TEMPORAL VARIABILITY AND PRE-MORBID ADJUSTMENT IN SCHIZOPHRENIA

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A DISSERTATION PRESENTED TO THE GRADUATE COUNCIL OF
THE UNIVERSITY OF FLORIDA
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

June, 1960

ACKNOWLEDGMENTS

The author extends his gratitude to Dr. James C. Dixon and the other members of his committee; to Dr. Martin J. Brennan of the Psychology Service of Lenwood Hospital, VAH, Augusta, Georgia; and to Mr. Julian C. Davis of the Psychology Department of the Florida State Hospital at Chattahoochee, Florida.

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CHAPTER I

INTRODUCTION

The Problem

Variability has long been noted as an outstanding characteristic in the test performance of schizophrenics. This study seeks to determine if variation in test performance over a period of time is related to level of pre-morbid adjustment in schizophrenics.

Specifically, this study seeks to test the hypothesis that individuals who have had a good pre-morbid adjustment will show more temporal variability than those individuals who have had a poor pre-morbid adjustment. Fluctuations in attention and motivation would seem more likely to occur in those still in the acute storm and stress of recent conflicts than in those who have long since reorganized and stabilized themselves, even though on a psychotic basis.

A certain amount of variability appears in the normal organism, and has been found to occur as a matter of course in many subhuman animals. Actually, variability in the sense of adaptibility is felt by some to be a necessary part of evolutionary progress (Lepley, 1954) and should be examined as a lawful variable in itself. However, this study is concerned primarily with pathological variability, which may be defined as an inconsistency greater than normally expected or

behavior differing from what would normally be predicted on the basis of preceding activities.

Temporal Variability

Temporal variability has been observed in the gross behavior of schizophrenics. Studies (Gjessing and his associates, 1938; Rice, 1944; and Richter, 1938) have show explicitly repeated cycles of abnormal and normal behavior with a sharp transition from one phase to another, the cycles ranging from two days to forty days in length. More subtle temporal variability, perhaps not observable in overt behavior, has been shown to occur in psychological testing and is often used as an aid in differential diagnosis. Temporal variability can manifest itself in a short period of time over the course of a single testing session, causing striking irregularities between tasks, and in sub-test scores. It can show itself in the erratic and seemingly paradoxical answering of difficult questions while missing easy ones.

Temporal variability can also be shown in the performance of the same tasks over a period of time, when results are often highly inconsistent with what would be expected on the basis of learning and familiarity with material.

Research interest in variability and mental aberration was shown early in the history of psychological testing, although interest failed to continue. Pressey (1918) studied differences in test performance between psychotics (in his sample, cases of dementia praecox

and chronic alcoholism) and primary mental defectives, both groups having obtained scores in the mental defective range on the Yerkes Point Scale. He found that the psychotics showed a consistently greater total variation from the average normal individual of the same age and that there was more individual variation from the average for the psychotics.

In a study following up this first, Pressey and Cole (1918) examined the value of irregularity on a psychological examination as an indicator of deterioration. Again the Yerkes Point Scale was used on a sample of 158 feeble-minded patients and 67 cases of dementia praecox and chronic alcoholism grading from 8 to 12 years of Mental Age. They found the increasing order of irregularity to be the feeble-minded patients, the cases of dementia praecox and the alcoholics. However, the mean variation at each Mental Age was large, rendering the irregularity on the total scale of little value. Certain of the tests were more differential with respect to irregularity, giving results that were much more meaningful statistically. They concluded that irregularity could be caused by poor cooperation, illiteracy, malingering, psychotic disturbance of a temporary nature, or by deterioration alone.

Curtis (1918) set out to obtain norms for the Yerkes Point Scale but incidentally obtained variability scores for the various categories of individuals whom she tested. She found chronic alcoholics to be

most variable, with schizophrenics second most variable. She stated that this result seemed contrary to popular opinion of the day, but that the schizophrenics were individuals who had recently become patients; that if they had been psychotics of long standing their variability would have been greater.

Hunt (1936) tested schizophrenics, organics, and normals with the same tests at intervals over a period of time and found that the schizophrenics had the highest rate of variability. He stated that high variability has been one of the most consistently demonstrated characteristics of the performance of schizophrenics and cites as an illustration the work of Gatewood (1909). Gatewood obtained performances on the same tests successively through a period of several weeks and found schizophrenics who would achieve a score three times their initial score and the next session would obtain scores only half their initial score. Hunt's theory was that the high variability is due to the lack of "governability" by which he meant the ability of individuals to apply themselves to what they are doing and not to be distracted by their own private responses.

Another similar study (Keehn, 1957) found greater variability in schizophrenic test responses. He tested four chronic schizophrenics from 13 to 15 times with the Bender-Gestalt test and the Block Design sub-test from the Wechsler-Bellevue. Testing at intervals of about four days, he found that two of the patients improved on the Bender-

Gestalt over the period of time, reaching normal levels or above. However, the other two became poorer in their performance on the Bender-Gestalt. All four improved on accuracy on the Block Design Test, but not on time scores. The Bender-Gestalt scores fluctuated widely, and Keehn felt that better scores could have been obtained if the patients had been tested in several short periods, since in every case, a patient's best possible performance substantially exceeded his best actual performance. Keehn felt that it was not the Bender-Gestalt material that caused the fluctuations but the inability of the patients to apply themselves consistently to the material over the whole testing period. Similar results were obtained on the Block Design Test, but they were not so marked, and general improvement outweighed score fluctuations. All fluctuations occurred without treatment or apparent change in the patient's overall behavior.

A study with similar findings, although incidental to the main purpose, was that of Rosenthal and Imber (1958). They administered mephenesin daily for two weeks to a group of patients including ambulatory schizophrenics, and also administered the Bender-Gestalt five times over the period. They found that repeated administration of the Bender-Gestalt had resulted in a generally improved performance, but learning curves varied widely, some patients ending up worse than they started.

Wolf (1957) used the test-retest method on 72 schizophrenics and 72 non-schizophrenics to determine if there was impairment of particular functions. He equated them for age, intelligence, and education and tested them twice, a month apart. He found that the schizophrenics had greater variability than the non-schizophrenics and also did less well as a group. There was no difference in the amount of variability from test to test so he concluded that schizophrenia does not affect stability of performance in specific areas of functioning.

Armstrong (1952) studied the consistency of longitudinal performance on the Graham-Kendall Memory-for-Designs Test, and showed that while schizophrenics scored much better on total score than organics with whom they were compared, they were far more erratic, showing much greater inter-test variability. It was his belief that the lesser motivation of the schizophrenics to improve their performances accounted for the difference between the groups.

Rappaport (1953) tested groups of organics and schizophrenics with the same tests repeatedly over a period of more than a month. He attempted to relate the level of intellectual functioning with what he called "behavioral accessibility," the degree to which the individual is able to respond to selected environmental stimuli. Also, he attempted to ascertain the relative variability of accessibility in the two groups.

He found that the relative variance of organics and schizophrenics from day to day was not significantly different, considering the group as a whole. However, the temporal variability of each schizophrenic from performance to performance was significantly greater than that of each of the organics, at the 1% level of confidence. This suggests that the behavioral accessibility of the schizophrenic varies widely from day to day, and his behavior and performance on various tasks do likewise. The individual behavior patterns were grossly irregular, but in gathering data for groups as a whole, the patterns were cancelled out by the superimposing of curves in grouping the data. He concluded that the intellectual functioning of psychotic patients does appear to be dependent upon behavioral accessibility and that the varying manifest intelligence of schizophrenics is especially highly related and in direct proportion to their accessibility at the time of testing.

Two Kinds of Schizophrenia

Certainly the bulk of the evidence seems to indicate that schizophrenics show great temporal variability. However, these studies treat schizophrenics as a fairly homogeneous group. There is a current hypothesis (though not really new) that there are two subgroups of schizophrenia which can be differentiated, and that these sub-groups can be shown to have considerable differences.

This hypothesis can be found, stated either implicitly or explicitly in the psychiatric and psychological literature since the time of Bleuler (1950). He recognized that some individuals appeared to recover from dementia praecox in opposition to Kraepelin's notion of non-recoverability (1913), and felt that there was something operating that made necessary further criteria for the diagnosis. Many others have divided schizophrenia into two sub-types and have suggested many names for the dichotomy, e.g., process-reactive, chronic-episodic, typical-atypical, evolutionary-reactive, true-schizophreniform, etc. Bellak (1944) sums it up in his statement that there is apparently a syndrome that distinguishes itself from the classical dementia praecox by an atypical pre-psychotic personality. Its onset is not insidious; there is often a precipitating factor; it does not take place in the presence of a clear sensorium; many of the phenomena can be well understood and dealt with in terms of psychological dynamics; and the outcome is relatively good. He terms this syndrome schizophrenia and leaves the term "dementia praecox" to a possibly more somatically determined disorder. Meyer (1906) also made it a point to distinguish the catagories, and Sullivan (1928) and Langfeldt (1937) considered it well worth writing about. The inference based on these observations has usually been that there is a schizophreniform psychosis which develops fairly suddenly and in response to relevant stress which does not follow the classical course, and that many cases of

so-called typical schizophrenia are so classified mistakenly.

Actually, however, there was very little definitive research on the problem until Kantor, Wallner, and Winder (1953) explicitly formulated the concepts and separated a group of schizophrenics into "process" and "reactive" types from the case histories. They found their separation to be reliable and demonstrated certain test differences between the two groups. The authors felt that their results supported the view that the diagnostic catagory of schizophrenia can be legitimately elaborated to include the classifications "reactive" and "process."

Following up their work, Brackbill and Fine (1956) conjectured that perhaps process schizophrenics have organic complications while the reactive group does not, which would help explain the great variability found in studies in this field. They studied three groups of subjects; two groups diagnosed process and reactive by the same criteria as Kantor, Wallner, and Winder (1953), and a third group of demonstrated organic brain damaged individuals. They found that the organics and process schizophrenics were quite similar with regard to certain test responses, and were different from the group judged to be reactive schizophrenics. They suggested that the difficulty in the differential diagnosis of some schizophrenia and organicity is the result of central nervous system pathology in process schizophrenia.

Continuing along the same line, Becker (1956) used the Elgin Prognostic Scale to evaluate case records of 24 male and 24 female schizophrenics in terms of the process-reactive continuum, assuming the scale to be a measure of the level of personality organization reached. He found lower genetic level scores in the process type for both males and females, but results were more definite for the males. He found a significant difference between males and females on the Elgin Prognostic Scale, indicating that the process and reactive types of schizophrenia may be manifested differently in males and females.

In another study (Kantor and Winder, 1959) the authors depart from the usual process-reactive dichotomy and assume a theoretical formulation that there is a continuum of stages of personality development and that each of these steps must be dealt with in order to successfully cope with the next stage. The malignancy of the schizophrenic reaction will depend primarily upon the developmental stage at which overwhelming anxiety and psychological trauma occur. These five stages have been patterned after the five integrative modes suggested by Sullivan (1947), i. e., the empathic, the prototaxic, the parataxic, the autistic and the syntaxic. The authors state that schizophrenia developed in the syntaxic mode of development tends to be the least malignant, and indeed suggest that it is the only mildly malignant reaction of all of the modes, and that it is an appropriate reaction to

accidental severe stress, with minimal chances of repetition of breakdown. This appears to correspond to the concept of the reactive schizophrenic, while all four of the other stages reflect varying degrees of the process type.

Zimet and Fine (1959) relate the process-reactive concept also to levels of personality organization. Using Werner's (1948) concept of ontogenetic development from amorphous and undifferentiated perceptions to increasing differentiation and hierarchic integrations, they examined the same population as that used in Kantor, Wallner, and Winder's study (1953). They found very significant differences between the groups in level of perceptual development.

Becker (1959) further discusses the process and reactive syndrome in schizophrenia as end-points of a continuum of illness and at the same time as reflecting levels of personality organization. This, he states, opens up a number of research strategies which offer promise of increasing knowledge about schizophrenia.

The Phillips Scale

Phillips (1953) studied case history data of a number of schizophrenic patients and noted that there were constant and consistent differences between those who remitted following electroconvulsive treatment and those who did not. By categorizing the data, he obtained a rating scale which measured three aspects of the individual; premorbid adjustment in the social and sexual fields, possible precipitating

factors; and signs of the disorder. This covered the general area of the case history variables studied by Kantor, Wallner, and Winder (1953); and, using the scale, he was able to differentiate those patients who could be expected to remit following electroconvulsive therapy and those who were not likely to remit. Prediction was accurate in a cross-validation study.

He found that nearly all of his predictive power came from the scale which measured pre-morbid history. This scale deals with (a) recent sexual adjustment, (b) the social aspects of sexual life during and immediately beyond adolescence, (c) social aspects of the recent sexual life, (d) the past history of personal relations, and (e) recent adjustment in social relations. Chi-square for the combination of these factors against remission was 15.4, which is significant at the .001 level of confidence. This scale is used in the present experiment.

The Phillips Scale, particularly the section dealing with pre-morbid sexual and social history, has been utilized by several experimenters who have found significant differences between schizophrenics who were found to have good pre-morbid histories compared with those who were found to have poor pre-morbid histories. In the first place, Phillips found a striking difference in remission rates. Bleke (1955) used the scale and demonstrated a significant difference between the two groups on adequacy of behavior under stress, although the two groups scored the same as each other and as a group of normals under

reward conditions. Harris (1957) discovered a difference between the two groups on size-estimation of pictures reflecting child-mother relationships. Farina and Webb (1956) found that, although there was only a slight relationship between Phillips Scale scores and a patient's ability to remain out of the hospital on an early trial visit, the relationship between the scores and the patient's later hospital status was significant. Rosenthal (1959) studied concordance and discordance of schizophrenia in identical twins and found that in discordant twins (one of whom has schizophrenia and one of whom had not) the one that has escaped the disease had a more favorable Phillips Scale score than the one who had become schizophrenic, in every single case.

The dichotomy of good and poor pre-morbid adjustment types of schizophrenia is not known for certain to be isomorphic with the "process-reactive" dichotomy, but there are certainly many likenesses apparent in the notion of bad pre-morbid adjustment in process schizophrenia. If comparability is assumed, it would seem that the Phillips Scale would be of great value in differentiating the two groups whose differences in variability are being investigated.

Rodnick and Garmezy (1957) also report that evidence from the laboratory suggests that the Phillips Scale is a reliable instrument as well as a valid predictor. They state that a high inter-rater reliability has been found when senior clinicians are compared with each other as well as untrained graduate students. In addition, they report that pre-

morbid adjustment ratings derived by intensive interviews with patients, and from information supplied from case history data, have tended to be markedly similar.

Garmezy and Rodnick (1959) admit that the observation that schizophrenic patients are a heterogeneous lot is not an uncommon one. However, they do not concur completely with the notion that there is a real dichotomy or that the "process" schizophrenics are necessarily organic and the "reactive" schizophrenics necessarily psychogenic in origin. They do recommend that the use of certain factors of pre-morbid adjustment in testing schirophrenic patients will strongly tend to reduce their heterogeneity, however, and illustrate this point with a number of experiments (Alvarez, 1957; Bleke, 1955; Englehardt, 1959; Farina, 1958; Garmezy, 1957; Zahn, 1959.) They noted that in many of them, the heterogeneity of variance would have masked real differences if separation on the basis of good and poor pre-morbid adjustment had not been made, by use of the Phillips Scale. Again, differences reflecting a wide range of pre-morbid antecedents were found.

The Problem Restated

To restate the hypothesis, schizophrenics who are shown to have good pre-morbid adjustment on the Phillips Scale will have more temporal variability on psychological testing than will schizophrenics who are shown to have a poor pre-morbid adjustment.

CHAPTER II

SUBJECTS

The subjects used in this study were 44 patients of the Florida State Hospital at Chattahoochee, Florida, and 16 patients of the Lenwood Veteran's Administration Hospital at Augusta, Georgia, making a total of 60 subjects.

In order to reduce variability from sources other than those desired, certain controls were placed on the subjects to be chosen. All had been diagnosed as schizophrenic by staff diagnosis, and none had been hospitalized more than a total of five years, although for some the time since first hospitalization exceeded five years. At least a modicum of contact with the environment was required, since it was necessary that the patient be able to attend to the task. No patient less than 19 years of age nor older than 35 was used in the study, since there appear to be few age differences in ability to do tasks in this range. This restriction penalizes those in the younger group somewhat, however, since marriage is a positive factor in obtaining a favorable Phillips Scale score. All were males, so that sex differences could not contribute to the variability. All of the patients were seen at intervals of the same length of time (two weeks $\pm$ one day) so that changes in performance would be equal so far as retention and famili-

arity factors were concerned.

Three other sources of possible variation, age, intelligence, and sub-type diagnosis were investigated to determine their influence. Age and intelligence were correlated directly with Phillips Scale scores and were found to be non-significant. (See Table 1.) There were six different types of schizophrenia. The means of the Phillips Scale scores of each of the sub-types were computed. The highest and lowest of the means were tested for significance of the difference between them and the difference was found to be insignificant. (See also Table 1.) This being the case, then, none of the other means could possibly be significantly different, and it is concluded that sub-type was not a confounding source of variation.

TABLE 1

RELATIONSHIPS BETWEEN CONTROL VARIABLES AND PHILLIPS SCALE SCORES

Categories	r	t
Age vs. Phillips Scale Score	-.22	1.69
MQ vs. Phillips Scale Score	-.17	1.31
Mean of SRSA - mean of SRP vs. Phillips Scale Scores	-	1.14

While no direct measure of intelligence was made, the Wechsler Memory Scale, one test of the experimental battery, is designed to be

compared directly with the Wechsler Bellevue, Form 1. Wechsler (1945), in the manual of the Wechsler Memory Scale states, "... a method was arrived at which equated the memory scores against the weighted scores of the Full Scale. The method is essentially empirical and was arrived at by plotting the mean memory scores for different ages against the weighted scores of the Bellevue Scale (age group 20-24 years) and then trying out various constants which would keep the IQ for any age group equivalent to the mean IQ of that age group. The advantages of the Memory Scale are its relatively satisfactory standardization, the fact that an allowance is made for memory variations with age and the fact that memory quotients so obtained are directly comparable to the subject's intelligence quotient." Thus, the Memory Scale was felt by the investigator to be fairly indicative of the functioning level of the intelligence of the patient.

Complete data regarding the patients and their ages, MQ's and diagnoses may be found in Appendix II.

The problem of tranquilizers and other drugs and their effects on variability is so complex as to almost defy logical determination. Certainly it can be stated that these agents bring about considerable changes in overt behavior, and seem to reduce over-activity to a great extent. It is the ordinary practice to administer larger and larger amounts of drugs to patients whose behavior becomes more

and more erratic to bring this behavior more into normal range, and this might possibly reduce also the variability which is shown on psychological testing. It also appears possible that drugs, in making schizophrenics' behavior closer together (toward normal) may thus mask true differences which could be shown to exist if both groups had not been pushed toward the normal. On the other hand, it might very well be true that the ataractics cover over the behavior symptoms only, and that psychological tests still reveal the basic irregularities in the personality picture.

Most of the patients used in this study were on tranquilizers throughout the six weeks that were required to complete the study and, of course, the effects of these are unknown. There has been some research done in connection with the effects of various drugs and tranquilizers on psychological test performances and the conclusions drawn are most inconsistent. Some (Good, Sterling, Holtzman, 1958) find no change in test performance of schizophrenics with or without tranquilizers even with startling changes in overt behavior. Others (Kovitz, Carter, and Addison, 1955) find that tranquilizers have a facilitating effect on schizophrenic test performance; others (Lehmann and Hanrahan, 1954) find it inhibits some tests; still others (Shaten, Rockmore and Funk, 1956) find that tranquilizers inhibit some types of tests, facilitate others and have no effect upon others. The same confusion is found in the use of tranquilizers and drugs on normals and

their test performances; some increase, some decrease, some do both, some do neither. At the very least it appears there is no clear-cut relationship between the use of tranquilizers and their effect on psychological test performance, although the impression is gained that the technique of examining for the effect of the tranquilizer is one factor in obtaining differences. Nevertheless, the conclusions of this study must be made with the reservation that the effect of tranquilizers on test variability was an uncontrolled variable.

CHAPTER III

PROCEDURE

The same set of psychological tests was presented individually to the 60 schizophrenic patients every two weeks for a period of six weeks, making a total of four presentations altogether. The tests included the Wechsler Memory Scale, the Pursuit Rotor test, the Word Association test and the Digit Symbol test. These tests were chosen because of brevity, ease of scoring, previous standardization, diversity of mental function examined, and a good likelihood of sensitivity of temporal variations in effort, attention, motivation and transitory psychotic disturbances. This design was arranged to examine the degree to which the subjects varied in their responses on the various tests from time to time throughout the period of the study.

Previous to testing, each patient had been rated for pre-morbid adjustment using the Phillips Scale (see Appendix I). Any source of information was utilized in filling out the rating scale, although most information was obtained from the regular case folder. Any material found in the case folder was examined for pertinent information, including social histories, psychiatric examinations and notes, correspondence and reports from other hospitals, agencies, and institutions. On three of the patients special interviews were done by the psychiatrist

in charge of the patient at the request of the investigator to obtain additional sexual and social information so that the Phillips Scale ratings could be completed.

When case history data were too scanty to rate at least four of the five sub-scales of the Phillips Scale, the case was discarded. However, if at least four of the five scales could be rated, the fifth scale was prorated. If enough information was present to make it obvious that the patient could not have been rated below a certain point on the scale or above a certain point on the scale and yet the exact point was indeterminate, a range estimate was made and the midpoint of the range was used as the rating on that scale. Half scores were rounded off to the next highest full digit score. Even with these allowances, most of the case histories were unusable and were discarded. No more than four cases having the same Phillips Scale score were used, and some of the possible Phillips Scale scores were not obtained. However, the majority of the scores have two cases, and the distribution of the cases is roughly equal from high to low scores.

Inter-rater reliability was determined by having another staff psychologist at the Florida State Hospital rate ten of the same cases independent of the investigator. A Pearson product-moment correlation was obtained for the two ratings, which was .96. All other ratings were made by the investigator alone for the Chattahoochee cases. The ratings of the Augusta cases were made by the staff psychologists of

that hospital after careful and detailed instruction in the use of the scale by the investigator.

Each subject was tested individually. At the first session, he was asked if he would like to take part in a scientific experiment which might be of some benefit in obtaining information about people who are troubled with nervousness. If he assented to the testing, he was told, "This test procedure requires that you come back several times for further testing, approximately on the same day of the week each time. At each of these sessions you will receive several different types of tests. I would like for you to do your best each time. Are there any questions? Then let us begin with the first test. They will be fairly short." If he refused testing, he was allowed to return to his ward. If the patient requested more information about the testing, he was told that it was entirely voluntary and would be in no way connected with his relationship to the hospital or his treatment. This was sufficient to dispel most suspicions. Only one patient refused to continue testing after completing the first session, although many were lost because of administrative action of one kind or another--furloughs, transfers, referrals to medical and surgical wards, etc.

Testing was begun by the administration of the Wechsler Memory Scale. The Wechsler Memory Scale is composed of seven sub-tests, each measuring some aspect of memory. Test 1, called Personal and

Current Information, is composed of six simple questions. It is scored by summing up the total number of correct answers. Test II, Orientation, asks five questions about the date and the place, and is scored by summing up the total number of correct answers. Test III, labelled Mental Control, consists of three sub-items, counting backwards from 20 to I, repeating the alphabet, and counting by threes. It is scored by giving two points for each sub-item done correctly, adding a point if it were done in a certain time limit, taking away a point from each sub-item if one error were made on that sub-item. These three subtests discriminate very little or not at all between subjects of normal or even near-normal intelligence and mental condition but many of the patients used in the present investigation do not fall into either of these categories.

Test IV, Logical Memory, consists of two memory passages which are read to the subject and then he is asked to repeat as many of the ideas as he can. The subject's score is the average of the number of ideas which he produces correctly on both passages. The test is intended to measure immediate recall of logical material. Test V is the Memory Span for digits backward and forward, and the score is simply the number of digits recalled. Test VI is a test of Visual Reproduction which requires the subject to draw from memory geometric figures exposed for a period of 10 seconds. Scoring is based upon the number of correct elements included in the reproduction of each of the

three figures. The final test, Test VII, called Associate Learning, consists of 10 paired associates, some easy and some hard, which the subject is required to learn in three trials. The score is the sum of the hard associates recalled and half the easy associates.

The tests were all administered according to the directions in the manual for the Memory Scale, with the exception of minor changes due to present conditions. For example, the question, "Who is the mayor of this city?" was changed to, "Who is mayor of your home town?" since the patients in this hospital come from all over the state.

After the Memory Scale was completed, the patient was told, "Fine, and now let us try something a little different." He was asked to stand in front of the Koerth Pursuit Rotor, and given the following directions, similar to those of Huston and Shakow (1948), "On this device you show your ability to learn a new movement. Hold the pointer like this." The subject is shown that the pointer handle is held in the hand with the palm downward and the fingers around the handle and not touching the metal point. Directions are continued, "With the wrist and pointer in a straight line, your body erect and well balanced, keep the pointer on the target as it turns around. If you let the pointer get off the target, catch up with the target again, moving the pointer steadily until you get on it. At first, you may not be able to keep the pointer on the target well, but as you continue, your hand and eye will begin to work together and you will improve much if you do your best.

Your score will be higher the more you make contact with the target. Let the other hand rest lightly on the edge of the turntable box. If you relax between tries you will do better. When I say 'Ready,' place the pointer on the target and follow it as best you can until I say 'Stop.'" Five trials were given, with a maximum of twenty seconds per trial possible, and the score was the average of the five trials in seconds as measured by a chronoscope. The Pursuit Rotor was set automatically to run for about twenty seconds, switch off for about ten seconds and repeat.

The Word Association Test was administered next. The words used were taken from the list compiled by Rappaport in Volume II of Diagnostic Psychological Testing (1946). Fifty of the words were used, omitting those of obvious sexual content, because with a psychotic population the words would have contributed little and would have complicated rapport. The following directions were given, "I am going to read to you a series of words, one by one. I want you to respond to each word with one other word. It does not make any difference what your word will be, but it should be the very first word that comes to your mind after you hear my word. I want you to be just as fast as you can because I will time you. When people take this test, they have a tendency not to hear some of the words I call out. I want you to resist this tendency; I am not supposed to repeat the words." The words and the reaction time to the nearest second were recorded and scores were obtained by count-

responses on the first test for the same stimulus word.

When that was completed, the Digit Symbol sub-test from the Wechsler-Bellevue Test of Adult Intelligence, Form 1, was administered according to the standard directions. The score was the total number correctly completed, and half scores for one of the symbols which could be reversed. Afterwards, the subject was thanked and told that he would be asked to come back in the near future and take some more tests.

As was noted previously, the same set of tests was given four times. It was expected that scores would show a gradual increase as the testing continued, but this would be a constant factor and would not bias the final comparisons. However, each time the subjects were not certain that the same tests would be given each time or when they might be called again; this probably helped hold down the effects of between-sessions practicing for the subjects.

The data were treated by calculating a mean and standard deviation for all scores on each of the tests, including all seven of the subtests of the Wechsler Memory Scale separately. Then each of the raw test scores was converted in deviation scores, or z-scores. These scores were then summated for each of the cases and their means computed. Then the differences between each z-score and the mean of the z-scores were obtained, squared, summated and divided by the mean to yield the actual variance of each case, that is, the composite vari-

ability of each case. Frequency distributions were plotted to determine linearity of the relationship between variability and Phillips Scale scores for each of the tests including the sub-tests of the Wechsler Memory Scale, and for all of the tests combined. Then a Pearson Product-Moment Correlation of each of the sub-tests and the Phillips Scale scores and for all of the tests combined and the Phillips Scale scores were carried out. Finally, the null hypothesis was assumed, and all correlations tested for significance.

CHAPTER IV

RESULTS AND CONCLUSIONS

The hypothesis studied in this investigation was that schizophrenics who had a good pre-morbid adjustment would show more variability than schizophrenics who had a poor pre-morbid adjustment on the basis that their conflicts and struggles to solve their difficulties would affect their test performance differentially from time to time.

This hypothesis, in the main, was not substantiated by the data. Only one of the eleven correlations between test variability and Phillips Scale scores was found to be of significance (see Table 2). This test was the Pursuit Rotor test, a test of visual-motor coordination.

The Pursuit Rotor also led the group of tests very greatly in amount of increase from time to time as a result of practice, and a high variability score on this test was almost entirely the result of a large increase in time spent on the target as testing progressed (see Table 3). This result suggests that one difference between reactive and process schizophrenics is that the reactives are able to improve significantly their performance on a psycho-motor test of this type, while the process schizophrenics can not. However, these findings are of little significance for the purpose of this investigation, since there was really no more genuine variability or erratic performance on the

Pursuit Rotor than any other of the sub-tests. Most subjects showed a rather smooth increase from occasion to occasion.

TABLE 2

CORRELATIONS OF PHILLIPS SCALE SCORES AND TEST VARIABILITY

Test	Variability	r	t
WMS Test 1	30.38	.14	1.08
" Test 2	38.63	.12	.92
" Test 3	36.79	-.19	1.46
" Test 4	41.10	.04	.31
" Test 5	33.22	-.10	.75
" Test 6	29.73	-.10	.77
" Test 7	48.63	.14	1.08
Pursuit Rotor ...	79.07	-.36	2.74*
Word Association	13.69	.18	1.36
Digit Symbol ...	18.46	.26	2.02
All Combined ...	369.70	.19	1.46

*Significant at 1% level of confidence.

All other sub-tests, and also all tests taken together show no relationship between variability and Phillips Scale scores. The null hypothesis could not be rejected for any of the other tests. Apparently all the subjects, at least with regard to variability of behavior on psychological testing, have been drawn from the same population.

All distributions were plotted and examined to see if the relationship between variability and Phillips Scale score might have been

concealed by a curvilinear relationship. The distributions were found to be linear in nature.

TABLE 3

RELATIVE CHANGES IN SUB-TEST SCORES
FROM FIRST TO LAST SESSION

Test	Mean Scores Sessions 1	2	3	4	Percent of Change
Wechsler Memory Scale					
Test I	4.82	4.95	5.02	5.03	+04 %
Test II	4.20	4.23	4.07	4.18	-.5 %
Test III	5.25	5.93	5.67	6.07	+16 %
Test IV	5.53	6.97	7.72	8.96	+62 %
Test V	9.55	9.67	9.60	10.35	+08 %
Test VI	8.33	8.50	9.17	9.92	+19 %
Test VII	12.19	14.23	15.98	17.13	+41 %
Pursuit Rotor	231.72	466.07	574.43	672.80	+190%
Word Association . . .	-	19.30	18.02	17.90	-07 %
Digit Symbol	31.24	35.30	35.03	38.23	+22 %

It is concluded then, that no matter what the pre-morbid adjustment of the individual has been, his variability on psychological tests does not differ significantly from that of other schizophrenics. Schizophrenics who have had a good pre-morbid adjustment have been shown in other studies to be different in certain ways from those with poor pre-morbid adjustment. Apparently one of the ways in which they differ least is that of symptomatology, and prognostic estimates based upon variability of performance would be no better than chance.

CHAPTER V

SUMMARY

High variability has been one of the most consistently demonstrated characteristics of the performance of schizophrenics. This present experiment proposed that the amount of variation in test performance is related to the level of pre-morbid adjustment in schizophrenia, the individual with a good pre-morbid adjustment showing more temporal variability than the individual with poor pre-morbid adjustment. The basis for this hypothesis was that persons who presumably have only recently been stricken with schizophrenia are still in the midst of strain and strife that will affect their test performance adversely from time to time, while the persons who have long ago reorganized on a psychotic basis will not show this storm of conflict and will not have their test performance disrupted in the same way, but their divergencies from normality will be fairly constant.

Many experimenters have compared the temporal variability of schizophrenics with normals and other nosological groups and the findings have essentially confirmed the fact that temporal variability in psychological testing is greater in schizophrenics than in any other group. These experiments have assumed that schizophrenics are a fairly homogeneous group, however, and this may not be the case.

There may be two or more types of schizophrenia which have differing antecedents, prognosis, etc., or perhaps a continuum of malignancy in schizophrenia with other demonstrable concomitants. This is not a new concept, but little experimental work had been done to examine it until fairly recently. For the last six or seven years, however, many investigators, using primarily case histories but other criteria also, have separated schizophrenics into groups, and have demonstrated significant differences between these groups. These differences have been found to be in responses to projective tests, to level or personality organization reached, to the developmental stage at which psychological trauma occurred, and in many other areas.

One method of separating schizophrenics is on the basis of pre-morbid adjustment, and the Phillips Scale is used in this investigation to separate them. The Phillips Scale was developed to aid in the prediction of the individuals who could be expected to profit from electroconvulsive therapy, but was found to have great usefulness in separating schizophrenics for various other types of measure. While the scale actually has three parts, only the part involving pre-morbid adjustment was utilized, since it contributed the greatest part of the predictive power. This scale measures (a) recent sexual adjustment, (b) the social aspects of sexual life during and immediately beyond adolescence, (c) social aspects of the recent sexual life, (d) the past

history of personal relations, and (e) recent adjustment in social relations. Subsequent investigators have found the Phillips Scale to be both reliable and valid.

Subjects used in this study were 60 male schizophrenics, 44 from the Florida State Hospital at Chattahoochee, Florida, and 16 from Lenwood Veterans Administration Hospital at Augusta, Georgia. All were between 19 and 35 years of age and none had been hospitalized for more than 5 years. Age, intelligence and sub-type of schizophrenia were shown by computation not to be confounding sources of variation. Most of the patients were on drugs and the effects of these on variability is not known for certain, since results of investigations on the effects of drugs on psychological test performance are, at best, contradictory.

Previous to testing, each patient was rated for pre-morbid adjustment on the Phillips Scale, principally from case histories. Inter-rater reliability was determined by having another staff psychologist rate 10 of the cases independently and the correlation between ratings was .96.

The same set of psychological tests, the Wechsler Memory Scale, the Pursuit Rotor test, the Word Association Test, and the Digit Symbol test were presented individually to the 60 subjects every two weeks for a period of six weeks, making a total of four presentations altogether. The design of this experiment was arranged to

examine the degree to which the subjects varied in their responses to the tests from time to time.

All raw scores were converted to deviation scores, and variances were computed from them. All of the seven sub-tests of the Wechsler Memory Scale, and each of the other tests used were correlated with Phillips Scale scores. Also the total variability for each case on all the tests combined was correlated with Phillips Scale scores.

With the exception of the Pursuit Rotor, all correlations between variability and pre-morbid adjustment ratings were not significant. The Pursuit Rotor indicated that schizophrenics of good pre-morbid adjustment varied more than the schizophrenics who had a poor pre-morbid adjustment. This seems to have been due to the relatively large increases in scores made by the good pre-morbid adjustment schizophrenics, while the poor pre-morbid adjustment schizophrenics did not tend to make large increases.

It may be concluded from these results that the high temporal variability found in schizophrenics is not a function of pre-morbid adjustment.

APPENDICES

APPENDIX I

PHILLIPS SCALE

Part I

A. Recent Sexual Adjustment

1. Stable heterosexual relationship and marriage 0
2. Continued heterosexual relationship and marriage, but unable to establish a home 1
3. Continued heterosexual relationship and marriage broken by permanent separation. 2
4. (a) Continued heterosexual relationship and marriage, but low sex drive 3
   (b) Continued heterosexual relationship with deep emotional meaning, but emotionally unable to develop it into marriage 3
5. (a) Casual but continued heterosexual relationships, "affairs" but nothing more 4
   (b) Homosexual relationships, with lack of or chronic failure in heterosexual relationships 4
6. (a) Occasional casual heterosexual or homosexual relationships with no deep emotional bond 5
   (b) Solitary masturbation, not active attempt at heterosexual or homosexual relationships 5
7. No sexual interest in either men or women 6

B. Social Aspects of Sexual Life During Adolescence and Immediately Beyond

1. Showed healthy interest in opposite sex - a "steady" during adolescence 0
2. Started going out with opposite sex regularly in adolescence 1
3. Always mixed closely with boys and girls 2
4. Consistent deep interest in same sex attachments with restricted or no interest in opposite sex 3
5. (a) Casual same sex attachments with inadequate attempts at adjustment to going out with opposite sex 4
   (b) Casual contacts with boys and girls 4

6. (a) Casual contacts with same sex, lack of interest in opposite sex 5
   (b) Occasional contacts with opposite sex 6
7. No desire to be with boys or girls; never went out with opposite sex 6

C. (30 years of age and up) Social Aspects of Recent Sexual Life

1. Married and has children, living as a family unit 0
2. Married, has children, unable to establish or keep a home 1
3. Has been married, had children, but permanently separated 2
4. (a) Married, but considerable martial discord 3
   (b) Single, has had engagement or deep heterosexual relationships, but emotionally unable to carry it through to marriage. 3
5. Single, with short engagements or relationships with opposite sex which do not appear to have much emotional depth, i.e., "affairs" 4
6. (a) Single, has gone out with a few of opposite sex, but without other indications of a continuous interest in them 5
   (b) Single, consistent deep interest in same sex attachments, no interest in opposite sex 5
7. (a) Single, occasional same sex contacts, no interest in opposite sex 6
   (b) Single, interest in neither men nor women 6

C. (Below 30 years of age) Social Aspects of Recent Sexual Life

1. Married, living as a family unit, with or without children 0
2. (a) Married with or without children, unable to establish and keep a home. 1
   (b) Single, engaged or in a deep heterosexual relationship leading toward marriage 1
3. Single, has had engagement or deep heterosexual relationship, but emotionally unable to carry it through to marriage 2
4. Single, consistent deep interest in same sex attachments, with restricted or lack of interest in opposite sex 3
5. Single, casual same sex relationships with restricted interest in opposite sex 4

6. Single, has gone out with a few of opposite sex but without other indications of a continuous interest in them. . . 5
7. (a) Single, never interested in or associated with men or women 6
   (b) Antisocial 6

D. Personal Relations: History

1. Always had close friends, didn't habitually play leading role 1
2. From adolescence on had a few close friends 3
3. From adolescence on had a few casual friends. 3
4. From adolescence on stopped having friends 4
5. (a) No intimate friends after childhood 5
   (b) Casual but never any deep intimate mutual friendships 5
6. Never worried about boys or girls; no desire to be with them 6

E. Recent Pre-Morbid Adjustments in Personal Relations

1. Habitually mixed with others, but not a leader 1
2. Mixed only with a close friend or group of friends 3
3. No close friends; very few friends; never quite accepted by them 4
4. Quiet; aloof; seclusive; preferred to be by self 5
5. Antisocial 6

APPENDIX II

PERSONAL DATA OF SUBJECTS

Part II

Phillips Score	Age	MQ	Sub-type of Schizophrenia
5	27	66.5	SRC
5	33	112	SRP
6	26	100	SRC
6	25	72	SRP
7	35	96	SRP
7	29	93.5	SRP
8	32	91	SRSA
8	26	121	SRP
9	21	83.5	SRU
9	28	76.5	SRP
9	28	104	SRS
10	26	103	SRP
10	30	66	SRP
10	24	105	SRU
11	30	97	SRC

Phillips Score	Age	MC	Sub-type of Schizophrenia
11	30	62	SRP
11	24	122	SRP
12	29	59	SRC
13	35	64	SRC
13	21	122	SRP
14	32	89.5	SRC
14	22	74	SRU
15	22	105.5	SRU
15	22	86	SRU
15	35	93	SRU
16	32	65	SRH
16	27	83	SRP
17	22	79.5	SRS
17	23	52	SRC
18	28	86	SRP
18	34	60	SRU
18	22	59	SRC
19	29	98	SRC
19	30	48	SRC
19	34	62	SRH

Phillips Score	Age	MQ	Sub-type of Schizophrenia
20	25	73	SRU
20	27	72	SRU
20	26	61	SRH
21	33	105	SRU
21	22	62	SRU
21	25	89	SRC
21	35	76.5	SRP
22	29	84	SRP
22	24	82	SRU
23	28	110	SRSA
23	29	92	SRC
23	35	51	SRU
23	31	107	SRS
24	30	108	SRP
24	22	109	SRSA
25	25	48	SRP
25	25	52	SRS
25	20	122	SRP
26	19	95	SRS
27	25	93.5	SRP

Phillips Score	Age	MΩ	Sub-type of Schizophrenia
27	22	74	SRP
28	21	114	SRP
28	29	66.5	SRU
29	20	48	SRSA
29	26	75	SRC

SRC Schizophrenic Reaction, Catatonic Type

SRP Schizophrenic Reaction, Paranoid Type

SRH Schizophrenic Reaction, Hebephrenic Type

SRS Schizophrenic Reaction, Simple Type

SRU Schizophrenic Reaction, Undifferentiated Type

SRSA Schizophrenic Reaction, Schizo-affective Type

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BIOGRAPHICAL SKETCH

Charles C. Humphries was born in Miami, Florida, on August 23, 1924. He graduated from South Broward High School at Hollywood, Florida, in 1941, and entered the Armed Services on April 20, 1943, where he served until December 3, 1945. He enrolled at the University of Florida in September, 1946, and obtained a Bachelor of Science degree in September, 1949, and a Master of Arts degree in 1956.

This dissertation was prepared under the direction of the chairman of the candidate's supervisory committee and has been approved by all members of that committee. It was submitted to the Dean of the College of Arts and Sciences and to the Graduate Council, and was approved as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

June, 1960

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