the application of sorting tests) to distinguish two kinds of human behavior, the abstract and the concrete.

According to Goldstein (41), the concrete attitude is "realistic". In this attitude, "we are given over and bound to the immediate experience of the given thing or situation in its particular uniqueness" (41, p. 19). Our thinking and acting are directed by the immediate claims made by one particular aspect of the object or situation in the environment. In the abstract attitude, "we transgress the immediately given specific aspect of sense impression ... and the individual thing represents to us an accidental sample or representative of a broader category" (41, p. 9).
In the pathology of patients with cortical lesions, behavior is disintegrated in such a way that the capacity for abstract behavior is impaired: the individual is more or less reduced to a level of concreteness and can only perform those tasks which can be fulfilled in a concrete manner, Goldstein found. This approach was extended by Goldstein and Hanfmann and Kasanin (51, 52) to the study of thought disorder in schizophrenia.

Hanfmann's (50) description of a case of schizophrenia illustrates with a great number of examples how a schizophrenic patient is bound to reality as he experiences it, in a pathologically concrete way. Hanfmann's patient was able to "make a unreal assumption or to accept a fictitious situation as such, whether it was expressed in a sentence, a story, or a picture" (50, p. 569). Because of being limited to this concrete behavior, the patient reacted to the "ball and field" test with the declaration that she had not lost a ball; and in the object sorting test she placed the fish with vegetables because "fish goes with pumpkin".

Several recent studies have supported Goldstein's original hypothesis that schizophrenic patients present thought disorders -- particularly in the impairment of the abstract-concrete attitude. A developmental study of concept formation in schizophrenic children was done by Schulman (84), who used the Object Sorting Test to find that schizophrenic children showed (1) a narrow concept span; (2) marked inability to form abstract and functional concepts together with an excessive reliance on concreteism; (3) an elevated frequency of inadequate and missing responses; (4) lack of development of higher order concepts with increasing age. Fey (29), using the new Wisconsin Card
Sorting Test, found that 22 young schizophrenics experienced greater difficulty in solving problems involving generalizations or concepts than did 47 young normal subjects. In 1951, Feldman and Drasgow (28) conducted a study with the aim of constructing a "visual-verbal" test to discriminate schizophrenics from normals. This was done on an a priori construction of items based on the theory that schizophrenics have difficulty in (1) formulating abstract concepts and (2) shifting from one concept to another with the same set of stimuli. The test scores discriminated schizophrenics from normals with a high degree of accuracy. Data indicated that impairment in conceptual thinking in schizophrenics is determined to a greater extent by their inability to form abstract concepts than to the inability to shift from one concept to another with the same set of stimuli. A very recent study by Cohen, Sherif, and Huston (26), investigated the effect of amobarbital (amytal) on conceptual thinking in schizophrenia, depression, and neuroses. Eighty-eight patients in four diagnostic groups (chronic and early schizophrenia, depressive phase of manic-depressive, and mixed neuroses) were individually given an object-sorting test under four experimental conditions. Analysis of data indicated that both groups of schizophrenic Ss showed impairment in formulation of principles sufficient in resistance that affective stimuli and drugs did not modify it. Conceptual acts in the depressive states were readily impaired by the drugs and by emotion-inducing stimuli. The drugs "lessened ... the constriction" in the neurotic subjects, thereby facilitating concept formation.

Several experimental studies of abstract-concrete attitude in schizophrenic patients have suggested the use of this psychological
variable in prognosis. Levin (65) formulated the hypothesis that patients who show signs of loss of abstract power at an early stage of psychosis were more apt to deteriorate. Bolles, Rosen and Landis (12), using a battery of tests of abstract-concrete attitude, suggested that the group of patients with the poorest performance on abstraction tests benefited least from insulin shock treatment. Benjamin (4) came to a similar conclusion on the basis of Rorschach tests in 81 schizophrenic patients. Indicators of thought disorder in the Rorschach were defined by Benjamin and his collaborators. These criteria suggested that poor abstraction ability is related to poor responsiveness to insulin shock treatment. Piotrowski (76) suggested that a patient's ability to differentiate genus and species was a good prognostic sign.

The origin of this impairment of abstract-concrete attitude (presumably a reflection of thought processes) is as yet open to conflicting interpretations. For example, Vigotsky (87) believes that the disturbance in concept formation is caused by an underlying organic process. Goldstein (40, p. 583), writing in 1939, stated that "this similarity (in test performances of organic and schizophrenic cases) does not permit the rash assumption that schizophrenia is fundamentally an organic disease; the great differences in the behavior of organic and schizophrenic patients in various directions will prevent such conclusions. However, the similarity points to an organic process as cause of this impairment, whether this process be primary or of secondary origin." In a later publication (41), however, Goldstein seems to view the problem as currently indeterminate. Both Goldstein and Vigotsky stress the general nature of the defect. Indeed, Goldstein considers the abstract and concrete attitudes not merely as cognitive functions
but as "capacity levels of the total personality, each furnishing the basis for all performances on a certain plane of reference to the outer world situation" (11, p. 18).

For Cameron (15, 16, 17, 18, 19, 20, 21, 22, 23), the disorganization in schizophrenic thinking is a symptom of the patient's "social disarticulation", initially occasioned by defective role-taking ability. This isolation from common environmental influences leads to a progressive substitution of a social fantasy for realistic interchange of attitudes and viewpoints, resulting in a gradual impairment of organized, socially acceptable thinking.

Several important considerations in the interpretation of results of tests of abstract-concrete attitude must be taken into account. The general problem is: did the patient have the capacity to "abstract" before the illness; i.e. is it a functional loss due to reaction to a particular stress, as the general use of these tests seems to suggest? The possibility of testing before and immediately after the onset of an acute schizophrenic reaction is an almost impossible ideal. Results must invariably be taken post factum. One possible solution to this problem would be the testing of abstract-concrete attitude after a spontaneous remission (assuming that scores prior to the remission were available). In such cases, does the abstract-concrete attitude essentially change according to test scores? And, accordingly, after a course of treatment, is the recovery of the patient merely clinical or symptomatological or is there a change in the abstract-concrete attitude of the patient?

The possibility of intellectual deficiency is always present
where responses are mostly "concrete" in form. Proper matching of experimental and control groups on the basis of IQ and/or education, should eliminate this interpretive hazard to some extent.

The discovery of a disturbance on concept formation in the schizophrenic patient has important implications for dealing with the patient, both custodially and in psychotherapy. It seems relatively fruitless to undertake any superficial psychotherapy if the condition of the patient excludes the possibility of "psychological contact" with the therapist. The procedure can probably be successful only if the patient is able to grasp the nature of the therapeutic situation. But there arises a great difficulty. The therapist's function takes place on a rational level which would seem to exceed the patient's capacity to conceptualize.

In the present study, both verbal and motor tests of abstract capacity were given. These included:

1. the Goldstein-Scheerer Object Sorting Test
   (a) Part I (Active)
   (b) Part II (Passive)

2. Similarities subtest of the Wechsler-Bellevue Intelligence Scale, Form I.

3. Block Design subtest of the Wechsler-Bellevue Intelligence Scale, Form I.


Of utmost importance in the evaluation of the usefulness of the test battery in differentiating schizophrenics from non-schizophrenics is a careful consideration of the validity and reliability of each test.
Rapaport (77, p. 424) analysed adequacy scores on Part I (Active) and Part II (Passive) of the Goldstein-Scheerer Object Sorting Test for various clinical groups by means of the Chi-squared test. He presents distributions of cases based on their number of inadequate sortings, together with the differential significance of these distributions. Regarding inadequate sortings on Part I, the combined Schizophrenics and combined Depressives were found to be significantly worse than the combined neurotics and combined Patrol. The Schizophrenics again were found to give significantly poorer performances regarding adequacy of definitions of Part II. However, Rapaport's poor choice of groups and ad hoc examination of test results diminish the value of his reports. Also, Rapaport is willing to accept lax levels of significance, such as the 30 or 50 per cent level.

Regarding abstract-conceptual definitions on Parts I and II of the Goldstein-Scheerer Object Sorting Test, Rapaport (77, p. 439), finds that abstract-conceptual definitions differentiate Schizophrenics from Depressives between the 30 per cent and 50 per cent level; Schizophrenics from Neurotics at the 2 per cent level and Schizophrenics from Patrol between the 10 per cent and 20 per cent level. For Part II, Rapaport (77, p. 440) finds the following differential significance of distribution of cases: Schizophrenics from Neurotics between the 2 per cent and 5 per cent level; Schizophrenics from Patrol at less than the 1 per cent level.

Rapaport presents no data regarding the reliability of the Goldstein-Scheerer Object Sorting Test.

Regarding the Similarities subtest, there is no data which
indicates reasonably conclusively that poor performance on the Similarities subtest is diagnostic of schizophrenia. Being mindful of reservations regarding the value of Rapaport's statistical evaluations, it maybe reported that he found a differential significance (77, p. 155) between Schizophrenics and Depressives, Schizophrenics and Neurotics, and Schizophrenics and Patrol all between the 1 per cent and 2 per cent level.

Webb and DeHaan (89) found split-half reliability of 0.73 for psychotic on the Similarities subtest.

Regarding the Block Design subtest, Rapaport (77, p. 282) again offers some evidence of the differential significance of cases of various diagnostic groups: Schizophrenics from Depressives between the 10 per cent and 20 per cent level, Schizophrenics from Neurotics between the 30 per cent and 50 per cent level and Schizophrenics from Patrol at the 5 per cent and 10 per cent level.

Webb and DeHaan (89) found a split-half reliability of 0.86 for psychotics for the Block Design subtest. However, the determination of a split-half reliability on a speed test results in a spuriously high reliability coefficient (1, p. 116).

The Benjamin Proverbs test, as devised by Benjamin (4, p. 110), is self-admittedly "like the Rorschach ... not a test at all in the strict psychological use of the term." Benjamin's choice of items was based on clinical experience with schizophrenic thought disorders. In his most recent publication (4), he proffers some tentative results. Using a population of only fifty-eight schizophrenic subjects, the Proverbs test was validated against formal thought disorder as rated
from Rorschach records. Benjamin (4, p. 114) reports "a high degree of
correlation between the indices of formal thinking disorders" but offers
no supportive statistical evidence.

Test-retest after a period of two months, using a population
of twenty-five chronic schizophrenics (those who had been hospitalized
for at least a period of two years), yielded a reliability coefficient
of 0.82 for the Benjamin Proverbs test.

With this rather promising indication regarding the reliability
of the Benjamin Proverbs test, it was decided to include it in the
test battery to attempt to establish its use on a purely empirical basis.

The foregoing discussion regarding the validity and reliability
of each test of abstract-concrete attitude indicates the sparse nature
of experimental work designed to investigate their usefulness as diagnostic tools.

The Minnesota Multiphasic Personality Inventory.

In attempting to correlate an objective measure of personality
function with objective measures of autonomic reactivity and thought
disorder in schizophrenia, it was decided to employ the Minnesota Multi-
phasic Personality Inventory, "the self-report most promising for
diagnosing abnormal personality patterns in the clinic" (27, p. 319),
with special note of the contribution of the Sc (Schizophrenia) scale
to the differential diagnosis of early schizophrenia.

The authors have placed their emphasis on scores claiming
empirical validity, making psychological interpretations of scores a
secondary consideration. Items were selected, not because they fitted
a definition of a trait, but because item validation showed that mental
patients gave responses different from those of normal adults. On this empirical basis, the MMPI sets out "to assay those traits that are commonly characteristic of disabling psychological abnormality" (53, p. 5).

Prior to discussing the relative diagnostic values of the separate scales -- especially concerning the differential diagnostic value of the Sc scale, mention should be made of Eysenck's (13, p. 60) evaluation of the MMPI as a clinical tool. Briefly, Eysenck considers these as good points of the inventory: standardization has been done very carefully; statistical work leaves little to be desired; the validity scales are good; method of having subject sort cards instead of filling in a questionnaire is a distinct improvement with "abnormal" subjects. Of special interest here are the drawbacks cited by Eysenck: diagnostic groups are based on psychiatric classification which is notoriously inaccurate and disputable; reliability of the scales is not very high (range from .71 to .83 for test-retest).

Reliability of the Sc scale has been found to be rather high in recent well-controlled studies. Rosen (81) found a test-retest stability of .83 for the Sc scale for a psychiatric population. Holzberg and Alessi (59) found a reliability coefficient of .89 for the Sc scale for a psychiatric population. Both of these studies used small samples for their purpose (N= 40 and N = 30, respectively) and their experimental groups were probably too heterogeneous regarding nosological groups. However, their conclusions offer promising evidence in favor of reliability of the Sc scale.

In regard to the diagnostic usefulness of the MMPI, it should be realized that the inventory has been advanced as the "first inventory
measuring common specific clinical syndromes, in contrast to the earlier schedules designed for either the more general concept of 'neuroticism' or special states like 'inferiority' (83, p. 292). Consequently studies which report that the inventory is effective as a screening device for "abnormality in general" in mass selection situations cannot be considered as true assessment of the analytic-diagnostic validity of the inventory (13, p. 104). Nor would such studies appear to have great clinical import in view of the demonstrated practical effectiveness for screening purposes of simple abbreviated questionnaires.

Studies citing evaluation of the validity of single scale scores by comparison with established diagnoses have been largely unfavorable. However, it is well to bear in mind the fact that the diagnoses, not the scales, may be at fault.

Benton and Probst (6), working with small groups of selected patients "in whom diagnoses was established beyond reasonable doubt," found that "only about one-half of a group of schizophrenics made high scores on the schizophrenia scale" (6, p. 78). Comparing the ratings by psychiatrists of their patients with respect to the personality trends investigated by the MMPI and the test scores themselves, Benton and Probst found a significant degree of agreement between psychiatric ratings and test scores in respect to psychopathic deviate, paranoia, and schizophrenia scales.

Benton (5) administered the MMPI to 85 patients of whom only 10 were schizophrenics. He states that the MMPI is not successful in identifying schizophrenics, since of these 10 patients, only five gave "positive" results on the Sc scale.
A slightly more adequate study using 40 cases is reported by Pacella, Piotrowski, and Lewis (73). The 22 schizophrenics who later showed improvement following electric convulsive treatment had a mean Sc scale T-score of 65.27. The 18 schizophrenics who showed no improvement after electric convulsive treatment had a mean Sc scale T-score of 70.33. Since no measure of scatter is reported, it is difficult to evaluate the meaning of the T-scores reported.

Morris (70), comparing the mean scores of patients in various diagnostic categories with those of a normal control group, found that the inventory readily distinguished the normal controls from the pathological groups. However, the mean score profiles of the abnormal groups were practically indistinguishable from each other, all having high hypochondriasis, depression and hysteria scores and all having femininity and hypomania scores within broad normal limits. The schizoid personalities had high schizophrenia scores but so did the emotionally unstable psychopaths. Morris concludes that the inventory "does differentiate borderline normals from serious pathologic states but does not aid in the diagnosis among pathological groups" (70, p. 270).

Wauck (88) conducted a clinical investigation of the Schizophrenia (Sc) scale of the MMPI to determine whether the Sc scale taken by itself suffices as a valid indicator of a schizophrenic psychosis. The actual study included an investigation of the other scales of the MMPI, profile analysis, and a complete item analysis. Wauck administered the individual form of the MMPI to a group of 80 clinically diagnosed schizophrenic patients of various sub-types. Using an external criterion of medical staff diagnosis, Wauck found that an Sc score of 70 or above
had been obtained in 41 per cent of the cases. In only 22 per cent of the cases was the Sc score the highest of all the other scales, either above or below the T-score of 70; and in only 20 per cent of the cases was the Sc scale the highest of the scales and also above the pathological T-score of 70.

Wauck suggests the possibility of an age factor in operation, since on superficial inspection the young early cases of schizophrenia seemed on the whole to obtain more bizarre and unusual looking profiles. The group of 80 schizophrenics was divided into three age groups: 15 to 29 (33 cases), 30 to 39 (31 cases), 40 to 53 (16 cases). Wauck reports that a comparison of the three age groups reveal the "levelling-off" process usually described in schizophrenics with advancing age. "The youngest group exhibits a degree of disorganization and dissociation on the MMPI which is markedly pathological. The next age group exhibits a definite lowering of score to within normal limits. The last group manifests a profile which is in all respects 'normal!" (85, p. 280).

Wauck also carried out an item analysis of the Sc scale. The items of the Sc scale itself proved to be non-discriminatory. He concludes that "the MMPI taken by itself is not an adequate or valid diagnostic tool" (85, p. 282).

Since the schizophrenic group in Wauck's study included an age range of 15 to 53 years, it is not directly comparable to the present study, since an age range of 20 to 40 years had been imposed in an attempt to control extraneous influences possibly related to adolescence and onset of middle age (involutional period). Also, Wauck
does not define his group in terms of length of stay in hospital, so that the group seems to include reactions from the earliest to the most chronic stages. Again, his study is not comparable to the present study in terms of the chronicity variable. It will be recalled that only cases of early schizophrenia, on first admission to a psychiatric hospital, were used here.
CHAPTER III

EXPERIMENTAL METHOD

Subjects.

The experimental group consisted of 50 early schizophrenics, selected at random from patients on their first admission to a psychiatric institution. These schizophrenic patients had been diagnosed as such at clinical conferences of medical staff, social workers, and psychologists. An age range of 20 to 40 had been arbitrarily imposed as one selective factor.

Only those patients were selected whose diagnoses were unanimous and uncomplicated by neurological involvement or primary physical disability, with the possible exception of six epileptic patients in the control group. Each patient must also have been admitted to the hospital within 10 days of testing and to have undergone no prior formal treatment, physical or psychotherapeutic. Other criteria for selection were the testability and degree of cooperativeness of the patient — although only five cases were lost because of disturbances too great to permit testing. As a whole, the patient populations could be characterized clinically, or in a Kraepelinian sense, as relatively undeteriorated.

With respect to occupation, the majority of the subjects in both groups fell into the semi-skilled or unskilled occupations. It was not possible to make a subject-for-subject matching for occupation, but the groups are reasonably comparable with respect to this variable.

The experimental group consisted of 25 males and 25 females as did the control group. All subjects were white, native born, and had lived most of their lives in a rural environment.
Each member of the experimental group was matched with a non-schizophrenic control on the basis of:

1. admission to the hospital within a period of one week of the matched subject;
2. age within a range of five years;
3. sex;
4. IQ as measured by the Wechsler Bellevue Adult Intelligence Scale, Form I -- within a range of 10 IQ points.

Table 1 presents means and standard deviations of the two groups for age and IQ. It will be noted for each comparison the groups are approximately equal. The subdiagnostic breakdown of the experimental group was as follows:

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple</td>
<td>12</td>
</tr>
<tr>
<td>Paranoid</td>
<td>9</td>
</tr>
<tr>
<td>Hebephrenic</td>
<td>12</td>
</tr>
<tr>
<td>Undifferentiated</td>
<td>7</td>
</tr>
<tr>
<td>Catatonic</td>
<td>10</td>
</tr>
</tbody>
</table>

of schizophrenics.

The control group consisted of 50 non-schizophrenic patients, diagnosed by a clinical conference of medical staff, social workers and psychologists, as having functional disorders other than schizophrenia. Each control subject was also on his (her) first admission to a psychiatric institution and between the ages of 20 to 40. Matching of control subjects with experimental subjects was carried out according to the criteria outlined above. The nosological breakdown for the control group was as follows:

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manic-depressive</td>
<td>15</td>
</tr>
<tr>
<td>Undeteriorated epilepsy</td>
<td>6</td>
</tr>
<tr>
<td>Psychopathic personality</td>
<td>5</td>
</tr>
<tr>
<td>Hysterical reaction</td>
<td>5</td>
</tr>
<tr>
<td>Psychasthenia</td>
<td>2</td>
</tr>
<tr>
<td>Immature personality</td>
<td>2</td>
</tr>
<tr>
<td>Hypochondriac reaction</td>
<td>2</td>
</tr>
<tr>
<td>Dissociative reaction</td>
<td>2</td>
</tr>
</tbody>
</table>
### TABLE 1

**AGE AND IQ OF SCHIZOPHRENIC AND CONTROL GROUPS**

<table>
<thead>
<tr>
<th>Group</th>
<th>Age (Mean)</th>
<th>Age (S.D.)</th>
<th>IQ (Mean)</th>
<th>IQ (S.D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controls</td>
<td>28</td>
<td>6.7</td>
<td>99.02</td>
<td>12.0</td>
</tr>
<tr>
<td>Schizophrenics</td>
<td>29</td>
<td>7.3</td>
<td>95.06</td>
<td>10.2</td>
</tr>
</tbody>
</table>
Procedure.

Tests of abstract-concrete attitude were administered individually, in one session whenever possible. Both verbal and motor tests of abstract capacity were given. These included:

1. The Goldstein-Scheerer Object Sorting Test.
   (a) Part I (Active)
   (b) Part II (Passive)

2. The Similarities subtest of the Wechsler-Bellevue Adult Intelligence scale.

3. The Block Design subtest of the Wechsler-Bellevue Adult Intelligence scale.

4. The Benjamin Proverbs Test.

1. The Goldstein-Scheerer Object Sorting Test. The test material consists of 33 objects common in everyday experience. These objects are: a real knife, fork and spoon; a miniature knife, fork and spoon; a real screwdriver and pair of pliers; a miniature screwdriver, pair of pliers, hammer and hatchet; two nails; a block of wood with a nail in the centre; two corks; two sugar cubes; a pipe; a real cigar and cigarette; an imitation cigar and cigarette; a matchbook; a rubber ball; a rubber eraser; a rubber sink stopper; a white filing card; a green cardboard square; a red paper circle; a lock, and a bicycle bell.

The test is divided into two parts (77, p. 127) each presenting the subject with a different type of conceptual problem.
(a) Part I (Active) consists of six items. In each of these, one object is put before the subject and he is asked to find which of all the remaining objects "belong with it". In all but the first of these items a standard initial object is placed before the subject by the examiner; in the first item the subject is asked to pick any of the objects at random. After the subject finishes his grouping he is asked; "Why do all these belong together?" (See Appendix A for record sheet).

(b) Part II (Passive) consists of twelve items. In each item the examiner places before the subject a group of chosen objects and asks; "Why do all these belong together?" Each such grouping implies an abstract-conceptual definition of the objects in it, such as "eating utensils", "smoking equipment", and so on. (See Appendix A for detailed account).

The subject's groupings and verbalizations were recorded completely on a blank with space enough for detailed notes on both behavior and side comments. The groupings and definitions were both evaluated on the basis of Rapaport's scoring rationale for "conceptual level of sorting" (77, p. 403), and "adequacy of sorting and verbalization" (77, p. 401). To maintain as objective an evaluation of the patient's performance as possible, it was designed to assign arbitrary scores of:

2 - adequate sorting and abstract-conceptual definition.
1 - adequate sorting and functional definition (the objects defined in terms of their common use).
0 - inadequate sorting and/or a concrete definition (in terms of immediate physiognomic impression).
No attempt was made at a qualitative analysis of the results (except as a matter of clinical interest), nor were Rapaport's "pathological indicators" -- the "syncretistic", "fabulated", "symbolic", and "chain" definitions -- employed.

(2) The Similarities subtest of the Wechsler-Bellevue Intelligence Scale.

This subtest was chosen particularly because of the scoring in a three-fold category of abstract, functional, and concrete conceptualization follows roughly Rapaport's scoring of the Goldstein-Scheerer Object Sorting Test (see above). A cursory survey shows that the norms Wechsler (90) gives for scoring the Similarities items -- in other words, the enumeration of what type of response should be scored 2, 1, and 0 -- follow in general the sequence conceptual, functional, and concrete level. As scoring norms are established by statistical frequency, any exceptions to the sequence of scores may be considered as the statistical reflection partly of the difficulty of some of the similarities items, and partly because of the fact that abstract conceptual level of concept formation is the ideal rather than the general rule for the cross-section of the population.

In each of the 12 items of this subtest, the subject is to state in what way the two things named are alike, e.g. "fly" - "tree" -- living things.

(3) The Block Design subtest of the Wechsler-Bellevue Adult Intelligence Scale.

In this subtest, the subject is asked to reproduce presented designs with varied numbers of coloured blocks. The subtest
seems to involve some sort of synthesizing ability (71), or loss of the "abstract approach", in Goldstein's sense of the term (41, p. 19). Schizophrenic disorientation and confusion should presumably cause impairment on this subtest, involving visual motor coordination as it does.

(4) **The Benjamin Proverbs Test.**

This test, consisting of nine proverbs (see Appendix A), was developed by Benjamin (4) to demonstrate some aspects of schizophrenic thought disorder. The proverbs are read in order to the subject who is asked to explain what they mean.

The scoring system, according to criteria set forth by Benjamin, parallels the Wechsler subtests:

2 - abstract-conceptual explanation of each proverb or phrase.

1 - "medium-abstract" interpretation, i.e. a good conceptual interpretation with concrete contamination.

0 - concrete interpretation; no reply; bizarre content, incoherence, neologisms.

The individual form of the MMPI was of course self-administered after standard instructions from the examiner.

The inventory consists of 550 questions to be judged "true", "false", or "cannot say". Items range widely in content, covering such areas as: somatic experience, family relations, social-political attitudes, sexual attitudes, mood-tone beliefs, etc.

The MMPI provides scores for nine clinical scales. Each scale consists of items which differentiated between the corresponding clinical
group and a normal control group of approximately 700 persons. The latter were all visitors at the University of Minnesota hospitals. The scales were thus developed empirically by a "criterion keying" of items, the criterion being specific psychiatric diagnosis. The following scales were prepared by this method:

- Hypochondriasis (Hs)
- Depression (D)
- Hysteria (Hy)
- Psychopathic deviate (Pd)
- Masculinity or femininity of interest pattern (Mf)
- Paranoia (Pa)
- Psychasthenia (Pt)
- Schizophrenia (Sc)
- Hypomania (Ma)

A novel feature of the MMPI is its utilization of four so-called validity scales which represent checks on carelessness, malingering, misunderstanding and the operation of special response sets and test-taking attitudes (1, p. 550). These validity scales include:

- Question score (Q)
- Lie score (L)
- Validity score (F)
- K score (K)

The first three scores (Q, L, F) are ordinarily used for an overall evaluation of the test record. If any of these scores exceeds a certain maximum value, the record is suspect. The K score is designed to function as a "supressor variable". Empirical studies have failed to demonstrate the expected usefulness of the K corrections in sharpening the discriminative value of the clinical scale scores (13, No. 71).

The higher a subject's score in a classification, the more his answers resemble those given by that type of patient. Any standard score greater than 70 is taken as an indicator of significant abnormality.

The Physiological Test.

The physiological test was carried out under the supervision of a physician and blood pressure recordings were taken, by means of a sphygmomanometer, by a nurse. A dosage of 10 milligrams of mecholyl was
administered intramuscularly while the patient remained in a supine position. The systolic blood pressure and pulse were taken at five-minute intervals over a period of thirty minutes. After the thirty minute interval, the systolic blood pressure had invariably become stabilized. A reading was taken in terms of the number of blood pressure units above or below the pre-injection level at which the systolic blood pressure had become stabilized.
CHAPTER IV

RESULTS AND STATISTICAL TREATMENT

It will be recalled that the main hypothesis to be tested in this investigation was:

A test battery consisting of a physiological test of autonomic nervous system reactivity, psychological tests of abstract-concrete attitude, and the Sc scale of the MMPI would serve as a useful tool in differential diagnosis of a schizophrenic group from a non-schizophrenic group.

A statistical test of this hypothesis involved the use of a "t"-test for finding the significance of the difference between the correlated means of the schizophrenic and control group for:

1. physiological test
2. each of 5 tests of abstract-concrete attitude
3. the Sc scale of the MMPI.

It should be noted here that both experimental (schizophrenic) and control (non-schizophrenic) groups suffered the loss of subjects in that physical treatment (electroshock) was administered prior to a physiological test being taken. (All psychological tests were administered prior to treatment). Thus, six subjects from the experimental group and five subjects from the control group could not be assigned scores on the physiological test. In order to maintain the continuity of selection in terms of the criteria set forth under "Experimental Method", it was decided to take the mean value of the scores on the physiological test for both experimental ($N = 44$) and control ($N = 45$) groups and substitute these data for the lacking scores on the assumption that the mean score of $-4$ obtained by $N = 44$ in the experimental
group would most likely have been obtained by the six schizophrenic losses and, likewise, that the mean score of +6 obtained by N = 45 in the control group would most likely have been obtained by the five control losses. However, to support this assumption, "t"-test of significance of the difference of the correlated means of the experimental and control groups for the physiological test was carried out. Only those matched pairs for which each member could be assigned a score on the physiological test were employed in the "t"-test, resulting in an N = 40.

Hypothesis (2) stated:

In a group of mental patients, there is a positive relationship between impairment of autonomic nervous system reactivity and impairment of abstract-concrete attitude.

In evaluating hypothesis (2), the experimental group and the control group were used together to form one group. Correlations between the results of the physiological test and scores on each of the tests of abstract concrete attitude were calculated.

Hypothesis (3) stated:

The more hyporeactive the autonomic nervous system of the schizophrenic group (i.e., the lower the physiological score), the higher the score on the Sc (Schizophrenia) scale of the MMPI.

If hypothesis (3) is to be substantiated, there should be a significant negative correlation between scores on the physiological test and the Sc scale of the MMPI for the schizophrenic group.

Hypothesis (4) stated:

The greater the evidence of impairment on tests of abstract-concrete attitude in the schizophrenic group, the higher the score on the Sc scale of the MMPI.
If hypothesis (4) is to be substantiated, there should be a significant negative correlation between scores on each test of abstract-concrete attitude and the Sc scale of the MMPI for the schizophrenic group.

Table 2 presents for both schizophrenic and control groups, the mean, the standard deviation, mean difference and the "t"-values for each of the tests administered. In the same manner, Appendix B, Figures 1 to 7 present for both groups frequency distributions of the raw scores for each test administered. By noting the degree of actual overlap between the schizophrenic and control groups, "t"-tests which reveal a significant difference may be viewed with caution.

It will be noted from Table 2 that each test used in the diagnostic test battery differentiated the schizophrenic from the non-schizophrenic group at the .02 level and beyond. Where the estimated scores for the physiological test were omitted, resulting in N = 40, it was found that the physiological test again differentiated both groups at between the .02 and .05 level.

The secondary hypotheses, which sought to establish a relationship between impairment of autonomic nervous system reactivity, impairment of abstract-concrete attitude, and a significantly abnormal trend in a schizoid direction, were not substantiated.

The correlations between the physiological test and the Sc scale for the schizophrenic and control groups were .09 and .02, respectively. These correlations are, of course, not significantly different from zero.

Table 3 reports the correlations between the physiological
test and the tests of abstract-attitude for the combined groups. The five correlations shown in Table 4 are all non-significant. The correlations between the Sc scale and tests of abstract-concrete attitude for the schizophrenic and control group, shown in Table 4, are also all non-significant.

The Sc scale of the MMPI had been singled out for investigation in this particular study. As shown in Table 2, the Sc scale is found to differentiate the schizophrenic group from the non-schizophrenic group at the .001 level. Although the remaining eight clinical scales of the MMPI have no direct bearing upon the hypothesis in question as set forth under "Introduction", it may be of some interest to note that the non-schizophrenic group scored significantly higher than the schizophrenic group on the following clinical scales: Hs; Pd; Ma; Pt.

The mean score of the Hs (Hypochondriasis) scale for the control group was significantly higher at the .001 level. The mean score on the Pd (Psychopathic deviate) scale for the control group was significantly higher at the .01 level. The mean score on the Ma (Hypomania) scale for the control group was significantly higher at the .001 level. The control group also scored significantly higher (at the .02 level) on the Pt (Psychasthenia) scale.
## TABLE 2
COMPARISON OF SCHIZOPHRENIC AND CONTROL GROUPS
ON TEST VARIABLES

<table>
<thead>
<tr>
<th>TEST</th>
<th>SCHIZOPHRENIC GROUP</th>
<th>CONTROL GROUP</th>
<th>MEAN</th>
<th>S.D.</th>
<th>MEAN</th>
<th>S.D.</th>
<th>MEAN DIFF.</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Physiological test</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) N = 50</td>
<td>-4</td>
<td>+6</td>
<td>10</td>
<td>2.74</td>
<td>**</td>
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<td>(b) N = 410</td>
<td>-4</td>
<td>+6</td>
<td>10</td>
<td>2.41</td>
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<td><strong>II. Abstract-Concrete Tests</strong></td>
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<td>6.1</td>
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<td>13.1</td>
<td>3.0</td>
<td>6.0</td>
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<td>3.4</td>
<td>15.0</td>
<td>3.7</td>
<td>4.2</td>
<td>**</td>
<td>6.96</td>
<td>****</td>
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<td>5. Benjamin Proverbs</td>
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<td>6.3</td>
<td>**</td>
<td>10.60</td>
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<td>1. Hs scale</td>
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<td>10.1</td>
<td>6.3</td>
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<td>2. D scale</td>
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<td>3.2</td>
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<td>3. Hy scale</td>
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<td>9. Pt scale</td>
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<tr>
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<td>12. &quot;F&quot; scale</td>
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* * * * * Significant at the .001 level
*** Significant at the .01 level
** Significant at the .02 level
* Significant at the .02 - .05 level.
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<td>.04</td>
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<td>5. Benjamin Proverbs</td>
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<td>VARIABLE</td>
<td>SCHIZOPHRENIC GROUP</td>
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A discussion of the reliability and validity of each of the tests of abstract-concrete attitude in the section on "Theoretical Background" revealed the sparse nature of experimental work designed to test their usefulness as diagnostic indicators of schizophrenia.

The physiological test, using the drug, mecholyl, has been used to good advantage in prognostic studies of schizophrenia (32, 34, 36, 67, 79). Of special note here are the prognostic studies of Funkenstein et al (32, 34, 67) who have defined their problems in operational terms and have attempted to predict response to physical treatment of schizophrenic patients on the basis of response to the drug, mecholyl. Most prognostic studies to date have been carried out ad hoc after a course of treatment, resulting in contamination of evidence regarding the usefulness of pre-treatment observation and testing by knowledge of actual outcome of treatment. Unfortunately a serious drawback of the most promising study by Funkenstein (67) has involved the lack of a control group. Schizophrenic patients have been arbitrarily divided into groups on the basis of their autonomic reactivity to mecholyl or other autonomic drugs. These autonomic groups have then been compared with each other with respect to various variables, rather than with control groups of other types of patients or normals. In the same manner, no well-controlled study of the diagnostic use of mecholyl in the investigation of schizophrenia has been reported in the literature. Clinical evidence alone seems to have prompted its use in prognostic studies (37).
The majority of studies concerned with the diagnostic validity of the Sc scale have yielded largely negative results. Reliability studies (59, 81) have quoted reliability coefficients of .83 and .89 for the Sc scale for a psychiatric population. In terms of sub-test reliability, such coefficients are highly favorable indices.

It is obvious from the preceding paragraphs that both the validity and reliability of each of the tests employed in the battery are of questionable status with the exceptions indicated. On an empirical basis, each test in the battery employed in the present study does differentiate a schizophrenic group from a non-schizophrenic group. With reservations regarding validity and reliability of these tests in mind, it is possible to survey the differential significance found for each test with due caution and care. The degree of diagnostic precision necessitated by a particular situation should dictate whether or not these particular tests are to be employed. In conjunction with other clinical material gathered through observation, interview, projective techniques and other objective tests, the diagnostic battery used in the present study should prove of value. Since the tests were found to differentiate the schizophrenic group from the non-schizophrenic group, indications regarding the validity and reliability of the tests are favorable. Investigations of their diagnostic validity and reliability in well-controlled studies should prove to be positive.

In addition to the implications of validity and reliability of these tests, Figures 1 to 7 show graphically the overlap found for raw scores for the tests in question. Again, it may be noted that the significant differences between the means of the two groups on each test
must be viewed with caution.

In illustration, if the intersection of the curves of the two groups at score 11 on the Similarities test (Fig. 1) is chosen as an arbitrary cut-off point, 18 per cent of the schizophrenic cases are found to have obtained scores at or above 11. Of the non-schizophrenic cases, 22 per cent are found to have obtained scores at or below this arbitrary cut-off score of 11. Therefore, 40 per cent of the total group would be "false positives", or diagnosed incorrectly by this one test on the basis of the empirical curve as shown in Figure 4.

The finding of the present study regarding the physiological test, mecholyl, as being diagnostic of schizophrenia in that schizophrenic autonomic response tends to be hyporeactive, supports clinical evidence as reported by Gellhorn (37) and others (25, 30, 31, 54, 56, 57, 58). The findings also lend indirect support to the prognostic studies of schizophrenia as reported by Funkenstein et al (32, 34, 36, 67, 79) in that their basic assumption of autonomic failure in the schizophrenic seems well-founded. It will be recalled that in the Funkenstein study (34), adrenalin and mecholyl were administered to schizophrenic patients and normal controls. The effect of these drugs on systolic blood pressure was recorded at one-minute intervals. Depending on the degree of hypertensive and hypotensive effects of these drugs, they divided the patients into several groups and were able to establish a relationship between autonomic tests and prognosis regarding electro-shock therapy.

Implications of the relatively well-established evidence for autonomic hyporeactivity of the schizophrenic lead to the inevitable
debates regarding the etiology of the disorder. Stress factors do seem to play a part. Pincus and Hoagland (75) used six indices of sympatho-adrenal activation to compare the responses of groups of normal male subjects and schizophrenic male patients having been subjected to a variety of stresses. Their data indicate highly significant failure of normal adrenal stress responses in the schizophrenic group as compared with the control group. Is this autonomic hyporeactivity in the schizophrenic caused by an hereditary predisposition of autonomic failure in response to stress? Or is it the result of weakening of constitutional strength requisite for adequate adjustment by continual bombardment of stress? These two questions mirror the two opposing theoretical frameworks in the study of etiology of mental disorder -- the constitutional viewpoint versus the psychodynamic approach. There is no evidence to date which indicates the complete incompatibility of the two approaches, and a current attempt at rapprochement seems in order (72).

The findings of this study also lend support to the growing background of evidence for impairment of thought formation in the schizophrenic. The problem has been attacked by a clinical appraisal of schizophrenic impairment of thought formation in verbal tasks by Benjamin (41), Rashkis (78), Wegrocki (91), and Wentworth (92) with rather inadequate statistical evidence. The investigation of schizophrenic impairment of thought processes has been more carefully carried out with the use of performance tasks. Early studies by Bolles and Goldstein (11), Goldstein (38, 39, 40, 41, 42, 43), and Vigotsky (87), using a more qualitative approach than is usually accepted currently, paved the way for a more objective investigation of the presumed impairment of schizophrenic thought disorder.
One very interesting development in the area of thought disorder has been a study of the performance of schizophrenics on social concepts by Whiteman (94). The purpose of his experiment was to investigate the hypothesis that the social conceptual performance of schizophrenics is impaired relative to that of a normal group, even though both populations are equated on formal conceptual performance. This hypothesis followed from Cameron's (18, 19, 20) suggestion that schizophrenics suffer from "social disarticulation", resulting in an impairment of organized, socially acceptable thinking. It would follow from this suggestion that schizophrenics would have greater difficulty in the conceptualization of socially-toned material than more neutrally-toned material. In Whiteman's study, two formal concept tests (one verbal and one performance) and a pictorial social concept test were administered to 31 schizophrenics and 31 normal controls matched with respect to age, education, sex and Wechsler-Bellevue vocabulary score. The populations were then equated statistically and through direct matching on the formal concept scores. Significant differences in favor of the controls were obtained between the two groups on both types of tests. However, schizophrenic decrement on the social concept test proved significantly greater than decrement on the formal concept tests. Whiteman believes that as an explanatory hypothesis, the concept of an impairment of abstract attitude is, by itself, insufficient to account for the selective schizophrenic impairment on the social concept test. He views the latter decrement as lending support to a theoretical position which also stresses the importance of social withdrawal as a determinant of cognitive functioning in schizophrenia.
Whiteman has chosen to investigate probably the most meaningful approach to the study of schizophrenic thought disorder, from the practical point of view, in that the psychologist is usually most interested in the way that the patient is aware of the interpersonal situations about him. It is difficult to see why Whiteman chooses to differentiate "social concept" from "formal concept" although he does define these two concepts operationally in terms of "interpersonal" and "non-interpersonal" situations, respectively. The distinction, however, seems to be an artificial one in that all concepts are learned within a social context and are almost invariably applied within a social sphere. Generalizations of learned habit patterns may be very crudely described as taking place by relating concepts from prior situations to a new situation. Whiteman carried out a preliminary study before the experiment was begun in order to devise a social concept test with a suitable range of item difficulty and to standardize test procedure. Lack of space prevents Whiteman from discussing the procedure used in developing his social concept test and no data regarding validity and reliability is offered. His conclusions, therefore, must be inspected relative to the information available regarding the tests employed.

Another important approach to the study of schizophrenic thought disorder is a developmental study of concept formation in the schizophrenic child by Schulman (84). Schulman used the Object Sorting Test in a qualitative analysis of concept formation. Of relevance here, he found marked inability to form abstract and functional concepts together with an excessive reliance on concretism and a lack of development of higher order concepts with increasing age. Although his study
depends upon qualitative, clinical evaluation more than upon objective verification, Schulman's conclusion that schizophrenic children cannot adequately understand the relationship of environmental objects points up again the need to carry the investigation of schizophrenic thought disorder into the social area.

Feldman and Drasgow (28) were able to discriminate schizophrenics from normals on the basis of a visual-verbal test of concept formation. Since the validity and reliability of the test in question are of unknown status, the results must again be viewed with caution. Another test of promising diagnostic usefulness, the Wisconsin Card Sorting Test, has been used by Fey (29). Fey found that 22 young schizophrenics experienced greater difficulty in solving problems involving generalizations or concepts than did 47 young normal subjects. A number of experiments with normal subjects have also contributed an understanding of the factors involved in concept formation (7, 45, 46, 47). Cohen, Sherif and Huston (26) have very recently demonstrated that both chronic and early schizophrenics showed impairment in formulation of principles sufficient in resistance that the effect of amobarbital (amytal) drug did not modify it. In their study Cohen, Sherif and Huston used eighty-eight patients in four diagnostic groups (chronic and early schizophrenia, depressive phase of manic-depressive, and mixed neuroses). These patients were individually given an Object Sorting Test under four experimental conditions. Although the validity and reliability of the test used is again of questionable status, the use of amytal in studying concept formation may prove valuable in exploring objectively the psychotherapeutic value of narco-analytic
interview technique.

An interpretive hazard implicit in evaluating the so-called impairment of abstract-concrete attitude in schizophrenics is the question of the unreliability of schizophrenic IQ due to confusion, disorientation, etc.. The criticism may be posed that this impairment is merely part of a more general mental dysfunction. In the present study, an attempt was made to control this possible artifact by matching experimental and control subjects on the basis of IQ, by limiting subjects to those on their first admission, and by testing as soon after admission as possible. The interest, therefore, was in the particular way an individual suffering an acute schizophrenic reaction responds to a particular test situation upon admission to an institution, regardless of the reliability of his IQ. How the schizophrenic reacts to a test here and now in comparison to how a non-schizophrenic reacts here and now under similar conditions is the crucial issue.

In the same manner, the possibility of intellectual deficiency was controlled to some extent by matching experimental and control groups on the basis of IQ. The lowest schizophrenic IQ was 80, at which level there is danger of "concrete" responses not necessarily indicative of schizophrenic thought disorder, even though the "concrete" responses may show impairment of concept formation. That is, concrete responses may be healthy or normal responses at that IQ level. This offers another possibility for further study.

The question of the schizophrenic patient's capacity to conceptualize or form abstractions before his illness may be semantically side-stepped by again pointing to the psychologist's interest in the
patient's current reaction to a particular test situation. This difficulty is inherent in many test situations. Without recourse to a longitudinal study of the patient in terms of the functions that the clinician is desirous of studying, he must assume that the particular function in question has become disordered or impaired under the stress of schizophrenic illness.

It has been pointed out that studies citing the evaluation of the validity or single scale scores on the MMPI by comparison with established diagnoses have been largely unfavorable (5, 6, 70, 73, 88). Wauck (88) concluded that the Sc scale taken by itself was not an adequate or valid diagnostic tool, after having administered the MMPI to 80 clinically diagnosed schizophrenics. It has been pointed out previously that Wauck's study is not directly comparable to the present investigation because of differences in age range of the schizophrenic groups and the unknown chronicity of the schizophrenic group in Wauck's study. His schizophrenic group seems to include schizophrenic reactions from the earliest to the most chronic stages. Only cases of early schizophrenia, on first admission to a psychiatric hospital, were used here.

It has also been noted previously that Wauck (88) suggested the possibility of an age factor in operation in schizophrenic responses to the Sc scale. The youngest group of schizophrenics in his sample exhibited a degree of disorganization and dissociation on the MMPI which was markedly pathological. The next age group exhibited a definite lowering of score to within normal limits. The oldest group manifested a profile in all respects "normal". Wauck's suggestion and statistical
evidence for an age factor influencing the choice of more schizophrenic-like responses by younger schizophrenics may be applicable to the present investigation since the age means for control and schizophrenic groups were twenty-eight and twenty-nine years respectively, with exclusion of cases above forty years of age.

Negative findings regarding the diagnostic validity of the Sc (or other) clinical scale of the MMPI may be a function of current inadequate and unreliable medical diagnoses, especially in the area of the schizophrenic psychoses.

A more favorable report is given by Benton and Probst (6), who found a significant degree of agreement between psychiatric ratings and test scores on the Sc scale. Their study lends support to the findings of the present study, which demonstrated a statistical significance of the difference between the means of the schizophrenic and control groups on the Sc scale.

Further reasons for the difference in findings between Wauck's (88) and this study are not clear. It is possible that the schizophrenic subjects who made up the experimental group in this study were more representative of schizophrenics than those used by Wauck. The fact that the test was administered almost immediately upon admission when the schizophrenic reaction was presumably "full-blown" may have influenced the choice of more schizophrenic-like responses. Also, the mean score of the Sc scale for the schizophrenic group may not be too representative because of several extreme scores. However, since the validity scales in these particular cases offer no evidence as to possibilities of malingering, carelessness or misunderstanding, it is not very probable that these extreme scores are spuriously high. Possible
examiner effect must always be taken into account, but it is not very probable in this particular case since the inventory was self-administered with the examiner not in the immediate vicinity. In the same way, the significant differences between the means of the two groups on the Hs, Pd, Ma, Pt scales obtained in the present study may be found to differentiate non-schizophrenics from schizophrenics. However, since the control group comprised such varied nosological groups as Manic-depressive psychoses, mixed neuroses, epilepsy, etc., it cannot be stated with any degree of certainty that, for example, a depressive case would score higher than a schizophrenic case on any one of these scales. Also, the degree of overlap on these scales is considerable, as inspection of Figures 8, 9, 10 and 11 will disclose.

Interpretation of the diagnostic validity of each scale should take into account the objections regarding the use of separate MMPI scales for differential diagnosis. Both Eysenck (13, p. 60) and Anastasi (1, p. 554) point out the dubious theoretical framework upon which the clinical scales are based. However, when the empirical construction of the MMPI is considered, it assumes an advantage for the objectively-minded clinician over the subjectively-loaded approach used with projective techniques.

Since the differences between the means of both schizophrenic and control groups were statistically significant for the physiological test, the tests of abstract-concrete attitude, and the Sc scale of the MMPI, it would seem that hypothesis 2, 3, and 4 should have been substantiated. However, it will be noted in Tables 3 and 4 that no significant degree of correlation was established between the particular
tests. For example, no significant relationship was established between impairment on the physiological test and each test of abstract-concrete attitude. No significant relationship was found between impairment on the physiological test and an abnormally high score on the Sc scale. No significant relationship was found between low scores on each test of abstract-concrete attitude and an abnormal trend in Sc scores.

On the basis of this data, no conclusions may be drawn regarding the assumption that there is an "interruption" or disorder of the autonomic-hypothalamic-cortical neural chain in schizophrenia. This study could not demonstrate a correlative impoverishment of both affective and associative functions as measured by a physiological test of autonomic reactivity, the Sc scale of the MMPI and tests of abstract-concrete attitude.

In particular, the findings of this study do not corroborate those of Meadow and Funkenstein (67) who found that a relatively marked impairment in abstract thinking in schizophrenia is paralleled by a hyporeactive type of autonomic reaction. A methodology such as was employed by Meadow and Funkenstein would possibly be most appropriate for the particular type of conclusion desired. They were able to divide their schizophrenic group into three types on the basis of their autonomic reactivity and draw their conclusions from the performances of these groups on psychological tests of concept formation. Since Meadow and Funkenstein have not described their schizophrenic patients in terms of length of stay in the hospital, it is difficult to compare their study with the study presented here. It would seem that Meadow and Funkenstein chose subjects with schizophrenic reactions varying from the earliest manifestations to the most chronic. In the present study,
the schizophrenic group comprised only early schizophrenics on their first admission to a psychiatric institution and having had no prior formal treatment, physical or psychotherapeutic. The schizophrenic patients in the Meadow-Funkenstein study had had no treatment for a period of three months prior to the investigation. Also, since Meadow and Funkenstein use the three groups of schizophrenic patients as their own controls, rather than employing normal or other controls, it is difficult to evaluate the actual value of their conclusion that impairment of abstraction ability and parallel impairment of autonomic reactivity are definitely related in schizophrenia.

Granted that a methodology such as was employed by Meadow and Funkenstein is most suitable for the testing of Hypothesis (2), as set forth in the present study and granted that an interrelationship between physiological and psychological factors can be established, such a finding would raise several questions. Is this relationship specific for schizophrenia or may it exist in other conditions? It is well known than an impairment in abstraction is also associated with organic brain disease (38, 39). Hyporeactive autonomic patterns have been found in some cases diagnosed as psychopathic personality or obsessive-compulsive neuroses (33). Whether patients with organic brain disease who show loss of abstraction ability would also show a hyperreactive autonomic nervous system is not known. Conversely, patients diagnosed psychopathic personality, or obsessive-compulsive neuroses, who show a hyporeactive autonomic nervous system reaction, have not been tested for loss of abstract power. Further experimentation on this problem is indicated. Important implications regarding
the heterogeneity or homogeneity of mentally-ill patients in terms of these two variables (abstraction and autonomic reactivity) should point up more strongly than ever the adequacy (or inadequacy) of current diagnostic schema. One very important derivative of such a demonstrated relationship in both schizophrenic and brain damaged cases would suggest a cortical defect in schizophrenia. Lesions in the brain in schizophrenia have not been demonstrated by conventional neuropathological techniques. The implied cortical defect could, however, be on a purely biochemical, physiological, or neuropathological basis which so far has defied detection. Therefore, it can only be surmised whether this suggested cortical defect in schizophrenia is primary, or whether it is secondary to changes elsewhere in the central nervous system, autonomic nervous system, or adrenal cortex as suggested by Pincus and Hoagland (75).

In the present study, probably the techniques employed did not warrant the stating of hypotheses of such far-reaching implications as Hypotheses (2), (3), and (4). As our present state of knowledge regarding neural mechanisms of affective and associative factors is still in the exploratory stage and the psychological techniques used to measure these factors are still crude, this study points up again the need for refinement of theory and technique and especially the need for well-controlled studies of very finely delimited areas in the field of physiological-psychological correlates.
CHAPTER VI

SUMMARY AND CONCLUSIONS

The primary object of this study was to investigate the adequacy of a test battery for the differential diagnosis of early schizophrenia. More explicitly, the main hypothesis tested in this investigation was stated as follows:

(1) A test battery consisting of a physiological test of autonomic nervous system reactivity, psychological tests of abstract-concrete attitude, and the Sc (Schizophrenia) scale of the Minnesota Multiphasic Personality Inventory would serve as a useful tool in the differential diagnosis of a schizophrenic group from a non-schizophrenic group.

In employing the test battery chosen, it was also possible to study the supposed relationship between autonomic nervous system reactivity, abstract-concrete attitude (presumably revealing one type of thought disorder) and performance on an objective personality scale, the MMPI, in both a schizophrenic and non-schizophrenic group. The following related hypotheses were suggested:

(2) In a group of mental patients, there is a positive relationship between impairment of autonomic nervous system reactivity and impairment of abstract-concrete attitude.

(3) The more hyporeactive the autonomic nervous system of the schizophrenic group (i.e. the lower the physiological score), the higher the score on the Sc (Schizophrenia) scale of the MMPI.

(4) The greater the evidence of impairment on tests of abstract-concrete attitude in the schizophrenic group, the higher the score on the Sc scale of the MMPI.

The test battery described in hypothesis (1) was administered
to an experimental group of 50 early schizophrenic patients and to a control group of 50 patients suffering a functional disorder other than schizophrenia. Each member of both groups was on his (her) first admission to a psychiatric institution. The groups were matched on the basis of age, sex and IQ.

A statistical test of Hypothesis (1) involved the use of a "t"-test for finding the significance of the difference between the correlated means of the two groups for each test administered. The test battery was found to statistically differentiate the schizophrenic group from the non-schizophrenic group at the 2 per cent level and beyond. It is concluded that a test battery consisting of a physiological test to measure autonomic reactivity, psychological tests of abstract-concrete attitude, and the Sc (Schizophrenia) scale of the MMPI provides one basis for the differential diagnosis of a schizophrenic patient from a non-schizophrenic patient.

Decided drawbacks in the use of this battery deriving from the questionable status of validity and reliability of each test and the number of "false positives" (questionable diagnoses) to be expected, have been discussed. Individual choice, as dictated by the demands of the particular situation, will decide whether the precision (or lack of precision) offered by the test battery is adequate for the purpose at hand.

Hypotheses (2), (3), and (4) were not substantiated. No relationship was established for the expected correlation between autonomic nervous system hyporeactivity, evidence of impairment on tests of abstract-concrete attitude and an abnormal trend in the schizoid
direction, as measured by the Sc scale of the MMPI. It had been hypothesized that associative and affective functions in schizophrenia are impaired in a related fashion. The assumption that combination of loss of abstraction ability, schizoid personality trend and a physiological phenomenon interpreted as a "release" of the autonomic nervous system from higher (cortical) control was not confirmed.

With regard to the particular techniques employed and the data derived therefrom, it may be concluded that neither these techniques nor the data derived therefrom offer a firm enough basis for prediction as set forth in the hypotheses regarding physiological-psychological correlates. A more definitive approach is clearly indicated in that theoretical formulations regarding neural mechanisms must be more firmly supported by experimental evidence. In the same way, psychological tests of concept formation must be more refined before attempts are made to establish fine relationships between mental disorder and supposedly-parallel physiological disorder.

The most important implication for further study indicated in the present investigation is the need to establish the kinds of response made by various nosological groups to a physiological test of autonomic reactivity and tests of abstract-concrete attitude. This physiological-psychological approach might offer objective evidence for the homogeneity/heterogeneity of mental disorder.

In the area of abstract-concrete attitude, there is need for well-controlled study of the relationship between intellectual level and abstraction ability. Longitudinal studies of the development of abstract-concrete attitude should be undertaken and normative data
gathered to aid in the interpretation of these tests.

A discussion of the reliability and validity of each of the tests employed has pointed up the need for further well-controlled studies which should prove favorable.
APPENDIX A

COPIES OF
GOLDSTEIN-SCHEERER OBJECT SORTING TEST (ACTIVE)
GOLDSTEIN-SCHEERER OBJECT SORTING TEST (PASSIVE)
BENJAMIN PROVERBS
**GOLDSTEIN-SCHERER OBJECT SORTING TEST**

**PART I (ACTIVE)**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Response</th>
<th>Adequate Sorting</th>
<th>Conceptual Level</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. large fork</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. pipe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. bicycle bell</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. red paper circle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. toy pliers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. red rubber ball</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*total possible score = 12*
<table>
<thead>
<tr>
<th></th>
<th>Sample</th>
<th>Response</th>
<th>Conceptual Level</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>ball, paper circle, matchbook, sink stopper, eraser.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>large silverware, small silverware, bell, lock, 2 nails, 2 pairs of pliers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>ball, sink stopper, two corks, bicycle bell, paper circle.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>large screwdriver &amp; pliers, small screwdriver &amp; pliers, small hammer &amp; small hatchet.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>red paper circle, green cardboard square, white filing card, matchbook and real cigarette.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>all items of which there are 2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>real cigarette, 2 sugar cubes, filing card.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>sink stopper, imitation cigar, imitation cigarette, ball, &amp; eraser.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>pipe, real cigar and cigarette, imitation cigar &amp; cigarette, &amp; matchbook.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>large silverware, and miniature silverware.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>4 miniature tools, 3 miniature eating utensils, imitation cigar, imitation cigarette, and ball.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>filing card, green cardboard rectangle, block of wood with nail in it, matchbook, 2 sugar cubes.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total possible score = 24
The following nine proverbs and phrases are read in order to the subject who is asked to explain what they mean.

1. When the cat's away, the mice will play.
2. Don't cry over spilled milk.
3. It never rains but it pours.
4. The burned child dreads the fire.
5. Don't cross your bridges till you come to them.
6. A rolling stone gathers no moss.
7. Don't count your chickens until they're hatched.
8. The proof of the pudding is in the eating.
9. He who laughs last, laughs best.

total possible score = 18
APPENDIX B

FREQUENCY POLYGONS OF DISTRIBUTIONS OF RAW SCORES ON TESTS EMPLOYED IN DIAGNOSTIC TEST BATTERY FOR SCHIZOPHRENIC AND CONTROL GROUPS
Scores

Frequency Polygons of distribution of scores on physiological test.

--- schizophrenia group

--- control group.

Fig. 1
Figure 2

Frequency polygons of distributions of raw scores on Goldstein-Scheerer (Active)

--- schizophrenic group
--- control group
Fig. 3

Frequency polygons of distributions of raw scores on Goldstein-Scheerer (Passive)

- - - - schizophrenic group

- - - - control group
Fig. 4

Frequency polygons of distributions of raw scores on Similarities

--- schizophrenic group
---- control group
Fig. 5

Frequency polygons of distributions of raw scores on Block Design

--- schizophrenic group

----- control group
Fig. 6

Frequency polygons of distributions of raw scores on Benjamin Proverbs

--- schizophrenic group

----- control group
Fig. 7

Frequency polygons of distributions of raw scores on Sc (Schizophrenia) Scale

--- schizophrenic group

--- control group
Scores

• Fig. 8

Frequency polygons of distribution of raw scores on Hs (Hypochondriasis) Scale

--- schizophrenic group

--- control group
Fig. 9

Frequency polygons of distributions of raw scores on Pd (Psychopathic deviate) Scale

- schizophrenic group
- control group
Fig. 10

Frequency polygons of distributions of raw scores on Ma (Hypomania) Scale

--- schizophrenic group

--- control group
Fig. 11

Frequency polygons of distributions of raw scores on Pt (Psychasthenia) Scale

--- schizophrenic group

---- control group
REFERENCES


<table>
<thead>
<tr>
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<tbody>
<tr>
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