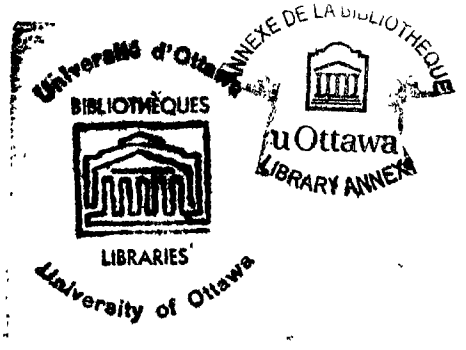
A PSYCHOMETRIC STUDY OF INSTITUTIONALIZED EPILEPTICS ON THE WECHSLER-BELLEVUE

by William P. Angers

Thesis presented to the Faculty of Arts of the University of Ottawa through the Institute of Psychology as partial fulfillment of the requirements for the degree of Doctor of Philosophy.



Ottawa, Canada, 1955

ACKNOWLEDGMENT

This thesis was prepared under the guidance of Maurice Chagnon, Professor and Director of Research at the Institute of Psychology.

C. Roger Myers, Psychologist, Department of Health, Toronto; J. J. Weber, Superintendent and H. L. Klions, Psychologist at the General Hospital, Woodstock, Ontario, assisted in making available the testing information of the epilepsy patients.

Professors at the Institute of Psychology, Reverend Father Raymond M. Shevenell, O.M.I., Director, and Victor Ozyrynski, Neurologist, were helpful with their suggestions and encouragement.

Gratitude is here expressed for their interest and cooperation.

CURRICULUM STUDIORUM

The writer was born on January 29th, 1925 in Springfield, Massachusetts. Having a background of thomistic philosophy, he received an A.B. Degree in 1947 from Providence College, Providence, R.I.; the next year, he took an A.M.degree from the Catholic University of America, Washington, D.C.; and, in 1950, a Ph.D. degree was granted to him from the University of Montreal, Montreal, Canada.

Since then his efforts have been devoted to the study of psychology.

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INTRODUCTION

Since the dawn of civilization man has been frightened and awed by the phenomenon that is known as epilepsy. It is not surprising that primitive man attributed these seizural manifestations to supernatural causes. With the rapid growth of scientific physiology in the late 19th century, the modern era of the study of epilepsy was initiated. This subject has received succinct and interesting treatment in the first chapter of Penfield's work.[1]

Perusal of the findings of the early workers makes it obvious that it is not only fallacious but misleading to think of epilepsy as a disease entity. There is at least one general dichotomy that can be made on the basis of etiology, viz., idiopathic versus symptomatic. The latter term refers to those cases in which a definite pathology has been found within the organism. The former term is applied to the vast remainder of the cases in which there is a lack of conclusive evidence as to pathological origin. If one classifies the epilepsies on the

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[1] Wilder Penfield and Herbert Jasper, Epilepsy and the Functional Anatomy of the Human Brain, Boston, Little Brown & Co., 1954, Chapter I.

basis of the seizure patterns which have been observed clinically, there are at least fifteen possible categories,[2] e.g., Jacksonian seizures, visual seizures, dreamy state seizures. Further, it is possible to classify seizures on the basis of chronology; however, this is not very satisfactory, for, as Penfield notes, it leads to a presumptive diagnosis as to the cause. The short-sightedness of using the vague term "epilepsy" has been given adequate treatment by Lennox[3] and Penfield.[4]

The main body of this study will be organized in the following manner:

Presentation of the Problem.- The various ways in which the term "epilepsy" is defined and used will be discussed in some detail. The divisions or categories of epilepsy which receive contemporaneous acceptance will be presented. Three types of theoretical analysis will be discussed. The means by which epilepsy is diagnosed will be categorized and discussed as follows:

(a) medical techniques,
(b) electrophysiological techniques,
(c) psychological techniques.

A general review of pertinent psychological studies in the

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[2] Penfield and Jasper, op.cit., Chapter II.

[3] William G. Lennox, Seizure States in Personality and the Behavior Disorders, J.McV.Hunt, editor, New York, Ronald Press, 1944, Vol.II, pp.938-967.

[4] Wilder T. Penfield, "Classifications of the Epilepsies", in the Archives of Neurology and Psychiatry, Vol.60, No.2, issue of August, 1948, pp.107-118.

literature will be undertaken, and finally, the chapter will terminate with a statement of the hypotheses which instigated the present study.

Experimental Design.- All of the population data which is pertinent to the problem will be presented and discussed, and the methods and techniques to be utilized to test the experimental hypotheses will be presented.

The Epileptic Pattern.- The results of the application of the various pattern analyses to the obtained data will be presented in detail. These results will be discussed in terms of their relevance to the first and second hypotheses.

Comparison with Organic Patterns.- The patterns obtained in the preceding chapter will be subjected to statistical comparison with four organic patterns. These results will be discussed in terms of their relevance to the third hypothesis.

Mental Deterioration in Epileptics.- Various indices of mental deterioration, including an original one, will be applied to the obtained data. These results will be discussed in terms of their relevance to the fourth hypothesis.

Summary and Conclusions.- The conclusions warranted by the experimental findings will be presented and discussed. Recommendations for further research will be presented.

CHAPTER I

PRESENTATION OF THE PROBLEM

1. Definition of Epilepsy

The use of the word "epilepsy" is unfortunate because it implies a disease entity. It would appear to be far more realistic to defer to the known facts and utilize Hughling Jackson's term, the "epilepsies".

Lennox attempts to circumvent the difficulty by defining epilepsy as "a recurrent disturbance of the chemico-electrical activity of the brain which manifests itself in a symptom complex of which impairment of consciousness, perturbation of the autonomic nervous system, convulsive movements or psychic disturbances are the essential components".[1] Penfield defines an epileptic seizure as "a state produced by an abnormal excessive neuronal discharge within the central nervous system".[2] Both of these definitions attempt to give emphasis to the organic etiology of cellular dysfunction

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[1] William G. Lennox, Seizure States in Personality and the Behavior Disorders, J. McV. Hunt, editor, New York, Ronald Press, 1944, Vol. 11, p. 938.

[2] Wilder Penfield and Herbert Jasper, Epilepsy and the functional Anatomy of the Human Brain, Boston, Little Brown and Co., 1954, p.20.

in the brain than to other factors. However, the problem as to what causes the disturbance in cerebral activity remains to be answered.

In those cases which are defined as symptomatic the causes are usually organically apparent. All of these cases have demonstrable cerebral lesions produced by tumors, trauma, infection, arteriosclerosis, etc. The type of seizure which results is primarily a function of the extent and locus of the lesion; however, it should be noted that two or three types of seizures may be common in any individual who is epileptic.

Difficulties arise in determining the etiology of those cases that are seemingly without demonstrable cerebral lesions. In the literature, these are often called "true", "essential", or "idiopathic" epilepsy.[3]

As with many other disorders of doubtful etiology, there has been a strong tendency to attribute idiopathic epilepsy to heredity. There is a vast amount of literature indicating that the incidence of cerebral dysrhythmia is far greater among the families and relatives of idiopathic patients than would be expected in a comparable group of normals. Thus, there is some presumptive evidence that epilepsy can be passed genetically. This has

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[3] for purposes of clarity, only the latter term will be applied throughout this study.

led Lennox[4] to conclude that cerebral dysrythmia indicates a predisposition to seizures and that it is the predisposition which is inherited. Thus, for any individual with this predisposition, almost any abnormality of the brain may be a precipitating factor. It might be well to note here that "emotional stress" may also be a precipitating factor. Actually, Lennox implies that a hereditary factor plays a part in all cases of epilepsy; however, there is little evidence which indicates a genetic factor in symptomatic cases. Even in idiopathic epilepsy, it is apparent that little is known about the genetic mechanisms by which it might be passed. Thus, at the present time, the only reasonable conclusion is that the cause or causes of idiopathic epilepsy is unknown.

There is apparently much confusion concerning the relationship between the epilepsies and personality. This is not too surprising when one realizes the vast amount which is unknown in both areas. In the preceding paragraph, the confusing status of the etiological classification of epilepsy was reviewed. Anyone familiar with the psychological literature on "personality" cannot fail to be impressed by the difficulties involved in defining and analyzing personality.

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[4] William G. Lennox, op. cit., pp. 938-967.

In general, psychological definitions of personality tend to fall into two classes, viz., "type" versus "trait" definitions. Most of the attempts to link personality and epilepsy fall into the former category, i.e. they speak of an "epileptic" or "epileptoid" type. In recent years, the trait type of analysis has been slightly more popular within psychology; therefore, it has been fairly common to see epileptics described as irritable, withdrawn, etc.

It may be hypothecated that attempts to link personality and epilepsy have suffered from superficial treatment in the hands of individuals who are not sufficiently acquainted with both fields. The difficulties involved in studying personality in epileptics are overwhelming because of the pervasiveness of certain seizural phenomena. It is obviously necessary to partial out such phenomena in studying the personality of the epileptic patient. Secondly, one must consider the psychological effects of the anti-convulsive drugs. Thirdly, one must consider the amount of actual brain damage whether of traumatic or seizural etiology.

There are three general types of theories concerning the personality of epileptics which receive frequent attention.[5]

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[5] Edith Silverglied, "Convulsive Disorder and Personality", in The Journal of Abnormal and Social Psychology, Vol. 43, No.1, issue of January, 1948, pp. 26-37.

The first type of theory postulates an "innate epileptic constitution" which either leads to or parallels the "epileptic personality". One modification of this theory states that "constitutional" defects lead to a predispositional factor, but that the presence or absence of seizures depends upon personality which may precipitate seizures.

The second type of theory asserts that seizures cause cerebral changes which in turn lead to a certain type of personality. Any empirical evidence which indicates that all epileptics fit into an "organic test pattern", despite the absence of physiological evidence, is relevant to this theory. It is certainly tenable for the symptomatic epilepsies.

The third type of theory assumes that the seizures cause a great deal of environmental stress, which in turn causes the individual to develop a certain type of personality. As long as clear-cut evidence of pathology in all epileptics remains absent, this theory is certainly the most parsimonious. One extension of this theory asserts that it is the environmental stress plus the cerebral changes which lead to a certain type of personality.

It may be hypothesized that, at this stage of development of our knowledge about epilepsies and about personality, it is very presumptuous to adhere too

rigidly to any of the foregoing theories. The so-called "heredity-environment" controversy that raged for a number of years within psychology points up the fruitlessness of adhering too rigidly to a strictly genetical or environmental point of view. Most psychologists now maintain an eclectic, inter-actionist sort of theory.

Within the epilepsies, it will probably be far more fruitful to carry on a great deal more basic empirical work within both the physiological and psychological frameworks before attempting any all-encompassing theories. Within the field of psychology, the most advancement has been achieved in studying the ability (or abilities) known as intelligence which is closely related to personality. This area is worthy of much attention with reference to its relation to the epilepsies.

At the empirical level, there have been three approaches to diagnosis and treatment of the epilepsies. These can be roughly categorized as electrophysiological, medical, and psychological, respectively.

It might be pertinent at this point to mention the use of the electroencephalograph (EEG) in the diagnosis of epilepsy. This technique was originally developed by Hans Berger in 1929 when he showed that the electrical activity of the brain can be recorded by placing electrodes on the intact skull. Berger found that there were

certain typical, recurrent patterns and frequencies of waves which were obviously correlated with certain states of the organism. One skilled in the use of the EEG could tell from the record of the "brain waves" whether the individual was awake, quiet, somnolent, or asleep. It is only natural that many scientists believed that, with the discovery of the EEG, they stood on the threshold of sweeping advances in the knowledge of brain functions and dysfunctions. Thus, there is a vast literature concerning the EEG, and it has been utilized in the attempt to diagnose everything from schizophrenia to brain tumours. Unfortunately, it is now apparent that the EEG has not lived up to the lofty aspirations of those who first recognized its possibilities. However, despite disappointments concerning its use in many realms of investigation, it has been extremely helpful to scientists interested in the epilepsies.

There are characteristic wave forms and patterns to be found in the electroencephalograms of most epileptic patients. In 1935, it was shown[6] that during petit mal seizures there are high voltage spike and dome waves

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[6] F. A. Gibbs, H. Davis, and William G. Lennox, "The Electroencephalogram in Epilepsy and in Conditions of Impaired Consciousness", in the Archives of Neurology and Psychiatry, Vol. 34, No. 6, issue of December, 1935, pp. 1133-1148.

occurring at the rate of about three per second; grand mal seizures are accompanied by increased speed and voltage which indicates strong, diffuse neuronal discharge over the entire cortex. There are also characteristic EEG patterns accompanying the various other types of seizures. Many investigators hoped to be able to diagnose epilepsy, or a predisposition to epilepsy, solely on the basis of cortical dysrythmia as shown by the EEG. However, there is now evidence that there are twenty persons with cortical dysrythmia for each person with epilepsy.[7] Some writers have hypothecated that all individuals who give evidence of dysrythmia are predisposed to epilepsy; however it is beyond the scope of this introduction to go too deeply into the various interpretations of cortical dysrythmia in people who do not suffer epileptic seizures. In diagnosis the EEG is of value in differentiating the true epileptic seizure from the relatively infrequent "hysterical" type of seizure which has received so much attention from those who favor a psychosomatic interpretation. Further, the EEG is of particular value when it indicates the possibility that there is a brain tumor which is precipitating the seizures. In these cases a diagnosis of symptomatic epilepsy is clearly warranted.

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[7] William G. Lennox, Seizure States ..., pp.930-967.

Tucker and Forster report two petit mal cases in which the EEG "played a major role in the proper diagnosis".[8] The use of the EEG in epileptic diagnosis has been treated thoroughly in a chapter written by Jasper.[9]

Of primary interest to all the workers in this field is the efficaciousness of the various methods of treatment. Several of the early investigators discovered that it was possible to alter the frequency of seizures by starvation, ketogenic diet, or by dehydration. In the middle of the nineteenth century, the use of drugs was instituted, and such drugs as bromide, phenobarbital, and dilantin sodium have been widely used at various periods. Unfortunately, the use of drugs has proceeded in what can best be called a trial and error manner. Very often there are undesirable symptoms which follow the administration of drugs, and sometimes even an increase in the frequency of seizures. As Penfield notes,[10] it is to be hoped that future workers in this area will lean more heavily upon experimental procedures.

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[8] Weir M. Tucker and Francis M. Forster, "Petit Mal Epilepsy Occurring in Status", in the Archives of Neurology and Psychiatry, Vol.64, No.6, issue of December, 1950, p. 826.

[9] Wilder Penfield and T. C. Erickson, Epilepsy and Cerebral Localization. Springfield, Ill., Thomas, 1941, Chapter 14.

[10] Ibid., Chapters 1, 2.

Of course, it should be pointed out that treatment with drugs is merely an attempt to treat symptomatic manifestations rather than a cure.

The most encouraging progress to date has been made in the treatment of that group of the symptomatic epilepsies which have a focal origin. In one type of case, the seizures have their etiology in a brain tumor, and surgical removal of the tumor may result in a permanent cure. In the other type of case, the seizures appear to have a focal origin in the cerebral cortex. The EEG is extremely helpful in determination of the focal origin. Such a determination can be followed by opening the skull and making a more precise localization by utilizing the EEG as an electrocorticograph. By the use of delicate techniques, it is sometimes possible to pinpoint the focal origin and remove it surgically. This approach has proven quite successful in the hands of Penfield and his colleagues, and has been explained in some detail in his published works.[11,12, 13.]

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[11] Penfield and Erickson, Epilepsy ..., Chapter 15.

[12] Wilder Penfield and K. Kristiansen, Epileptic Seizure Patterns, Springfield, Ill, Thomas, 1951, Chapter 2.

[13] Penfield and Jasper, Epilepsy and the Functional Anatomy of the Human Brain, xv-896 pp.

The foregoing pages have served to give an extremely brief review of the physiological phenomena which are grouped under the heading of epilepsy, and have treated of the subjects from the point of view of the physiologist, physiological psychologist, and medical doctor. The remainder of this study will deal largely with the epilepsies as approached by the clinical and testing psychologist.

Because of the peculiar ways in which epilepsy may manifest itself in behavior, the layman has always regarded the epileptic with an attitude much like that which he feels toward the psychotic. In earlier times, when the theological interpretations were predominant, the epileptic was regarded as one whose body had become possessed by demons or evil spirits. There can be little doubt that there is still a stigma attached to epilepsy despite the light which modern science has shed upon this disorder.[14, 15] Thus, there have been numerous attempts throughout history to define the personality of the epileptic. Most of the earlier writers obviously felt that there was a personality configuration which was characteristic of the epileptic, and this was given names such as "epileptoid". There is little to be gained by reviewing the various loose and

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[14] William G. Lennox, Science and Seizures, New York, Harper, 2nd ed., 1946, pp. xiii-358.

[15] T. J. Putnam, Convulsive Seizures: How to Deal with Them, Philadelphia, Lippincott, 1943, pp. xv-168.

unscientific speculations concerning the "epileptoid personality"; however, a consideration of the psychological variables involved in the epilepsies would seem to be appropriate.

First, it is obvious that there are certain psychological seizural phenomena. Penfield presents[16] the following types of "psychical seizure":

1. Dreamy seizures - These involve perceptual changes including illusions, hallucinations, and doubling of consciousness.

2. Petit-mal.- This term refers solely to brief losses of consciousness.

3. Automatism.- In this state, the individual is released from conscious control, and may be completely irresponsible. This phenomenon may follow upon a grand mal seizure.

4. Psychotic states.- This may result from the deleterious effects of severe or repetitious epileptic seizures.

The first three apparently are direct results of abnormal neuronal discharge in the brain, and can be reproduced by careful stimulation of the cerebral cortex.

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16 Wilder Penfield and T. C. Erickson, Epilepsy and Cerebral Localization, Chapter 2.

The fourth phenomenon implies organic brain damage which may be a result of anoxia from seizural cyanosis. The first three phenomena are transient, but the last one is most likely irreversible.

Evidence for any type of epileptic personality aside from these seizural phenomena is inconclusive. However it is highly probable that some epileptics become neurotic or psychotic in terms of their reaction to the disorder rather than as a direct result of it. The elimination of this type of development can be hoped for with the progression of public enlightenment and education with reference to the epilepsies. Both Lennox[17,18] and Harrower-Erickson[19] give detailed consideration to the problems inherent in the assessment of the personality of epileptics.

2. Importance of Psychological Studies

The preceding section was primarily concerned with the difficulties involved in defining and studying the epilepsies, and indicated the problems involved in

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[17] William G. Lennox, Seizure States ..., pp.938-967.

[18] William G. Lennox, Science and Seizures, pp. xiii-258.

[19] Penfield and Erickson, Epilepsy and Cerebral Localization, Chapter 20.

determining some of the psychological variables which are important. Despite the complexity of the problem, there is a great need for careful psychometric research with epileptic populations and samples.

There are several very important purposes which the psychological tests can serve. Actually, there is little or no conclusive evidence as to whether the total epileptic population differs from the normal (as defined by intelligence tests). There can be little doubt that the present evidence indicates that institutionalized epileptics have intelligence quotients which are below those of normals. However, recent studies[20, 21] indicate that non-institutionalized epileptics generally show normal intelligence. Johnson notes that "many are institutionalized because of their inability to get along rather than the fact that they have seizures".[22] Further psychometric studies with clearly defined populations should eventually give a clearer picture of the intellectual abilities of epileptics.

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[20]A. Louise Collins, "Epileptic Intelligence", in the Journal of Consulting Psychology, Vol. 15, No. 5.

[21]Homer B. Reed, "The Intelligence of Epileptics", in the Journal of Genetic Psychology, Vol. 78, Second Half, issue of June, 1951, pp. 145-152.

[22]Anna P. Johnson, "Measuring Mental Deterioration by the Differential Test Score Method", in the American Journal of Mental Deficiency, Vol. 51, No. 3, issue of January, 1947, p. 390.

Secondly, intelligence tests serve to mirror the level of performance of which the individual is capable. Further, within certain nosological categories, there may be impairment of some special abilities. One study [23] indicates that epileptic patients do significantly better on Wechsler's Verbal scale than on the Performance scale. Another study [24] with a large number of patients indicates that the Digit Symbol subtest is usually significantly low as compared with the other subtests.

Thirdly, pattern analyses of intelligence tests such as the Wechsler-Bellevue have been widely studied in an attempt to correlate recurring patterns with certain diagnostic entities. There have been attempts[25, 26] to screen brain-injured individuals by use of the Wechsler-Bellevue. It is apparent that the validity of the Wechsler-Bellevue in diagnosing such organic dysfunction is certainly worthy of exhaustive further study.

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[23] Selma Landisberg, "A Personality Study of Institutionalized Epileptics", in the American Journal of Mental Deficiency, Vol.52, No. 1, issue of July, 1947, pp. 16-22.

[24] Homer B. Reed, "The Intelligence of Epileptics", pp. 145-152.

[25] J.A.Aita, J.C.Armitage, et al., "The Use of Certain Psychological Tests in the Evaluation of Brain Injury", in the Journal of General Psychology, Vol.37, First Half, issue of July, 1947, pp. 25-44.

[26] Kate Levine Kogan, "The Diagnosis of a Patient with Organic Defect", in the Journal of Personality, Vol.15, No.2, issue of December, 1946, pp.113-120.

Finally, psychological tests are of considerable value in determining improvement or deterioration of intellectual functions. Wechsler provides[27] a mental deterioration index which is made up of certain subtests which "hold" and "don't hold" with age. Others have used this and similar indices to test for mental deterioration as a function of disorders such as epilepsy.[28,29,30,31] If such indices can actually serve to indicate deterioration by accurately estimating previous intellectual abilities, they will certainly be of inestimable value in work with epileptics.

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[27]David Wechsler, The Measurement of Adult Intelligence, Baltimore, Williams and Wilkins, 3rd ed., 1944, pp.63-69.

[28]Robert M. Allen. "A Note on the Use of the Wechsler-Bellevue Scale Mental Deterioration Index with Brain-Injured Patients," in the Journal of Clinical Psychology, Vol.4, No.1, issue of January, 1948, pp. 88-89.

[29]A.Lloyd Andersen, "The Effect of Laterality Localization of Brain Damage on the Wechsler-Bellevue Indices of Deterioration", in the Journal of Clinical Psychology, Vol.6, No.2, issue of April, 1950, pp. 191-194.

[30]Brigette Gutman, "The Application of the Wechsler-Bellevue Scale in the Diagnosis of Organic Brain Disorders", in the Journal of Clinical Psychology, Vol.6, No. 2, issue of April, 1950, pp. 195-198.

[31]Lawrence S. Rogers, "A Comparative Evaluation of the Wechsler-Bellevue Deterioration Index for Various Adult Groups", in the Journal of Clinical Psychology, Vol. 6, No. 2, issue of April, 1950, pp. 199-202.

An earlier study at Woodstock was carried out by Falk, Penrose, and Clarke, using the Stanford-Binet intelligence test. They indicate that "no evidence of mental deterioration was found except in the case of three psychotic epileptics".[32]

There are many advantages to using the Wechsler-Bellevue scale. It has all the advantages of a point scale, yet intelligence quotients can be computed. The division of the Full scale into Performance and Verbal scales is particularly valuable in psychometric studies.

Analysis of the discrepancies between the scores on these various subscales has proven to be of great clinical and diagnostic value. Further, the individual subtests of the scale have been equated, and it is this that makes possible the pattern analyses which will be carried out in the following chapters. Finally, the Wechsler-Bellevue has been extensively used in a variety of studies, and there are data available on large numbers of subjects (both normal and pathological).

It is apparent that psychological studies are useful in diagnosis, and that the Wechsler-Bellevue is one instrument which is useful in these diagnostic studies. The following section will survey the relevant literature.

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[32] R. Falk, L.S.Penrose, and E.A.Clarke, "The Search for Mental Deterioration among Epileptic Patients", in the American Journal of Mental Deficiency, Vol.49, No.4, issue of April, 1945, p.471.

3. A Survey of the Literature

A. The Wechsler-Bellevue and Epilepsy[33]

Inasmuch as this study is primarily concerned with the performance of epileptics on the Wechsler-Bellevue, this review will be confined to studies using it. Since the majority of epileptics are not institutionalized, this study will not throw too much light on the intellectual ability of epileptics as a whole. Collins analyzed[34] the Wechsler-Bellevue scores of four hundred private patients by studying the relative rankings of the various subtest scores. She concludes that high ratings on the C subtests, and consistently low ratings on the DSp test might justifiably be considered an epileptic characteristic. Landisberg found [35] that the DSy and PA subtests indicated impaired performance in epileptics. He notes that the former requires "learning" and "motor functions", and

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[33] Throughout this study the following abbreviations will be used for the Wechsler-Bellevue subtests: Vocabulary (V), Information (I), Comprehension (C), Arithmetic (A), Similarities (S), Block Design (BD), Picture Arrangement (PA), Picture Completion (PC), Digit Span (DSp), Digit Symbol (DSy), and Object Assembly (OA).

[34] A. Louise Collins, "Epileptic Intelligence", pp. 392-399.

[35] Selma Landisberg, "Personality Study of Institutionalized Epileptics", pp 16-22.

that the latter requires "comprehension" and the "appraisal of total situations". The study done by Lewinski[36] gives further confirmation to the finding that the PA and DSp rank lowest on the subtests of epileptics.

B. Methods used with the Wechsler-Bellevue

(1) Scatter Patterns. - The majority of the studies has been concerned with developing or evaluating pattern analyses of the subtest scores. Wechsler suggests[37] a scatter pattern in his book. Several workers[38,39,40] have attempted an analysis based on this technique, but their results have been mixed. The Rapaport Vocabulary Scatter[41]

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36 Robert J. Lewinski, "The Psychometric Pattern, III, Epilepsy", in the American Journal of Orthopsychiatry, Vol. 17, No.4, issue of October, 1947, pp. 714-722.

37 David Wechsler, Measurement of Adult Intelligence, Chapter 11.

38 Wallace C. Diers and Clinton C. Brown, "Psychometric Patterns Associated with Mutiple Sclerosis", in the Archives of Neurology and Psychiatry, Vol.63, No.5, issue of May, 1950, pp.760-765

39 Brigette Gutman, "Application of the Wechsler-Bellevue Scale ...", pp. 195-199.

40 Rosaline Goldman, Milton Greenblatt and Gaylord Palmer Coon, "Use of the Bellevue-Wechsler Scale in Clinical Psychiatry", in the Journal of Nervous and Mental Diseases, Vol.104, issue of July-December, 1946, pp 144-149.

41 David Rapaport, Diagnostic Psychological Testing, Chicago, Year Book Publishers, 1945, Vol. 1, Chapters 1 and 2.

and the Allen Information Scatter[42] are two techniques that have been widely used. Although both approached are similar, it seems that both have certain individual advantages. Allen found[43] that in the brain-injured group which he studied, the I subtest held up the best, and he got a more significant scatter pattern with this as the zero point.

Rabin has utilized a ranking technique[44] with schizophrenics which has proved to be of value in differentiating other groups,[45] and might be worth applying to epileptics.

Barnett has developed[46] a table of Z scores which he believes serves to better equate the various subtest scores for disparated age groups. Using these scores he obtains a pattern which sometimes contradicts the findings of other techniques.

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[42]Robert M. Allen, "The Test Performance of the Brain-Injured", in the Journal of Clinical Psychology, Vol.3, No.3, issue of July, 1947, pp. 225-230.

[43]Robert M. Allen, "Note on the Use of the Wechsler-Bellevue Scale ...", pp.88-89.

[44]Albert I. Ranin, "Test-score Patterns in Schizophrenia and Non-psychotic States", in the Journal of Psychology, Vol.12, First Half, issue of July, 1941, pp.91-100.

[45] Ann Margaret, "Parallels in the Behavior of Schizophrenics, Paretics, and Pre-senile Non-psychotics", in The Journal of Abnormal and Social Psychology, Vol.37, No.4, issue of October, 1942, pp.511-528.

[46] Irving Barnett, "The Use of Z-Scores in Equating the Wechsler-Bellevue Sub-Test", in the Journal of Clinical Psychology, Vol.6, No.2, issue of April, 1950, pp 184-188.

One of the most interesting attempts to objectify diagnosis on the basis of a scatter technique is the use made by Klein[47] of the multiple regression equation. He uses Rapaport's V scatter as the basic unit of validation with group identity serving as a criterion. He utilized this technique to objectively differentiate normals and schizophrenics, and found that the weighted scores did enhance the differences between the two groups.

(?) Organic Patterns. - There have been numerous attempts, starting with Wechsler's,[48] to find a consistent pattern which is indicative of organic brain damage, i.e., an organic pattern. Wechsler presents a "sign test" based on the deviations from the subtest means which is supposed to define the organic pattern on the Wechsler-Bellevue scale. Goldman's attempts[49] to diagnose organic involvement showed the usefulness of the Wechsler-Bellevue scale, but failed to confirm Wechsler's organic pattern.

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[47] George S. Klein, "An Application of the Multiple Regression Principle to Clinical Prediction", in The Journal of General Psychology, Vol.38, Second Half, issue of April, 1948, pp. 159-179.

[48] David Wechsler, The Measurement of Adult Intelligence, Baltimore, Chapter 11.

[49] Goldman, Greenblatt, and Coon, "Use of the Bellevue-Wechsler Scale in Clinical Psychiatry", pp 144-149.

Gutman found[50] that she could not do better than chance in differentiating cases which had been classified "organic" from those which had been classified "non-organic" by using the Wechsler organic pattern.

By using different combinations of the Wechsler weighted scores, Hewson has worked out[51] a number of ratios which may indicate "organic" or "normal" patterns. Wheeler found that the "Hewson ratio method of differential diagnosis, while one of the most sophisticated methods yet devised, is not valid enough for clinical diagnosis".[52] His findings indicated that the method classifies a large number of subjects without organic brain disease as cerebral pathology. However, Gutman's study indicated that Hewson "ratio" method was the only one that surpassed chance expectancy in differentiating known organic and non-organic patients.[53]

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[50] Brigette Gutman, "The Application of the Wechsler-Bellevue Scale in the Diagnosis of Organic Brain Disorders", pp.195-198.

[51] Louise A. Hewson, "The Wechsler-Bellevue Scale and the Substitution Test as Aids in Neuro-psychiatric Diagnosis", in the Journal of Nervous and Mental Diseases, Vol.109, issue of February, 1949, Part I, pp. 158-183; Part II, pp.248-265.

[52] John I Wheeler and Walter L. Wilkins, "The Validity of the Hewson Ratios", in the Journal of Consulting Psychology, Vol.15, No.2, issue of April, 1951, p.166.

[53] Brigette Gutman, op.cit., pp.195-198.

Reynell has also established an index [54] for classifying cases as organic. Gutman's results did not confirm the Reynell index and further work would be necessary to determine its worth.

Many early workers in the field of the epilepsies were of the opinion that epileptics were in general intellectually inferior to normals. More recent results,[55,56,57] point up evidence which shows the need for great caution in studying mental deficiency in epileptics.

(3) Mental Deterioration Indices. - There has been considerable speculation concerning the possibility of mental deterioration in epileptics. Lennox [58] and others have pointed out several considerations which one should keep in mind when considering mental deterioration in such patients. First, the mental defect may be primary and the seizures only an accompanying phenomenon. Second,

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[54] W. P. Reynell, "A Psychometric Method of Determining Intellectual Loss Following Head Injury", in the Journal of Mental Science, Vol.90, No. 380, issue of July, 1944, pp. 710-719.

[55] Don L. Winfield, "Intellectual Performance of Cryptogenic Epileptics, Symptomatic Epileptics and Post-traumatic Encephalopaths", in The Journal of Abnormal and Social Psychology, Vol.46, No. 3, issue of July, 1951, pp. 336-343.

[56] Frederic T. Zimmerman, Bessie B. Burgemeister, and Tracy J. Putnam, "Intellectual and Emotional Makeup of Epileptics" in the Archives of Neurology and Psychiatry, Vol.65, No. 5, issue of May, 1951, pp.545-556.

[57] Collins, "Epileptic Intelligence" pp 392-399.

[58] Lennox, "Seizure States ...", pp 938-967.

organic brain injury may lead to both low mentality and seizures. Third, mental impairment may be a result of seizures.

Hunt has noted [59] that following a petit mal seizure, a subject's performance level may fall to that of the feebleminded. However, the findings concerning mental deterioration of a permanent nature, as a result of seizures (of short or long duration), are not so clear.

Finally, sluggishness may be a result of drug treatment or of psychological or social mistreatment. There is no clear empirical evidence here, but Reed "doubts if deterioration is as widespread as is commonly believed".[60]

There have been several attempts to set up ratios or indices which will indicate the amount of mental deterioration. Wechsler has presented a Mental Deterioration Index (MDI) which has been used in a number of studies.[61,62] In studying a large number of private patients,[63] Collins found that there were only slight indications of deterioration, and only in symptomatic patients. Of these,

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[59] W. A. Hunt, C. L. Wittson, and H.I.Harris, "Temporary Mental Impairment Following a Petit Mal Attack", in the Journal of Abnormal and Social Psychology, Vol.37, No.4, issue of October, 1942, pp 566.

[60] Homer B. Reed, "The Intelligence of Epileptics", p.151.

[61] A.Loyd Andersen, "The Effect of .. Localization .. on the ... Indices of Deterioration", pp 191-194.

[62] Lawrence B. Rogers, "A Comparative Evaluation ...", pp. 199-202.

[63] Collins, "Epileptic Intelligence" pp 392-399.

a few showed over ten percent deterioration and some of them over twenty percent. Rabin studied[64] eighty-four subjects whose ages ranged from 60 to 80 in an attempt to validate the MDI. He concludes that, contrary to Wechsler's findings, the OA and PC do not hold up with age. One study[65] with brain-injured patients indicates that the MDI placed fifty-one percent of them within the normal range, sixteen percent were suspicious, and 33 percent definitely showed deterioration. A control group of normals showed eighty-four percent without deterioration, ten percent suspicious, and 6 percent impaired. Allen studied[66] fifty brain-injured patients with the MDI, and suggested that twenty-seven of them had more than 20 percent deterioration, nine had a 10 to 20 percent loss, and fourteen showed less than a 10 percent loss. This survey of the literature suggests several hypotheses which will be stated in the following section.

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64 Albert I. Rabin, "Wechsler-Bellevue Test Result in Senile and Arteriosclerotic Patients", in the Psychological Bulletin, Vol. 39, No.7, issue of July, 1942, p.510.

65 J.A.Aita, J.G.Armitage, et al., "The Use of Certain Psychological Tests ...", in the Journal of General Psychology, Vol.37, First Half, issue of July, 1947, pp 25-44.

66 Robert M. Allen, "Note on the Use of the Wechsler-Bellevue Scale Mental Deterioration Index with Brain-Injured Patients", pp. 88-89.

4. Statement of the Problem

This work will be primarily concerned with a study of the abilities of institutionalized epileptics. Psychologists have made great advances in the development of the tests which measure the ability known as "intelligence" or intellectual ability.

The Wechsler-Bellevue Scale is especially valuable for a clear analysis of a patient's abilities, inasmuch as it is divided into various subtests which tap many types of intellectual function. Analyses of these tests can be qualitatively and quantitatively meaningful. With the use of such an instrument, it is possible to do a thorough psychometric study of any large group of individuals.

The first step in such a psychometric study is the analysis of the subtest scores in an attempt to see if they fall into any meaningful pattern. If such a consistent pattern is discovered, it is possible to further scrutinize it in terms of the capacities which these subtests tap. Secondly, it is possible to compare obtained patterns with those obtained from groups with known organic involvement. Finally, it is possible to analyze the scores for possible evidences of mental deterioration. Such an analysis should have important practical and theoretical bearing upon treatment, diagnosis, and prognosis.

This work presents the results of such a psychometric study with institutionalized epileptics.

It is the purpose of this study to investigate three problems with respect to institutionalized epileptics. Each of these problems is given individual consideration in Chapters III, IV, and V. These problems which were introduced in the review of the literature, will now be presented as specific hypotheses.

General Hypothesis.- The institutionalized epileptics will show a characteristic pattern on the Wechsler-Bellevue. In order to fully determine this, four secondary hypotheses will be studied.

Hypothesis 1: The level of performance of these institutionalized epileptics will be inferior to that of the normal population. Further, the Verbal I.Q. will be higher than the Performance I.Q. for the total groups as well as the subgroups.

Hypothesis 2: There will be a characteristic pattern of the subtest scale scores for institutionalized epileptics. It is probable that this pattern will be predominant in the subgroups; however, it is unlikely that there will be a pattern for the groups as a whole because there are so many varieties of the epilepsies included.

Hypothesis 3: This group of institutionalized epileptics will show a pattern which is similar to the

organic pattern. The idiopathic groups may now show it, but it should most certainly be found with the symptomatic groups.

Hypothesis 4: There is mental deterioration in epileptics as indicated by the application of several mental deterioration indices.

CHAPTER II

EXPERIMENTAL DESIGN

In this chapter a description of the population will be given. Part of the sample data which is relative to this issue will be statistically summarized in tables. The various methods which will be used to check the four subsidiary hypotheses will be explained.

1. The Population

The population consists of 596 epileptic patients institutionalized at the General Hospital at Woodstock, Ontario. It would not be valid to generalize the results of this study to all epileptics; however, there is no reason why these results could not be generalized to institutionalized epileptics excepting those groups who were rejected from this study.

Of this hospitalized group, 159 had been administered the Wechsler-Bellevue scale. Form I had been administered to forty-seven of these, and the other 112 had taken Form II. The forty-seven who had taken Form I did not constitute a good sample for two reasons. First, there were wide deviations in length of hospitalization,

duration of disease, time of testing, etc. Second, this group was too small to give much reliability to any breakdown of the results.

Of the 112 who had been administered Form II, two were on tridone treatment, one was on mysoline, and three were on mesantone. It was decided to eliminate these six symptomatic subjects to better equalize the sample. Among the idiopathic subjects, six were also rejected in order to minimize the confounding effects of natural mental deterioration at the more advanced ages (three subjects of age 50 and one of age 48 were rejected). Finally, two subjects who had obtained college degrees were eliminated inasmuch as their educational attainment was far above that of the other subjects.

All the subjects in the study were administered the Wechsler-Bellevue scale (Form II) by the chief psychologist at the Ontario Hospital. It should be noted that Form II was used because, in the opinion of the chief psychologist, it is more effective with low-grade epileptic patients. Inasmuch as most of these patients were low-grade in intelligence, it was hoped that the use of Form II would be more sensitive to differences than Form I.

The OA subtest was not included among the subtests that were administered. There are several justifications for omitting the OA subtest. First, it takes the most

time to administer. Second, "it shows the smallest correlation with all other tests when taken individually or collectively";[1] further, most formboards are "generally ill-adapted for testing adults".[2]

All the tests were administered under the same conditions. No patient took the test unless rapport was properly established. The methods of administration which were described in Wechsler's instructions were rigidly observed.

Thus the final sample includes one hundred subjects, consisting of seventy idiopathic and thirty symptomatic epileptics. The complete characteristics of the accepted subjects can be seen in Tables XXXV through XLVI which appear in Appendix I.

Part of this sample data (Tables XXXV through XL) is statistically summarized in Tables I through VI. The remaining part (Tables XLI through XLVI) consisting of the subtest scale scores, is the basis of Chapters III, IV, and V. Data such as this is often not included in studies of epilepsies; however, it is of the utmost importance, and, as our knowledge of the psychometric patterns increases, such information will serve as the starting point for many further studies. For example, it can be

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[1] David Wechsler, The Measurement of Adult Intelligence, Baltimore, Williams and Wilkins, 3rd ed., 1944, p.98.

[2] Ibid., p.97.

seen in Tables I-VI that there are some differences between symptomatic and idiopathic subjects which might be important variables for future study.

One factor which is quite striking is the low degree of educational attainment of the sample, which may be seen from looking at Table II. Wechsler presents[3] some of the difficulties involved in assessing the influence of educational attainment upon intellectual performance. If his conclusions are justified, it would appear that his standardization procedure has minimized this factor.

The I.Q. characteristics of the sample used in this study are given in Tables VII and VIII which appear in Chapter III, Part 1, V.P.Pattern, since they constitute an integral part of this section.

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[3] Wechsler, op.cit., pp 103-106.

Table I. - Range, Mean and Standard Deviations (SD) of age data of the Idiopathic (I) and Symptomatic (S) epileptic Subjects.

	Range		Mean		SD	
	I	S	I	S	I	S
Male	16-44	17-48	24.84	30.88	7.71	10.14
Female	16-43	16-48	24.24	26.57	15.02	8.96
Total	16-44	16-48	24.59	28.87	8.41	9.55
Number	I-M-37	I-F-33	S-M-16	S-F-14		

Table II. - Range, Mean and Standard Deviations (SD) of grade level attained by the Idiopathic (I) and Symptomatic (S) Epileptic Subjects.

	Range		Mean		SD	
	I	S	I	S	I	S
Male	1-12	1-9	6.08	5.62	2.94	2.50
Female	1-12	1-11	7.12	6.00	2.78	3.34
Total	1-12	1-11	6.57	5.80	2.91	2.92
Number	I-M-37	I-F-33	S-M-16	S-F-14		

Table III. - Range, Mean and Standard Deviations (SD) of age of onset of the Idiopathic (I) and Symptomatic (S) Epileptic Subjects.

	Range		Mean		SD	
	I	S	I	S	I	S
Male	1-40	1-43	13.84	16.88	8.81	14.33
Female	3-26	1-43	12.91	12.50	6.06	10.11
Total	1-40	1-43	13.24	14.83	7.71	12.73
Number	I-M-37		I-F-33	S-M-16		S-F-14

Table IV. - Range, Mean and Standard Deviations (SD) of length of disease in years of the Idiopathic (I) and Symptomatic (S) Epileptic Subjects.

	Range		Mean		SD	
	I	S	I	S	I	S
Male	8-38	1-34	11.40	14.00	8.72	10.15
Female	1-40	3-32	13.91	13.86	10.00	9.33
Total	1-40	1-34	12.68	13.93	9.43	9.77
Number	I-M-37	I-F-33	S-M-16	S-F-14		

Table V. - Range, Mean and Standard Deviations (SD) of length of hospitalization in days of the Idiopathic (I) and Symptomatic (S) Epileptic Subjects.

	Range		Mean		SD	
	I	S	I	S	I	S
Male	7-95	7-99	42.19	40.06	24.18	33.59
Female	6-94	7-100	33.21	40.43	23.16	24.76
Total	6-95	7-100	37.96	40.23	33.43	29.80
Number	I-M-37	I-F-33	S-M-16	S-F-14		

Table VI. - Range, Mean and Standard Deviations (SD) and length of treatment in days of the Idiopathic (I) and Symptomatic (S) Epileptic Subjects.

	Range		Mean		SD	
	I	S	I	S	I	S
Male	6-89	6-97	33.46	35.75	20.93	33.58
Female	3-80	6-100	28.73	36.57	23.94	26.24
Total	3-90	6-100	31.23	36.13	22.52	30.38
Number	I-M-37	I-F-33	S-M-16	S-F-14		

2. The Method

A.- Methods of Checking Hypothesis 1:

The first hypothesis will be tested by a general statistical analysis of the I.Q. characteristics of the sample used in this study. This analysis will serve to determine the comparability of this sample with the normal population. Statistical techniques for determining the significance of the difference between two means will be utilized to test the prediction that the Verbal I.Q. should exceed the Performance I. Q.

(1) Wechsler's Mean Scatter.- In Wechsler's book, it is suggested[4] that meaningful patterns can be obtained by taking the deviations of the subtest weighted scores from the mean of all the subtests. The expected score on any subtest is obtained by dividing the total weighted score by ten. Then the pattern for any individual can be obtained by computing the discrepancies of the obtained scores from the expected scores. Wechsler estimates that a deviation of more than two points from the mean subtest score is significant if the full scale weighted score lies between eighty and 110. For any individual whose weighted score falls outside these limits

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[4] David Wechsler, The Measurement of Adult Intelligence, p.148.

the significance of the discrepancy is determined by dividing his obtained score by four and considering the obtained figure as critical. The results of the application of this technique will be subjected to statistical analysis to determine the significant deviations.

(2) Rapaport's Vocabulary Scatter.- To apply this technique, one takes the deviations of the subtest means from the V subtest mean, and looks for statistically significant deviations. The rationale for this approach stems from the fact that the V subtest holds up well in many psychological and organic disorders.

(3) Allen's Information Scatter.- To apply this technique, one takes the deviation of the subtest means from the I subtest mean. Allen found that, with brain-injured patients, the DSy, DSp, B D, OA, PA, A, PC, and S deviate significantly. When he applied Rapaport's technique to the same data, only the DSp, OA, B D, and DSy gave significant deviations.

In each of the aforementioned techniques, one of the subtests is taken as a point of departure, and the other subtest scores are taken as deviations from this one. These deviations can be divided by their standard errors to create a series of critical ratios. The magnitude of the critical ratios determines the statistical

significance of the deviations. In this way, statistically meaningful pattern analyses can be developed.

(4) Barnett's Z scatter.- Wechsler points out[5] that the Wechsler Scale is comparable at all levels because the individual subtests are equated; however, Barnett notes that "this method fails to take into consideration the variations among the means of the subtests in the standardization group at various age levels and assumes that a given weighted score represents the same level of ability on every subtest".[6] To overcome this difficulty, Barnett has computed a series of Z-scores for each age level, and has put these into tabular form. Each Z score consists of the mean of the subtest at a particular age level minus the obtained weighted score divided by the standard deviation. Thus, by entering Barnett's table at the appropriate age level with any given weighted score, one obtains a Z score which is strictly comparable at any age level. With Barnett's table it is possible to compute a scatter from the means of all the obtained Z scores for purposes of pattern analysis.

(5) A Ranking Technique.- This technique consists of arraying the subtest weighted scores in such a manner that the one which is the highest is ranked number one, and the

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[5] David Wechsler, Measurement of Adult Intelligence, pp. 146-148.

[6] Irving Barnett, "The Use of Z-Scores in Equating the Wechsler-Bellevue Sub-test", in the Journal of Clinical Psychology, Vol.6, No.2, issue of April, 1950, p.185.

lowest is ranked number ten, etc. When the subtests have been arranged in this order, one can compare them with rankings obtained from known populations. Further, an analysis can be made of those subtests which are at the extremes to determine why they are there. Thus, the application of the ranking technique should be indicative of the subtest scales which are determining any epileptic pattern, and will definitely be of use in suggesting any new formula which might be applied.

(6) Klein's Multiple Regression Technique.- This approach is certainly worth applying because of its emphasis on predictive capacity. There are three steps in deriving Klein's multiple regression equation:

1. Intercorrelations (product-moment method) are obtained among all the V scatter subtest scores of the combined groups, i.e., normals and schizophrenics.

2. Each of the V scatter subtest scores are correlated (point biserial) with the criterion (normals versus schizophrenics).

3. Beta weights and their standard deviations are computed by a procedure developed in the AAF Aviation Psychol. Program for solving a set of simultaneous, symmetrical, linear equations.

For this population of schizophrenics, Klein found[7] that the V scatter scores on the C, PC, and DSy subtests were the most valid (the controls showed less scatter than the schizophrenics). That the multiple regression equation increased the predictive capacity of the technique is indicated by the coefficient of multiple correlation which equalled 0.45. The full regression equation, as applied to the data of this sample of epileptics is as follows:

$$X_c = 0.2107X_1\ (C) - 0.0686X_2(I) + 0.0215X_3(Sp) + 0.0596X_4(A) - 0.0122X_5(S) - 0.0403X_6(PA) + 0.1565X_7(PC) - 0.0943X_8(BD) - 0.0616X_9(CA) + 0.0768X_{10}(DSy) + 0.7825.$$

It can be seen that the weights are multiplied by the V scatter scores on the various subtests and summed to give a composite weighted score. A substantiation, on an epileptic population, of Klein's findings with schizophrenics would certainly be an interesting outcome.

The application of these techniques serves a dual purpose. First, it will serve to further evaluate them by means of a cross-validation on a new population; however, it should be noted that this application is not crucial to their general validity inasmuch as most of them have been set up for other specific purposes. Second, the patterns

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[7] George S. Klein, "An Application of the Multiple Regression Principle to Clinical Prediction", in The Journal of General Psychology, Vol.38, Second Half, issue of April, 1948, pp. 159-172.

obtained by these techniques should be of value in differentiating subgroups of the epilepsies. The interpretations which workers have been able to apply thus far may be amenable to extension to epileptics.

B.- Methods of Checking Hypothesis 2

(1) Wechsler's Organic Pattern.- In his book, Wechsler presents[8] characteristics of Mean Scatters which he feels are indicative of organic involvement.

Gutman suggests[9] a technique for comparing a pattern with Wechsler's organic pattern. Thus, a record was termed organic if five or more of the ten signs agreed with those given by Wechsler. Half a count was given to those items where Wechsler indicates "--" and the score obtained was "-" or vice versa with the same procedures applied to "+'s". For items which were marked "--" to "0" by Wechsler any one of the three signs, "--", "-", or "0", was accepted."Subsequent analysis of the data confirmed the assumption that this was a good point of departure".[10] Although the review of the literature was not too encouraging as regards the validity of Wechsler's organic pattern, as determined by the sign test, it certainly should be given further consideration.

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[8]David Wechsler, op.cit. pp 150-152.

[9]Brigette Gutman "The Application of the Wechsler-Bellevue Scale in the Diagnosis of Organic Brain Disorders", in The Journal of Clinical Psychology, Vol.6, No.2, issue of April, 1950, p.196.

[10] Ibid., pp 195-198.

(2) Allen's Organic Pattern.- With his brain-injured patients, Allen has noted[11] that the subtests fall into a pattern when ranked. Thus, by comparing an obtained pattern with this, one is able to make a tentative diagnostic classification.

The use of Allen's pattern with epileptics can serve two purposes. First, as a sort of cross-validation, the technique should show an organic pattern for the symptomatic epilepsies. Second, assuming that it does this, a positive or negative finding with the idiopathic groups would be more meaningful.

(3) Hewson's Ratios.- Hewson has worked out[12] a pattern of ratios using the weighted scores of the subtests. The ratios are as follows:

1. PA plus PC divided by A plus D3y (above 1.2)
2. I plus C divided by A (above 2.9)
3. I plus C divided by D3p plus D3y (above 1.6)
4. I plus C divided by PA plus D3y (above 1.5)
5. I plus C divided by D3y (above 3.4)

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11 Robert M. Allen, "The Test Performance of the Brain-Injured", in the Journal of Clinical Psychology, Vol.3, No.3, issue of July, 1947, pp.226-230.

12 Louise R. Hewson, "The Wechsler-Bellevue Scale and the Substitution Test as Aids in Neuro-psychiatric Diagnosis", in the Journal of Nervous and Mental Diseases, Vol.109, issue of February, 1949, Part I, pp.166-185; Part II, pp. 246-265

6. I plus C divided by PA plus DSp plus DSy (above 1.0)

7. DSp plus DSy divided by S plus SD (below 0.6)

8. C plus PA divided by DSy (above 3.0)

If a ratio is above or below a certain point it is organic. These ratios will be applied to test the fourth hypothesis.

(4) Reynell's Technique.- Reynell[13] takes the weighted score for the I, C, and V subtests and gets a score by multiplying the sum by 5/3 and finding in Wechsler's tables the patient's Verbal I.Q. A similar procedure is applied to the sum of the S, A, and DSp. If the quotient of the latter, the "Don't Hold", is ten points or more below that obtained on the "hold" tests, a diagnosis of permanent organic brain damage is made.

Although Gutman's application of the Reynell index gave no confirmation to the technique, the index may still be excellent for use with epileptics. This chance is enhanced by the fact that the Reynell index utilizes the Verbal scale which may be a characteristic of the epileptics.

C. Methods of Checking Hypothesis 3

(1) Wechsler MLI.- The Wechsler MLI is obtained by summing the tests which are alleged to hold up with age

13 C.M.Reynell, "A Psychometric Method of Determining Intellectual Loss Following Head Injury", in the Journal of Mental Science, Vol.90, No.380, issue of July, 1944, pp. 710-719.

(i.e., I, V, PC, and OA), subtracting the subtests which do not hold up with age (i.e., DSp, A, BD, and DSy) and then dividing by the "hold" test. This gives the percentage of mental deterioration. Subtest C was substituted for OA for purposes of this study. The survey of the literature indicated that previous workers have reported moderate degrees of success with the Wechsler MDI; therefore this approach will be included.

(2) Allen's MDI.- The mental deterioration index which Allen developed is computed by adding the I and C subtests and comparing this with the sum of the DSp and DSy subtests. If the former sum is greater than the latter by five points or more the record is termed organic. Allen felt that his modification of the MDI was of more diagnostic value with brain-injured patients than the Wechsler MDI; therefore, this system will also be used as an indicator of possible mental deterioration. Although it should be pointed out that Allen's index has been found[14] to yield greater errors than Wechsler's MDI in classifying normals.

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[13] Robert R. Blake and B.J.McCarthy, "A Comparative Evaluation of the Bellevue-Wechsler Mental Deterioration Index Distribution of Allen's Brain-Injured Patients and Normal Subjects", in the Journal of Clinical Psychology, Vol.4, No.4, issue of October, 1948, pp. 415-418.

(3) Rabin's MDI.- Rabin has noted[15] that "the rank order values are of greater significance since the absolute means are not comparable strictly speaking, because of some differences between the means of the total scores of the groups". Rabin's index is computed by summing the I, C, and BD subtests and dividing by the sum of the DSy, OA, and S subtests.

For purposes of this experiment, the PC was substituted for the OA subtest. This index, which was applied to schizophrenics may also work with epileptics, inasmuch as the characteristics of that population, on the Wechsler-Bellevue subtests, are similar to those of epileptics.

(4) Angers' MDI.- Using the Rabin criteria it should be possible to determine a new index which would differentiate epileptics. Rabin notes that neither member of the ratio should be exclusively Verbal or Performance scores; however, the selection should be made largely on the basis of the rank order of the epileptic subtests. On this basis, a new index was computed for this study. This index is determined by summing the V, BD and C subtests and dividing by the DSy, I, and S subtests. The foregoing mental deterioration indices will be presented in Chapter V.

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[15] Albert I. Rabin, "Test-score Patterns in Schizophrenia and Non-psychotic States", in the Journal of Psychology, Vol.12, First Half, issue of July 1941, pp 91-100.

It is apparent that each of the hypotheses presented is being tested by almost all of the available techniques. This approach is probably the most justifiable for two reasons:

1. The techniques themselves have not been exhaustively studied, and it is therefore impossible to make a decision, with any degree of confidence, as to which of them is best for use with this population.

2. The psychometric studies with epileptics have not been at all conclusive, and therefore, not too much is known about the test performance of epileptics.

CHAPTER III

THE EPILEPTIC PATTERN

This chapter will represent an effort to establish the existence and nature of the epileptic pattern. As a test of the first hypothesis, the I.Q. patterns will be analyzed. A test of the second hypothesis is accomplished by the application of several techniques of pattern analysis, viz., Wechsler's Mean Scatter, Rapaport's V Scatter, Allen's I Scatter, and Barnett's Z scores. Additional information concerning the epileptic pattern will be gained from the application of a ranking technique and Klein's multiple regression weights. These results will be treated by subgroups and subsequently as a unit.

1. V-P PATTERN

The IQ characteristics of the sample are presented in Table VII. The FIQ of the idiopathic groups is somewhat above that of the symptomatic; however, the difference does not reach statistical significance. Table VIII confirms the findings of previous workers as to the relationship between the VIQ and PIQ scores for epileptics. With the single exception of the male idiopathic group,

the group analyses demonstrate that the VIQ is higher than the PIQ and that these differences attain statistical significance. These sample characteristics will be mentioned frequently in the subsequent pages because of their importance in any analysis of the results.

Table VII. - Range, Mean and Standard Deviations(SD) of IQs obtained on the Verbal(V), Performance(P) and Full(F) Scales on the Wechsler-Bellevue by the Idiopathic and Symptomatic Epileptic Subjects.

	Idiopathic			Symptomatic		
	Male	Female	Total	Male	Female	Total
Range						
V	50-115	54-121	50-121	46-111	52-106	46-121
P	34-116	44-118	34-118	37-106	39-111	37-111
F	38-115	50-124	38-124	46-110	40-108	40-110
Mean						
V	78.94	81.76	80.27	77.44	77.43	77.43
P	79.43	74.76	77.23	70.88	67.07	69.10
F	77.68	77.18	77.44	72.31	70.35	71.40
SD						
V	14.95	14.71	14.90	18.93	17.90	18.39
P	21.20	17.22	19.57	21.32	21.45	21.47
F	18.47	17.01	17.79	20.38	20.39	20.41
Number	I-M-37	I-F-33		S-M-16	S-F-14	

Table VIII. - Significance of the difference between the Means of the Verbal and Performance IQs obtained on the Wechsler-Bellevue by the Idiopathic(I) and Symptomatic(S) Epileptic Subjects.

	V Mean	P Mean	DIFF	SED	CR[1]
I Male	78.94	79.43	0.49	2.62	0.18
I Female	81.76	74.76	7.00	1.61	4.35**
I Total	80.27	77.23	3.04	1.48	2.19*
S Male	77.44	70.88	6.56	3.53	1.86***
S Female	77.43	67.07	10.36	3.56	2.93****
S Total	77.43	69.10	8.33	2.22	3.75**
Number	I-M-37	I-F-33	S-M-16	S-F-14	

[1]CR - Critical Ratio at the 10% Level (***), 5% Level (*), 2% Level (****), and the 1% Level (**) of Significance.

2. Wechsler's Mean Scatter

For purposes of this study, the subtest variability of a group, i.e., institutionalized epileptics, is the topic of primary concern; therefore the method suggested by Wechsler was utilized. He states that, "In estimating the subtest variability of a group it is necessary to first treat each individual separately, that is, first obtain the subtest deviations from each subject's own mean and only afterwards average the deviations so obtained".[1] This minimized the possibility of obliterating the variability of the group.

Table IX-X shows the results obtained through the application of this pattern analysis. Although the S, I, and DSp subscales show strong negative deviations, they do not reach 1.5, which is the score which would be minimal for a minus sign. Thus, none of the male idiopathic subtests deviate significantly. However, the V and DSy subtests received positive and negative signs respectively when the analysis was applied to the female idiopathics. These results are in correspondence with those shown in Tables VII and VIII which indicated that the female idiopathics did significantly better on the Verbal than the Performance subtests; however, the male

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[1] David Wechsler, The Measurement of Adult Intelligence, Baltimore, Williams and Wilkins, 3rd ed., 1944, p.168.

idiopathics did better on the Performance scales although the difference did not attain statistical significance. When the idiopathic groups are combined none of the deviations are disparate enough to warrant a sign. Inasmuch as there is no a priori reason for expecting any differences between the male and female idiopathics it is difficult to assess this finding. However, this finding should be considered in the design of future research.

As shown in Table X, the results for the symptomatic groups are highly consistent, and appear to be definitely indicative of a symptomatic pattern. The V deviations are plus for both males and females; however, the fact that they disappear when the groups are combined (with a gain in statistical reliability) indicates that this finding is slightly tenuous. The minus deviation of the DSy is quite clear-cut and seems to be an outstanding characteristic of the symptomatic subjects. This tends to confirm the interpretations of Landisburg which were previously mentioned.

In general, the results obtained by application of the Wechsler Mean scatter suggest that the method may be useful in indicating differences between idiopathic and symptomatic groups. However, further work will be necessary to determine whether this pattern is primarily restricted to the symptomatic types.

Table IX. - Wechsler's Mean Deviations, and their Sign, of the Subtest Weighted Scores, obtained on the Wechsler-Bellevue by the Idiopathic Epileptic Subjects.

	Mean Deviation Idiopathic			Sign Idiopathic		
	Male	Female	Total	Male	Female	Total
I	-1.2	-0.6	-0.87	0	0	0
C	0.3	0.5	0.38	0	0	0
DSp	-1.1	-0.6	-0.84	0	0	0
A	-0.9	0.0	-0.48	0	0	0
S	-1.3	-0.5	-0.93	0	0	0
V	-0.1	1.5	0.61	0	+	0
PA	0.2	-0.2	0.02	0	0	0
PC	0.6	0.5	0.54	0	0	0
BD	1.1	0.8	0.96	0	0	0
DSy	-0.7	-1.5	-1.07	0	-	0
Number	I-M-37	I-F-33		S-M-16	S-F-14	

Table X. - Wechsler's Mean Deviations, and their Sign, of the Subtest Weighted Scores obtained on the Wechsler-Bellevue by the Symptomatic Epileptic Subjects.

	Mean Deviation Symptomatic			Sign Symptomatic		
	Male	Female	Total	Male	Female	Total
I	-0.9	-0.1	-0.49	0	0	0
C	0.3	1.3	0.73	0	0	0
DSp	0.2	0.4	0.30	0	0	0
A	0.1	-1.2	-0.52	0	0	0
S	-0.9	0.8	-0.11	0	0	0
V	1.5	1.5	1.43	+	+	0
PA	0.2	-0.6	-0.17	0	0	0
PC	1.0	0.8	0.90	0	0	0
BD	0.7	0.1	0.40	0	0	0
DSy	-1.9	-1.5	-1.73	-	-	-
Number	I-M-37	I-F-33		S-M-16	S-F-14	

3. Rapaport's Vocabulary Scatter

Rapaport believes that the V scores tend to "hold up" in many psychological disorders; therefore, a significant pattern is more likely to be obtained if this is used as a standard. Table XI indicates that once again the male idiopathic group fails to show any significant deviation. This would be expected on the basis of the previous finding that this group did not do significantly better on the Verbal subtests.

Inasmuch as the V subtest was the highest for the female idiopathics, its use as a standard does result in several significant negative deviations (Table XII). The I, DSp, S, and DSy deviations are significant at the one percent level of confidence, and the PA deviation is significant at the five percent level.

When the two groups are combined (Table XIII) the PA deviations loses its significance; however, the other findings for the female idiopathics are borne out. Here again there is a problem of interpretation because of the disparity between the males and females. Although, in this case, there are four highly reliable findings for the idiopathic group as a whole, thus giving empirical basis for the postulation of an idiopathic pattern.

Table XIV shows that the negative deviation of the DSy subtest is significant at the one percent level of confidence for the male symptomatics. This is consistent with the pattern found for this group by the application of the Wechsler Mean scatter.

Although the results for the female symptomatics are in the same direction, they do not reach statistical significance. There are not very many subjects in this group, and there is a good chance that increased reliability might disclose a pattern identical with that of the male symptomatics. When the symptomatic groups are combined in Table XVI the negative deviation of the DSy is still negative at the one percent level. The I, A, and S negative deviations are also significant, but these reach only the five percent level. The results for the symptomatic groups give strong indications of a symptomatic pattern which is characterized by a marked negative deviation on the DSy subtest. The meaningfulness of this pattern is enhanced by its substantial agreement with the findings of Wechsler's mean scatter.

Table XI. - Rapaport's Vocabulary Deviations (DEV) of the Mean Subtest Weighted Scores (MWS) and reliability of the differences obtained on the Wechsler-Bellevue by the Male Idiopathic Epileptic Subjects.

	MWS	DEV	SED[1]	CR[2]
	Male Idiopathic			
V	6.05	-	-	-
I	5.27	0.78	0.68	1.15
C	6.51	0.46	0.77	0.56
DSp	5.30	0.75	0.68	1.10
A	5.49	0.56	0.79	0.71
S	5.08	0.97	0.83	0.71
PA	6.68	0.63	0.76	1.21
PC	6.97	0.92	0.82	1.76
BD	7.42	1.44	0.78	0.41
DSy	5.73	0.32	0.80	1.21
Number	I-M-37			

[1]SED - Standard Error of the Difference.

[2]CR - Critical Ratio at the 5% Level (*) and the 1% Level (**) of Significance.

Table XII. - Rapaport's Vocabulary Deviations (DEV) of the Mean Subtest Weighted Scores (MWS) and reliability of the differences obtained on the Wechsler-Bellevue by the Female Idiopathic Epileptic Subjects.

	MWS	DEV	SED[1]	CR[2]
		Female Idiopathic		
V	7.52	-	-	-
I	5.61	1.91	0.64	2.94**
C	6.61	0.91	0.68	1.34
DSp	5.67	1.85	0.69	2.68**
A	6.24	1.28	0.71	1.80
S	5.52	2.00	0.73	2.74**
PA	5.91	1.61	0.77	2.09*
PC	6.67	0.85	0.75	1.13
BD	6.91	0.61	0.79	0.76
DSy	4.67	2.85	0.72	3.96**

Number I-F-33

[1]SED - Standard Error of the Difference.

[2]CR - Critical Ratio at the 5% Level (*) and the 1% Level (**) of Significance

Table XIII. - Rapaport's Vocabulary Deviations (DEV) of the Mean Subtest Weighted Scores (MWS) and reliability of the differences obtained on the Wechsler-Bellevue by the Total Idiopathic Epileptic Subjects.

	MWS	DEV	SED[1]	CR[2]
		Total Idiopathic		
V	6.74	-	-	-
I	5.28	1.46	0.49	2.98**
C	6.56	0.18	0.52	0.35
DSp	4.90	1.84	0.57	3.21**
A	5.84	0.90	0.54	1.62
S	5.28	1.46	0.55	2.66**
PA	6.31	0.43	0.58	0.74
PC	6.83	0.09	0.54	0.16
BD	7.21	0.47	0.58	0.81
DSy	5.23	1.51	0.55	2.64**
Number	I-T-70			

[1]SED - Standard Error of the Difference

[2]CR - Critical Ratio at the 5% Level (*) and the 1% Level (**) of Significance.

Table XIV. - Rapaport's Vocabulary Deviations (DEV) of the Mean Subtest Weighted Scores (MWS) and Significances obtained on the Wechsler-Bellevue by the Male Symptomatic Epileptic Subjects.

	MWS	DEV	s[1]	t[2]
	Male Symptomatic			
V	6.69	-	-	-
I	4.88	1.81	0.96	1.85
C	5.56	1.13	1.26	0.89
DSp	5.50	1.19	1.21	0.98
A	5.44	1.25	1.25	1.00
S	4.44	2.25	1.13	1.99
PA	5.38	1.31	1.11	1.18
PC	6.31	0.38	1.37	0.00
BD	6.00	0.69	1.04	0.66
DSy	3.38	3.31	0.94	3.54**
Number	S-M-16			

[1] s - Estimated Standard Error of the Mean.

[2] t - t Ratio at the 5% Level (*) and the 1% Level (**) of Significance.

Table XV. - Rapaport's Vocabulary Deviations (DEV) of the Mean Subtest Weighted Scores (MWS) and Significances obtained on the Wechsler-Bellevue by the Female Symptomatic Epileptic Subjects.

	MWS	DEV	s^1	t^2
	Female Symptomatic			
V	6.78	-	-	-
I	5.21	1.57	1.18	1.33
C	6.50	0.28	1.29	0.21
DSp	5.64	1.14	1.20	0.95
A	4.07	2.71	1.38	1.97
S	5.78	1.00	1.18	0.85
PA	5.43	1.35	1.38	0.98
PC	5.07	1.71	1.34	1.27
BD	5.78	1.00	1.38	0.72
DSy	4.28	2.00	1.05	1.91

Number S-F-14

[1]s - Estimated Standard Error of the Mean

[2]t - t Ratio at the 5% Level (*) and the 1% Level (**) of Significance.

Table XVI. - Rapaport's Vocabulary Deviations (DEV) of the Mean Subtest Weighted Scores (MWS) and reliability of the differences obtained on the Wechsler-Bellevue by the Total Symptomatic Epileptic Subjects.

	MWS	DEV	SED[1]	CR[2]
	Total Symptomatic			
V	6.71	-	-	-
I	5.03	1.68	0.73	2.30*
C	6.00	0.71	0.94	0.76
DSp	5.57	1.14	0.84	1.36
A	4.80	1.91	0.90	2.12*
S	5.07	1.64	0.80	2.05*
PA	5.40	1.31	0.85	1.54
PC	5.71	1.00	0.94	1.06
BD	5.90	0.81	0.81	1.00
DSy	3.80	2.91	0.68	4.28**
Number	S-T-30			

[1]SED - Standard Error of the Difference

[2]CR - Critical Ratio at the 5% Level (*) and the 1% Level (**) of Significance.

4. Allen's Information Scatter

The application of Allen's technique in Table XVII shows for the first time the existence of a pattern for the male idiopathic group. The C and PA subtests show positive deviations which are significant at the five percent level of confidence. The PC and BD subtests also show positive deviations which are significant at the one percent level.

Table XVIII shows that for the female idiopathics the one significant (one percent level) deviation occurs with the V subtest and is in the positive direction. This again attests the extremely high score attained by the female idiopathics group on the V subtest inasmuch as it remains highly significant even when compared with another of the Verbal subtests. Further, it should be noted that the C, PC, and BD show strong positive deviations which, while not statistically significant, are consistent with the male patterns.

Table XIX suggests the existence of an idiopathic pattern when the Allen I scatter is applied. This pattern is characterized by strong positive deviations on the V, C, PC, and BD subtests.

In contradistinction to the findings with the idiopathic groups, neither male nor female symptomatic

scores, as shown in Tables XX and XXI, show any significant deviations.

When the symptomatic groups are combined in Table XXII, it develops that the V and DSy subtests gain significance at the five percent level. The V subtest deviates in the positive direction, and this is consistent with the symptomatic pattern found with the Wechsler scatter. The DSy deviates in the negative direction, and this is consistent with the symptomatic patterns found with both the Wechsler and the Rapaport scatters.

Table XVII. - Allen's Information Deviations (DEV) of the Mean Subtest Weighted Scores (MWS) and reliability of the differences obtained on the Wechsler-Bellevue by the Male Idiopathic Epileptic Subjects.

	MWS	DEV	SED[1]	CR[2]
		Male Idiopathic		
I	5.27	-	-	-
V	6.05	0.78	0.68	1.15
C	6.51	1.24	0.64	1.94*
DSp	5.30	0.03	0.53	0.01
A	5.49	0.22	0.68	0.32
S	5.08	0.19	0.68	0.28
PA	6.68	1.41	0.72	1.96*
PC	6.97	1.70	0.64	2.66**
BD	7.49	2.22	0.71	3.12**
DSy	5.08	0.19	0.68	0.28
Number	I-M-37			

[1]SED - Standard Error of the Difference.

[2]CR - Critical Ratio at the 5% Level (*) and the 1% Level (**) of Significance.

Table XVIII. - Allen's Information Deviations (DEV) of the Mean subtest Weighted scores (MWS) and reliability of the differences obtained on the Wechsler-Bellevue by the Female Idiopathic Epileptic Subjects.

	MWS	DEV	SED[1]	CR[2]
	Female Idiopathic			
I	5.61	-	-	-
V	7.52	1.91	0.64	2.94**
C	6.61	1.00	0.62	1.61
DSp	5.67	0.07	0.63	0.01
A	6.24	0.63	0.65	0.97
S	5.52	0.09	0.67	0.01
PA	5.91	0.31	0.71	0.44
PC	6.67	1.06	0.69	1.54
BD	6.91	1.30	0.74	1.76
DSy	4.67	0.94	0.66	1.42

Number I-F-33

[1]SED - Standard Error of the Difference.

[2]CR - Critical Ratio at the 5% Level (*) and the 1% Level (**) of Significance.

Table XIX. - Allen's Information Deviations (DEV) of the Mean Subtest Weighted Scores (MWS) and reliability of the differences obtained on the Wechsler-Bellevue by the Total Idiopathic Epileptic Subjects.

	MWS	DEV	SED[1]	CR[2]
	Total Idiopathic			
I	5.28	-	-	-
V	6.74	1.46	0.49	2.98**
C	6.56	1.28	0.47	2.72**
DSp	4.90	0.38	0.52	0.73
A	5.84	0.56	0.49	1.18
S	5.29	0.00	0.50	0.00
PA	6.31	1.03	0.53	1.94
PC	6.63	1.55	0.49	3.17**
BD	7.21	1.93	0.53	3.64**
DSy	5.23	0.05	0.49	0.10

Number I-T-70

[1]SED - Standard Error of the Difference

[2]CR - Critical Ratio at the 5% Level (*) and the 1% Level (**) of Significance

Table XX. - Allen's Information Deviations (DEV) of the Mean Subtest Weighted Scores (MWS) and Significances obtained on the Wechsler-Bellevue by the Male Symptomatic Epileptic Subjects.

		MWS	DEV	s^1	t^2
		Male Symptomatic			
I	I	4.88	-	-	-
	V	6.69	1.81	0.98	1.85
	C	5.56	0.68	1.23	0.55
	DSp	5.50	0.62	1.20	0.52
	A	5.44	0.56	1.21	0.46
	S	4.44	0.44	1.09	0.40
	PA	5.38	0.50	1.07	0.47
	PC	6.31	1.43	1.34	1.07
	BD	6.00	1.12	0.99	1.13
	DSy	3.38	1.58	0.89	1.78
Number		S-M-16			

[1]s - Estimated Standard Error of the Mean

[2]t - t Ratio at the 5% Level (*) and the 1% Level (**) of Significance.

Table XXI. - Allen's Information Deviations (DEV) of the Mean Subtest Weighted Scores (MWS) and Significances obtained on the Wechsler-Bellevue by the Female Symptomatic Epileptic Subjects.

	MWS	DEV	σ^1	t^2
		Female Symptomatic		
I	5.21	-	-	-
V	6.78	1.57	1.18	1.33
C	5.50	1.29	1.40	0.92
DSp	5.64	0.43	1.09	0.39
A	4.07	1.14	1.28	0.89
S	5.78	0.57	1.07	0.53
PA	5.43	0.22	1.28	0.17
PC	5.07	0.14	1.24	0.11
BD	5.78	0.57	1.25	0.45
DSy	4.28	0.93	0.74	1.25
Number	S-F-14			

$^1\sigma$ - Estimated Standard Error of the Mean

^2t - t Ratio at the 5% Level (*) and the 1% Level (**) of Significance.

Table XXII. - Allen's Information Deviations (DEV) of the Mean Subtest Weighted Scores (MWS) and reliability of the differences obtained on the Wechsler-Bellevue by the Total Symptomatic Epileptic Subjects.

	MWS	DEV	SED[1]	CR[2]
	Total Symptomatic			
I	5.03	-	-	-
V	6.71	1.68	0.73	2.30*
C	6.00	0.97	0.90	1.07
DSp	5.57	0.54	0.79	0.68
A	4.80	0.23	0.86	0.27
S	5.07	0.04	0.75	0.05
PA	5.40	0.37	0.79	0.47
PC	5.71	0.68	0.89	0.76
BD	5.90	0.87	0.76	1.14
DSy	3.80	1.23	0.62	1.99*
Number	S-T-30			

[1]SED - Standard Error of the Difference

[2]CR - Critical Ratio at the 5% Level (*) and the 1% Level (**) of Significance.

5. Barnett's Z Scatter

This technique has been offered by Barnett as being of value because its basic assumptions are more valid than those of previous pattern analyses. As indicated in Table XXIII, this technique divulges a very strong negative deviation on the S subtest for the male idiopathics. A negative trend is also suggested for the DSy, while the PC and BD subtests deviate in the positive direction. The female idiopathics show the same negative deviations in addition to a positive deviation on the A subtest. The combination of the idiopathic subjects shows a strong negative deviation for the S and DSy subtests, and a positive deviation for the PC and BD subtests.

In general, Barnett's scatter created fewer strong deviations with the symptomatic subjects. Table XXIV indicates that the BD is positive for male symptomatics, whereas the S and DSy are strongly negative; however, Table XXIV shows no marked deviations for the female symptomatics. When the groups are combined, the only deviation beyond the expected range is a negative one on the S subtest. Although it was not significant when the groups were combined it should be noted that there was still a strong tendency for negative deviations on the DSy subtest. This tendency has been consistent in all the pattern analyses for the symptomatic subjects.

Table XXIII. - Barnett's Z Score Pattern of the Subtest Weighted Scores and their mean and standard deviations (SD) obtained on the Wechsler-Bellevue by the Idiopathic Epileptic Subjects.

	Z Idiopathic			Deviation[1] Idiopathic		
	Male	Female	Total	Male	Female	Total
I	-1.71	-1.50	-1.61	-0.28	-0.21	-0.24
C	-1.18	-1.05	-1.12	+0.25	+0.24	+0.25
DSp	-1.48	-1.21	-1.35	-0.05	+0.08	+0.02
A	-1.40	-0.96	-1.19	+0.03	+0.67*	+0.18
S	-2.16	-1.73	-1.96	-0.73*	-0.44*	-0.59*
PA	-1.18	-1.24	-1.21	+0.25	+0.05	+0.16
PC	-1.01	-1.04	-1.02	+0.42*	+0.25	+0.35*
BD	-1.01	-1.09	-1.04	+0.42*	+0.20	+0.33*
DSy	-1.79	-1.83	-1.81	-0.36*	-0.54*	-0.44*
Mean	-1.43	-1.29	-1.37			
SD	0.35	0.34	0.32			
Number	I-M-37		I-F-33			

[1] Beyond expected range of one SD(*)

Table XXIV. - Barnett's Z Score Pattern of the Subtest Weighted Scores and their Mean and Standard Deviations (SDO obtained on the Wechsler-Bellevue by the Symptomatic Epileptic Subjects.

	Z Symptomatic			Deviation[1] Symptomatic		
	Male	Female	Total	Male	Female	Total
I	-1.71	-1.67	-1.69	-0.10	-0.15	-0.23
C	-1.49	-1.18	-1.35	+0.12	+0.34	+0.11
DSp	-1.33	-1.27	-1.30	+0.28	+0.25	+0.16
A	-1.39	-1.82	-1.59	+0.22	-0.30	-0.13
S	-2.24	-1.76	-2.01	-0.63*	-0.24	-0.55*
PA	-1.36	-1.71	-1.53	+0.25	-0.19	-0.07
PC	-1.56	-1.24	-1.41	+0.05	+0.28	+0.05
BD	-1.24	-1.54	-1.38	+0.37*	-0.02	+0.08
DSy	-2.16	-1.50	-1.85	-0.55*	+0.02	-0.39
Mean	-1.61	-1.52	-1.46			
SD	0.33	0.34	0.48			
Number	S-M-16	S-F-14				

[1] Beyond expected range of one SD (*)

6. The Ranking Technique

Table XXV shows the rank order ratings of the subtests as determined by the mean weighted mean scores of each of the subtests. The trends which have been observed in the pattern analyses are quite clearly borne out by the ranking data. Despite certain discrepancies, viz., on the DSy and V subtests, the trends for the male and female idiopathics are in general agreement. As indicated by the totals the BD, PC and V are the highest; while the I, S, and DSy are the lowest.

The ranks of the male and female symptomatics are quite disparate on the A, S, and PC subtests. Once again the ranking totals bear out the trends which have been already suggested. The V, C, and BD are the highest ranking, while the I, A and DSy are the lowest. The ranking technique does not indicate any marked disparities between the symptomatic and idiopathic groups.

Table XXV. - Mean Subtest Rank Order Ratings from high to low obtained on the Wechsler-Bellevue by the Idiopathic and Symptomatic Epileptic Subjects.

	Idiopathic			Symptomatic		
	Male	Female	Total	Male	Female	Total
I	9	8	8	8	7	8
C	4	4	4	4	2	2
DSp	8	7	7	5	5	5
A	7	5	6	6	10	9
S	10	9	9	9	3.5	7
V	5	1	3	1	1	1
PA	3	6	5	7	6	6
PC	2	3	2	2	8	4
BD	1	2	1	3	3.5	3
DSy	6	10	10	10	9	10
Number	I-M-37	I-F-33		S-M-16	S-F-14	

7. Klein's Multiple Regression Weights

Inasmuch as there were no normal subjects in this study, Klein's control group was included in Table XXVI for comparison purposes. Unfortunately, it can be readily seen, by observation of the data in these tables, that the application of the regression weights to the unweighted V scatter scores has lessened the differences between the epileptic and normal groups rather than enhancing them. Obviously the application of the Klein weights to this sample is of little use, and, if this result were to be confirmed in other studies, the only alternative would be to determine entirely new regression weights for epileptic populations.

As Wechsler has noted in considering methods of evaluating tests, "From a statistical point of view the most valid method that can be employed seemingly is that of multiple correlations. But the results obtained thereby usually do not, in our experience, justify the amount of labor involved."[2] Further, it should be noted that, even in Klein's study, the application of the regression weights merely enhanced already significant differences. Nevertheless, the technique still has much to recommend it, and it would be interesting to see some

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[2] David Wechsler, op.cit., p.116.

large-scale studies which would attempt to set up unique regression weights for differentiating the epilepsies. Further, the regression weights, as applied in this study, are based on the assumption that the Rapaport V scatter is the most valid pattern analysis, and this assumption should be subjected to further scrutiny.

Table XXVI. - The Mean Unweighted and Weighted Total Scores obtained by an Application of Klein's Regression Weights to Rapaport's Vocabulary Deviations obtained on the Wechsler-Bellevue by the Idiopathic(I) and the Symptomatic(S) Epileptic Subjects

	Mean Unweighted Total Score	Mean Weighted Total Score
Normal[1]	0.867	0.819
I Male	0.759	0.871
I Female	1.541	1.164
I Total	0.927	0.864
S Male	1.480	1.164
S Female	1.418	1.180
S Total	1.457	0.710
Number	Normal - 54	I-M-37 I-F-33 S-M-16 S-F-14

[1]Data for the Normal Subjects taken from George S. Klein, "An application of the multiple regression principle to clinical prediction", in The Journal of General Psychology, Vol.38, Second Half, issue of April, 1948, p.166.

8. Discussion

It has been pointed out that other workers have found that certain subtest deviations might be considered as characteristic of epileptics. Their findings indicate that the DSp, DSy, and PA are generally negative deviates, and that C is often a positive deviate. This study certainly provides confirmative evidence for the hypothesis that a negative deviation on the DSy subtest is an epileptic characteristic. Further, it shows up more consistently with the symptomatic subjects than with the idiopathic. Poor performance on the DSy might be due to either or both of two primary factors. First, a lack of motor set and speed is reflected by poor performance on this scale. Second, a loss in learning ability. This substitution task requires the concentration and attention characteristic of quick association learning.

The consistency of the findings with regard to this subtest would seem to suggest the value of further attention to this aspect of epileptic performance. Further studies should be designed which would first attempt to determine the relative importance of the two primary factors mentioned above.

A second fairly consistent finding was that the S subtest tends to show negative deviations with both the idiopathic and symptomatic subjects. This subtest taps

general ability to abstract, conceptualize and generalize. This test is recognized as containing a large amount of "g"[3]. Thus, it may be that the institutionalized subjects in this study did poorly on the S subtest because of the low general intelligence which is characteristic of such subjects. Comparative studies of institutionalized and non-institutionalized epileptics of the various epileptic categories should provide critical evidence relevant to this interpretation.

Whereas both idiopathic and symptomatic groups yield the negative deviations discussed above, only the idiopathic groups show positive deviations on the PC and BD subtest when subjected to the I scatter and the Z scatter. Wechsler believes that these two subtests are the best of the Performance group, and he points out that they tend to correlate with each other. Ostensibly, the PC "measures the individual's basic perceptual and conceptual abilities insofar as these are involved in the visual recognition and identification of familiar objects and forms".[4] The BD subtest evidently measures the ability to perceive and analyze forms and patterns. It is interesting to note that patients with mental deterioration and brain disease often have difficulty with this subtest.[5]

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[3] David Wechsler, op.cit., p.86.

[4] Ibid., p.90.

[5] Ibid., p.93.

The findings with respect to the PC and BD subtests suggest the possibility that there are differential patterns for the symptomatic and idiopathic epilepsies. A rational analysis of the abilities measured by these two subtests gives further credence to this possibility, i.e., one would not expect the symptomatic subjects to do well on these subtests. However, it has been found that the male symptomatic subjects showed a positive deviation on the BD subtest as measured by the Barnett scatter. Thus, one cannot conclude definitely that there are different patterns for the two groups on this basis alone.

Probably at the present stage of our knowledge, it would be advisable to replicate, with other groups of epileptics, the approach utilized in this study. Such studies would, if confirmatory, give a high level of confidence to the interpretation that there are different patterns for the symptomatic and idiopathic groups.

That the use of several pattern analyses is the best way to demonstrate such a difference is suggested by the results obtained by the application of the ranking technique and Klein's regression weights. The ranking technique helps in suggesting which of the subtests play the most important roles in determining the various patterns; however, it is difficult to interpret statistically, and it does not seem to indicate any strong differences between the various groups.

The application of Klein's regression weights did not lead to any positive results in the present study. The weighted scores did not serve to differentiate idiopathic and symptomatic groups from each other or from normals.

In this chapter, idiopathic and symptomatic groups were subjected to four pattern analyses, a ranking technique, and a multiple regression analysis. The pattern analyses gave definite evidence of a general epileptic pattern which is characterized by negative deviations on the S and DSy subtests. Further, there was suggestive evidence for a differential pattern for idiopathic and symptomatic groups with the former group attaining positive deviations on the BD and PC subtests. The ranking and regression techniques added little or no further evidence to the four pattern analyses.

The evidence in this chapter suggests the following conclusions:

1. There is a characteristic pattern for institutionalized epileptics which is indicated by marked negative deviations on the S and DSy subtests.

2. If further studies utilizing Klein's regression weights with epileptics give the same results, new regression weights should be computed and cross-validated with large groups of epileptics and normals, and perhaps established with other pattern analyses.

CHAPTER IV

COMPARISON WITH ORGANIC PATTERNS

In the preceding chapter, it was established that there is an epileptic pattern for institutionalized epileptic subjects. In this chapter, the results obtained in this study will be subjected to four analyses which have been suggested as indices of organic involvement. These analyses will be discussed individually and as a group with reference to indications of an organic pattern for either of the diagnostic groups studied.

1. Comparison with Wechsler's Organic Pattern

The results of the application of the sign test, as a means of making an organic comparison, are shown in Table XXVII. It can be seen quite readily that only one of the idiopathic subjects (a female) was classified organic. Assuming the validity of Wechsler's pattern, this could be considered evidence for a lack of organic involvement in idiopathic cases. However, it would be presumptuous to assume the validity of the technique (for this population at least) inasmuch as only ten percent of the symptomatic subjects would be classified organic.

These findings are consistent with previous applications of the Wechsler organic pattern.

The consistency of these results seems to suggest that Wechsler's organic pattern is of little use as it stands, and should be subjected to revision or replaced. It is interesting that Wechsler makes the following comments with reference to the organic syndromes:

> Organic brain cases, with few exceptions, do consistently better on verbal than on performance tests. The greatest and most consistent falling off is on the Digit Symbol Tests; but even more diagnostic though not necessarily the most adversely affected performance is the organic's inability to do the Block Design test, which is systematically associated with disturbances in visual motor organization ... Certain cases also do badly on the Similarities test, and this may reflect either a loss in conceptual thinking or, more frequently, an increasing rigidity in thought processes.[1]

It will be recalled that the epileptic pattern disclosed in the previous chapter would be very well described by Wechsler's comments. In any event, it seems impossible to make any conclusive statements concerning organic involvement in epileptics on the basis of the Wechsler pattern at the present time.

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[1] David Wechsler, The Measurement of Adult Intelligence, Baltimore, Williams and Wilkins, 3rd ed., 1944, p.163.

Table XXVII. - Number of Idiopathic and Symptomatic Epileptic Subjects Classified on Wechsler's Organic Pattern.

	Number Classified					
	Organic		Non-Organic		Total	
	N	%	N	%	N	%
Idiopathic						
Male	0		37	53.6	37	52.8
Female	1	100.0	32	46.4	33	47.1
Total	1	100.0	69	100.0	70	99.9
Symptomatic						
Male	0		16	59.2	16	53.3
Female	3	100.0	11	40.7	14	46.7
Total	3	100.0	27	99.9	30	100.0

2. Comparison with Allen's Organic Pattern

On the basis of the application of his "Information" scatter to known organic patients, Allen has established a pattern which is typical of such cases. Table XXVIII presents Allen's organic pattern (as represented by subtest ranks), the pattern obtained for idiopathic subjects in this study, and the rank-difference correlation between the two.[2] The latter served as a quantitative measure of the agreement between the two patterns. Table XXVIII indicates that there is a substantial lack of agreement between the organic pattern and that of the male idiopathics. The female idiopathics have a pattern which shows a slight relationship to the organic pattern. While both of the symptomatic groups also show slight relationships to the organic pattern, neither is quite as large as that of the female idiopathics.

While there is slight evidence for an organic pattern in both symptomatic groups, the relationships are so slight as to be attributable to chance. Thus, once again the application of an organic pattern leads to no conclusive results.

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[2] The method used for calculating the rank-difference correlation was taken from Henry E. Garrett, Statistics in Psychology and Education, New York, Longmans Green, Fourth Edition, 1953, pp 353-356.

Table XXVIII. - The Rank-Difference Correlation obtained by a Comparison of Allen's Organic Pattern (O) with the Subtest Scale Scores obtained on the Wechsler-Bellevue by the Idiopathic and Symptomatic Epileptic Subjects.

	O[1]	IM	IF	SM	SF	DIM	DIF	DSM	DSF
V	3	5	1	1	1	-2	2	2	2
I	1	9	8	8	7	-8	-7	-7	-6
C	2	4	4	4	2	-2	-2	-2	0
DSp	9	8	7	5	5	1	2	4	4
A	5	7	5	6	10	-2	0	-1	-5
S	6	10	9	9	3.5	-4	-3	-3	2.5
PA	7	3	6	7	6	4	1	0	1
PC	4	2	3	2	8	2	1	2	-4
BD	8	1	2	3	3.5	7	6	5	4.5
DSy	10	6	10	10	9	4	0	0	1
Rho	0	0.35		0.32	0.24				
Number	O-50	I-M-37		I-F-33		S-M-16		S-F-14	

[1] Data for the Organic Pattern was taken from Robert M. Allen, "The Test Performance of the Brain-Injured" in the Journal of Clinical Psychology, Vol.4, No.3, issue of July, 1948, p.227.

3. Application of Hewson's Organic Ratios

The Hewson ratios were applied to the data obtained and analyzed by the method which she suggests.[3] As shown in Table XXIX, the Hewson technique indicated that approximately thirty-six percent of the idiopathic subjects should be classified as organic. Once again this might add evidence to the hypothesis that all epilepties have organic difficulties if one could assume that the Hewson ratios are valid. However, the application of the ratios to the symptomatic subjects indicates that approximately forty-six percent of these should be classified organic. Thus, there is the same problem of interpretation as with the Wechsler organic pattern. However, in this instance, relatively larger numbers of each nosological category have been classified organic.

This finding is entirely consistent with the results of Wheeler's study,[4] and it would seem that his conclusions are appropriate. While recognizing the sophistication

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[3]Louise R. Hewson, "The Wechsler-Bellevue Scale and the Substitution Test as Aids in Neuro-psychiatric Diagnosis", in the Journal of Nervous and Mental Diseases, Vol.109, issue of February, 1949, Part I, pp.158-183; Part II, pp.246-265.

[4] John I. Wheeler and Walter L.Wilkins, "The Validity of the Hewson's Ratios", in the Journal of Consulting Psychology, Vol.15, No.2, issue of April, 1951, pp.163-166.

of this method, he noted that it was not valid enough for differential diagnosis. The primary difficulty which he found was that, "the method classifies large numbers of subjects without organic brain disease as cerebral pathology".[5] This would appear to be the most warranted conclusion which can be directed to the results obtained from the application of the Hewson technique in this study.

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[5] Wheeler and Wilkins, op.cit., p.165.

Table XXIX. - Number of Idiopathic and Symptomatic Epileptic Subjects Classified by Hewson's Organic Ratios.

	Number Classified					
	Organic		Non-Organic		Total	
	N	%	N	%	N	%
Idiopathic						
Male	12	48.0	25	55.6	37	52.8
Female	13	52.0	20	44.4	33	47.1
Total	25	100.0	45	100.0	70	99.9
Symptomatic						
Male	8	42.8	8	50.0	16	53.3
Female	6	57.1	8	50.0	14	46.7
Total	14	99.9	16	100.0	30	100.0

4. Application of Reynell's Organic Index

Reynell has postulated that certain of the subtests hold despite cerebral involvement, whereas certain of the subtests "don't hold". The results of the application of this technique are shown in Table XXX. Obviously, these results give substantially the same picture as that obtained from the application of the Newson technique. In this case, exactly fifty percent of the idiopathic subjects would be classified as having permanent organic brain damage; however, only 46.6 percent of the symptomatic subjects would receive this classification. Thus, the application of this system leads to the paradoxical conclusion that more of the idiopathics than symptomatics have organic involvement. In light of the diagnostic rationale for classifying patients as idiopathic or symptomatic, these findings cast strong doubt upon the validity of the Reynell system.

Table XXX. - Number of Idiopathic and Symptomatic Epileptic Subjects Classified by Reynell's Organic Index.

	Number Classified					
	Organic		Non-Organic		Total	
	N	%	N	%	N	%
Idiopathic						
Male	21	60.0	16	45.7	37	52.8
Female	14	40.0	19	54.3	33	47.1
Total	35	100.0	35	100.0	70	99.9
Symptomatic						
Male	6	42.8	10	62.5	16	53.3
Female	8	57.1	6	37.5	14	46.7
Total	14	99.9	16	100.0	30	100.0

5. Discussion

Any interpretation of these results must rest upon certain assumptions. If one is willing to assume that the techniques which were applied are valid, it is difficult to reconcile the findings obtained by use of the Wechsler and Allen techniques with those obtained by the use of the Hewson and Reynell systems. The former would indicate a low degree of organic involvement for both idiopathic and symptomatic subjects, and the latter would indicate organic involvement in roughly half of the subjects of both groups. Such results certainly lead one to doubt the premise that the techniques are valid.

The same conclusion follows from the assumption that the clinical diagnoses, i.e., idiopathic and symptomatic are valid. One would certainly expect that the vast majority of the symptomatic subjects would be classified as organic. However, the Wechsler pattern shows the opposite, while the Hewson and Reynell techniques would operate as differential diagnosers at a level which is not above chance. Without any further index of the validity of the methods, there is little to be gained by speculating about the results of their application to the idiopathic subjects.

These findings suggest an urgent need for further research in this area. One of the primary difficulties

undoubtedly lies with the diagnostic reliability which can be attained with unoperated patients. The development of new indices of organic involvement as well as further modification of those presented in the present study should be characterized by long follow-up studies, culminating in autopsy where possible. In this way an organic diagnosis can be unequivocally established, thus providing a reliable criterion for establishing validity.

In this chapter, the patterns obtained in Chapter III were compared with the organic patterns of Wechsler, Allen, Hewson, and Reynell. There was no evidence for the validity of any of these techniques as tested by the frequency of classification of symptomatic subjects as showing organic involvement. These results are quite consistent with all earlier attempts at cross-validation of these techniques, and it is suggested that further research should yield new indices or modifications of the current ones.

The evidence in this chapter suggests the following conclusions:

1. The four techniques applied are inconsistent with each other, and with the symptomatic diagnosis.

2. Their lack of validity negates the possibility of attempting to determine the frequency of organic involvement among the idiopathic subjects.

CHAPTER V

MENTAL DETERIORATION IN EPILEPTICS

Many have hypothesized that there is mental deterioration in epileptics. This hypothesis will be tested in this chapter by the application of three indices of mental deterioration which have been favored by some workers. Finally the criteria suggested by Rabin[1] for setting up a mental deterioration index will be applied to attain maximum differentiation. This index will serve as an instrument for evaluating deterioration in epileptics if its validity is borne out in further studies.

1. Wechsler's Mental Deterioration Index

On the basis of his findings[2] that intellectual abilities fall off differentially with age, Wechsler established a Mental Deterioration Index which attempts to measure deterioration on the basis of differences

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[1] Albert I. Rabin, "Test-score Patterns in Schizophrenia and Non-psychotic States", in the Journal of Psychology, Vol.12, First Half, issue of July, 1941, pp. 91-100.

[2] David Wechsler, The Measurement of Adult Intelligence, Baltimore, Williams & Wilkins, 3rd ed., 1944, Chapter 6.

between scores on subtests that "hold" and those that "don't hold" as a function of age. He notes[3] that this index would also be useful for determining falling off of intellectual ability in various other disorders regardless of the cause of such deterioration.

Table XXXI presents the results of the Wechsler MDI when applied to the sample used in this study.[4] In terms of Wechsler's definition, "An individual may be said to show signs of possible deterioration if he shows a greater than a 10 percent loss, and of definite deterioration if a loss greater than 20 percent than that allowed for by the normal decline with age".[5]

As indicated by Table XXXI, 31.4 percent of the idiopathic subjects show definite deterioration, and an additional 7.1 percent show possible deterioration; 43.3 percent of the symptomatic subjects show definite deterioration, while 10 percent show possible deterioration. Assuming the validity of Wechsler's MDI, it is apparent that these results show a substantial amount of mental deterioration among institutionalized epileptics.

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[3] David Wechsler, op.cit., p.67.

[4] All the Deterioration Indices are "net", i.e., the deterioration which would naturally occur at that age is subtracted from the gross index for each individual.

[5] David Wechsler, op.cit., p.66.

Table XXXI - Intellectual deterioration distribution for the Idiopathic and Symptomatic Epileptic Subjects with the Wechsler M.D.I.

	Amount of Deterioration					
	0-10%		11-20%		More than 20%	
	N	%	N	%	N	%
Idiopathic						
Male	24	55.8	2	40.0	11	50.0
Female	19	44.2	3	60.0	11	50.0
Total	43	100.0	5	100.0	22	100.0
Symptomatic						
Male	8	57.1	2	66.6	6	46.2
Female	6	42.8	1	33.3	7	53.8
Total	14	99.9	3	99.9	13	100.0

Number	I-M-37	I-F-33	S-M-16	S-F-14

2. Allen's Mental Deterioration Index

Allen's index was established on the basis of his studies with brain-injured subjects, and he felt that it would be shown to have more validity than the Wechsler index. The application of the Allen Mental Deterioration Index to the data obtained in this study yielded the results shown in Table XXXII. There is a substantial difference between the male and female subjects with the number of female subjects classified as "deteriorated" exceeding chance expectancy. The totals indicate that the Allen index would classify twenty-five percent of the idiopathic subjects and 26.7 percent of the symptomatic subjects as showing mental deterioration. For both groups, these percentages are below those obtained by the application of the Wechsler index.

Table XXXII. - Number of Idiopathic and Symptomatic Epileptic Subjects Classified by the Allen M.D.I.

	No Deterioration N	%	Deterioration N	%
Idiopathic				
Male	32	57.1	5	35.7
Female	24	42.8	9	64.3
Total	56	99.9	14	100.0
Symptomatic				
Male	12	54.5	4	50.0
Female	10	45.4	4	50.0
Total	22	99.9	8	100.0

Number I-M-37 I-F-33 S-M-16 S-F-14

3. Rabin's Mental Deterioration Index

By comparing nurses and schizophrenics as to performance on the Wechsler-Bellevue test, Rabin presents[6] an index which he feels is indicative of mental deterioration. He felt that his ranking approach was more statistically valid than Wechsler's, and, therefore, would be of diagnostic value. Table XXXIII presents the results of the application of Rabin's technique to the subjects used in this study. Rabin's results indicate that the control groups of ninety-two student nurses at New Hampshire State Hospital obtained a mean index of 0.98; however, the selected schizophrenic group obtained a mean index of 1.35. It also shows that the idiopathic subjects have a mean index which is very close to Rabin's schizophrenic group. However, it should be noted that there is high variability in the indices of the idiopathic groups as shown by the magnitudes of the standard deviations. Thus it is not safe to draw sure conclusions from these results because of the low reliabilities of the mean indices.

The results for the symptomatic groups which are shown in Table XXXIII show a greater reliability, despite the fact that the mean index is lower than that found for

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[6] Albert I. Rabin, "Test-score Patterns ..." pp 91-100.

the idiopathics. There is no way of assessing the comparability of these groups with Rabin's control; however, it seems probable that the sample used in this study differs in many ways from them. These results do provide further presumptive evidence that Rabin's index might be of value in differentiating epileptics from normals.

Table XXXIII. - Mean Index and Standard Deviations obtained by the Idiopathic and Symptomatic Epileptic Subjects on the Rabin M.D.I.

	Mean Index	Standard Deviation
Idiopathic		
Male	1.21	0.74
Female	1.46	1.40
Total	1.32	1.11
Symptomatic		
Male	1.29	0.47
Female	1.08	0.36
Total	1.21	0.43

Number	I-M-37	I-F-33	S-M-16	S-F-14

4. Angers' Mental Deterioration Index

The premise offered by the Babin technique when used with schizophrenics suggests that it not only might have value when applied to epileptics, but that it could be even more fruitful to develop an original index with epileptics by following the criteria which Babin offers. Such an index was developed by the present writer, and Table XXXIV shows the results obtained by its application to the present sample. Of course the indices obtained are larger than those obtained by the application of the Babin index because they have been set up for maximum differentiation within this sample.

Assuming that this new index will prove to be of value when cross-validated, the results indicate that there is greater mental deterioration among symptomatic subjects than among idiopathic ones. However, the difference is only slight, and its reliability is not statistically stable enough to indicate that it is more than a chance occurrence. Further, the fact that the female idiopathics attained a higher index than the female symptomatics urges one to caution in interpreting these results.

Table XXXIV. - Mean Index and Standard Deviations obtained by the Idiopathic and Symptomatic Epileptic Subjects on the Angers M.D.I.

	Mean Index	Standard Deviation
Idiopathic		
Male	1.32	0.58
Female	1.50	0.42
Total	1.40	0.52
Symptomatic		
Male	1.69	0.83
Female	1.22	0.34
Total	1.48	0.69
Number	I-M-37 I-F-33	S-M-16 S-F-14

5. Discussion

The first problem of interpretation involved in discussing mental deterioration in epileptics arises from the fact that there appears to be much confusion as to the exact meaning of the term "mental deterioration". Wechsler notes that "most psychologists and neurologists" are primarily acquainted with mental impairment when associated with some organic or brain injury, but mental decline may and does occur independently of any specific mental disease.[7] This study has concerned itself with mental deterioration as defined by Wechsler; therefore, it has been treated in a chapter apart from the one on organic patterns. Thus, it would be beyond the scope of this treatment to speculate as to the actual etiology of deterioration. Although the importance of this problem should not be forgotten by future workers, it is apparent that, at the present time, one is always faced by the possibility that deterioration is due to organic changes that are subliminal in terms of their accessibility by present techniques.

The second factor which arises in assessing mental deterioration is the difficulty in determining whether institutionalized epileptics are originally more feeble-minded and dull than other groups or if they have actually

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[7]David Wechsler, Measurement of Adult Intelligence, p.54.

deteriorated. Obviously this is a problem involving the validity of the mental deterioration indices. These indices are in serious need of validation by outside criteria, e.g., long-range psychometric studies which would actually have data indicating the individual's original level of performance.

The techniques which were applied are fairly consistent in that they all suggest a fairly substantial amount of mental deterioration in this sample. However, it is extremely difficult to compare these indices directly inasmuch as two of them indicate whether or not there is deterioration, while the other two attempt to assay the deterioration by means of a numerical index.

The technique developed by the present writer seems promising in light of the high indices which were obtained without a loss of statistical reliability. Its final evaluation will, of course, await further studies with epileptics and normals.

Several techniques of assessing mental deterioration were applied to the sample of institutionalized epileptics. Both the Wechsler and Allen techniques indicated that a larger number of symptomatic subjects showed deterioration. Also, the Angers' index was higher for the symptomatic subjects; however, on the Babin index, the idiopathic subjects showed a higher index. Although

the differences were not of large magnitude, their consistency lends credence to the interpretation that the symptomatic subjects show more deterioration than the idiopathic. Further, all the techniques indicated that there is a considerable degree of mental deterioration among the institutionalized epileptics.

These findings justify the following conclusions:

1. It is probable that the symptomatic subjects show more mental deterioration than idiopathics.

2. All available indices show that there is mental deterioration among epileptics.

3. The Angers Index yields high scores with epileptics and appears to be worthy of further study.

SUMMARY AND CONCLUSIONS

The problems involved in defining epilepsy, and in developing a theoretical formulation which would satisfactorily integrate the present empirical evidence were presented at the beginning of Chapter I. Further it was pointed out that psychological studies can perform an important function by:

1. Giving a more lucid picture of the level of intellectual function of epileptics.

2. Indicating the existence of consistent characteristics of intellectual functioning which may be unique to this type of patient, i.e., a pattern.

3. Correlating any such patterns with different diagnostic categories in an attempt to ascertain their usefulness in prediction.

4. Determining the amount of improvement or deterioration in general intellectual functioning.

With these considerations in mind, a review of the literature was undertaken. This review indicated that most workers who have used the Wechsler-Bellevue have used certain techniques of pattern analysis. Each of these analyses had been established on the basis of certain

studies, and each appeared to have a rationale which suggested its validity for further research. It was noted, (p.43) that Klein went beyond the pattern technique and developed a regression equation which would have the purpose of enabling one to make differential predictions on the basis of subtest performance. The several studies in which workers attempted to determine the pattern which correlated with organic involvement and their conclusions were also included. Finally, the evidence with respect to mental deterioration in epileptics was reviewed, as well as the various formulas which had been put forward as being valid indicators of such deterioration.

All the available evidence suggested several hypotheses which were the subject of investigation in this study. They were as follows:

1. The population data should give further evidence as to the intellectual level of institutionalized epileptics, and should test previous findings that the VIQ is higher than the PIQ in epileptics.

2. The Wechsler, Rapeport, Allen, and Barnett pattern analyses would be applied to test the hypothesis that there is an epileptic pattern.

3. The patterns of this group of institutionalized epileptics should upon application of the appropriate techniques show an organic pattern.

4. The final hypothesis was that the various mental deterioration indices should indicate that there is such deterioration in epileptics.

In the course of testing these hypotheses, it was surmised that further evidence would become available as to the validity of the various techniques as well as to the psychometric characteristics of the institutionalized epileptics.

The full details as to the population and sample were given in Chapter II. From 596 epileptic patients, institutionalized at the General Hospital in Woodstock, Ontario, a sample of 112 subjects who had been administered Form II of the Wechsler-Bellevue were selected. Twelve of these were eliminated and the final sample consisted of one hundred patients, including seventy idiopathic and thirty symptomatic epileptics. There were eight tables presented which indicated statistical characteristics of the sample in great detail. The IQ characteristics of the sample confirmed the first hypothesis, and verified the previous studies on which it was based.

The second section of Chapter II presented, in some detail, the various methods which were to be applied to the sample data in order to test the other three hypotheses. Thus, the operations necessary to test the second hypothesis involved obtaining Wechsler's mean scatter,

Rapaport's V scatter, Allen's I scatter, Barnett's Z scores, a ranking technique, and Klein's multiple regression weighted scores.

To test the third hypothesis, the techniques by which one compares these patterns with various organic patterns were discussed, and it was decided that the data obtained in Chapter III would be compared with Wechsler's and Allen's organic patterns, and also analyzed by the Hewson and Reynell systems. The final hypothesis was amenable to testing by the application of the various mental deterioration indices; therefore, the methods required to utilize the indices of Wechsler, Allen, and Rabin were presented. Also, the methodology involved in developing a new mental deterioration index was reviewed.

Chapter III was organized to present the results of the pattern analyses, and is, therefore, relevant to the second hypothesis. The application of the Wechsler mean scatter yielded a consistent symptomatic pattern, and appeared to have a possible future value of differentiating idiopathic and symptomatic groups. The principal characteristic of the symptomatic pattern was a marked negative deviation on the DSy subtest.

The Rapaport scatter generated a pattern for the idiopathic subjects consisting of significantly negative deviations on the I, DSp, S, and DSy subtests. The symptomatic pattern shows less marked negative deviations on the

C, A, and S; however, the negative deviation of the DSy is again striking, and attains significance at the one percent level.

The Allen pattern is not as consistent as the others, and shows strong positive discrepancies on the V, C, PC, and BD subtests. The symptomatic subjects also show a positive deviation on the V subtest. In agreement with the previous patterns, the DSy shows negative deviations, but the difference is only significant at the five percent level.

The Barnett Z scatter also produced positive deviations on the PC and BD subtests for the idiopathic subjects as well as a negative one for the DSy subtest. Although the symptomatic subjects showed a negative trend on the DSy subtest, the only strong negative deviation was on the S subtest.

The ranking shows that the BD, PC, and V rank the highest for the idiopathic subjects, while the I, S, and DSy rank lowest. The symptomatic subjects have a pattern which differs slightly inasmuch as the V, C, and BD rank the highest, and the I, A, and DSy rank the lowest.

The application of the Klein regression weights to the Rapaport V scatter gave results which are rather disappointing. As applied in this study, they did not yield any differentiation, and, in fact, diminished the

differences which were present in the unweighted scores.

The results were interpreted as being consistent with earlier findings as to the DSy subtest which deviates negatively. Possible reasons for this finding were stated. Secondly, the S subtest shows fairly consistent negative deviations for all the subjects. This finding was also analyzed in terms of the abilities which this subtest attempts to tap.

Only the idiopathic subjects showed consistent positive deviations, and these occurred on the PC and BD subtests when analyzed by the Barnett and Allen techniques. It was suggested that this finding might serve as the beginnings of a technique which would serve to differentiate idiopathic and symptomatic subjects.

In Chapter IV, the third hypothesis was tested by comparing the patterns obtained with the organic patterns suggested by Wechsler, Allen, Hewson, and Reynell. The application of Wechsler's pattern as tested by use of the "sign test" classified only one of the idiopathic subjects as organic and only 10 percent of the symptomatic subjects as organic. This result was interpreted as shedding doubt upon the validity of the Wechsler technique as used in this study.

The degree of relationship between the Allen pattern and the one obtained in this study was measured by means of rank difference correlations. The relationships

were consistently low, and gave no evidence which would tend to confirm the third hypothesis.

The Hewson technique classified approximately 36 percent of the idiopathic subjects and approximately 46 percent of the symptomatic subjects as organic. These figures are considerably larger than those obtained by the Wechsler technique, and would appear to be more in line with what we would expect on an *a priori* basis.

Fairly high percentages of organic classification also resulted from the use of Reynell's index. Exactly fifty percent of the idiopathic subjects would be classified organic while only 46.6 percent of the symptomatic subjects would be so classified. These findings were interpreted as casting strong doubt upon the validity of this technique.

Whether one evaluates the validity of these techniques by a criterion of consistency with one another or of consistency with diagnostic classification, the results lead one to doubt the validity of these techniques. Without such validity they do not constitute an adequate test of the third hypothesis.

As indicated by Chapter V, the fourth hypothesis was tested by the application of the mental deterioration indices of several workers. Wechsler's index indicated that 31.4 percent of the idiopathic subjects and 43.3 per-

cent of the symptomatic subjects showed signs of definite deterioration. Allen's index classified 25 percent of the idiopathic and 26.7 percent of the symptomatic as showing deterioration.

Rabin's index was applied to this sample, and was evaluated in terms of its comparison with his own findings with schizophrenics. His control group had a mean index of 0.98 as opposed to 1.35 for schizophrenics. In this sample of institutionalized epileptics, the idiopathics attained a mean index of 1.32 and the symptomatics a mean index of 1.21. Despite the high variability of the idiopathic group, the results indicate that the Rabin technique could be developed into a reliable predictor.

Using the Rabin criteria, an epileptic index was formulated on the basis of the present study. This index yielded high and fairly stable scores with the present sample. The final interpretation of the value of this index will depend on its validity as determined by future research with epileptics.

Interpretations of mental deterioration depend largely upon the definition of the term. For purposes of this study Wechsler's definition was accepted. There is little or no evidence for the validity of mental deterioration indices by reliable and acceptable external criteria. However, the techniques applied do seem to be fairly

consistent in indicating that there is a fairly substantial degree of mental deterioration among institutionalized epileptics.

The following conclusions have been suggested by this study:

1. The IQ of institutionalized epileptics is considerably below that of the general population.

2. The consistent finding of earlier workers that the VIQ is significantly higher than the PIQ in epileptics is verified by this study.

3. There is a unique scatter pattern for epileptics which is characterized by marked negative deviations on the S and DSy subtests.

4. There is some evidence that the idiopathic group might be differentiated from the symptomatic groups on the basis of positive deviations on the BD and PC subtests in the former group.

5. Klein's regression weights, as established on the schizophrenics, are of little value in working with the epileptics.

6. The application of the four organic patterns yielded results which are not only internally inconsistent, but do not agree with the diagnostic categories of the patients used in this study. Thus there is no evidence for the validity of these techniques.

7. The study presents evidence which indicates that there is more mental deterioration among symptomatic than among idiopathic subjects.

8. All the mental deterioration indices show that there is mental deterioration among institutionalized epileptics.

9. A new index which was developed in this study yields high indices which are not too variable, and may provide a tool for differential prediction of deteriorated and normal subjects.

In terms of the four hypotheses, it is apparent that hypotheses one, two, and four have received empirical confirmation, whereas there was no evidence as to the validity of the third hypothesis.

A primary value of the present work is the evidence it presents which is worthy of further study with this sample, and the ideas which it suggests for future research.

The information which is presented in Tables XXXV through XLIV would be a definite source of further research which could be done with the present data. It might be worthwhile to see if there is any relationship between age of onset and such variables as intellectual level, mental deterioration, and scatter pattern. All of the other information presented could be subjected to comparison in the same way. At the present time, such studies would still be

of an exploratory nature, but they should yield hypotheses which will be very fruitful.

As a result of the patterns obtained in this study and others, it would be possible to set up a number of studies which would be designed to test various hypotheses as to the reasons for the deviations on certain subtests. Ideally, a research program could be instituted which would study groups of subjects classified as to diagnostic category, age, education, etc. These groups could be compared with normals in highly controlled situations which would attempt to assess the types of intellectual functions which are impaired or not disturbed. Such studies might serve to resolve the discrepancies which exist between the present types of pattern analysis. The results of these studies should provide excellent external criteria for the validation of scatter patterns.

It would seem that further applications of the multiple regression technique to epileptic samples might be worthwhile, following the establishment of definitely valid scatter patterns. Once a scatter pattern which is highly reliable and valid is established, the application of the multiple regression technique should yield weights with high predictive capacity.

The development of good techniques of assessing organic involvement will probably have to await further

physiological advances. When diagnostic categories, such as idiopathic and symptomatic, have known reliability, it will be far more feasible to attempt the determination of the organic test pattern.

In the absence of definite organic patterns, the mental deterioration indices serve an excellent purpose. Here again there is a need for a reliable external criterion against which the mental deterioration indices can be validated. It seems probable that such a criterion can only be established on the basis of long-range studies. Such studies would have detailed and reliable knowledge as to the initial level of functioning of the subjects. Awaiting such long-range studies, it would probably be more feasible to attempt studies based on inferences as to initial ability such as Wechsler suggests.[1]

The ultimate solution to the various problems which face those workers who are vitally interested in the epilepsies will probably come about only through the combined efforts of investigators trained in many fields which often seem divergent. The excellent work of Penfield and others which is being carried on at the present time in Montreal with a team consisting of medical doctors, trained in electroencephalography and surgery, physiologists, and psychologically trained workers is certainly promising.

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[1] David Wechsler, The Measurement of Adult Intelligence, Baltimore, Williams and Wilkins, 3rd ed., 1944, p.67.

It is hoped that the results of future research in this field will tear away the awe and fear and replace it with enlightenment and optimism.

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APPENDIX 1

DATA OBTAINED AT WOODSTOCK

The data which appear on the following pages have been obtained from the test forms and the personal files of the epileptics who are institutionalized at the General Hospital, Woodstock, Ontario.

Tables XXXV to XL inclusive describe the subjects under the headings of age, grade level attained (EDN), age of onset (AO), length of disease in years (LD), length of hospitalization in days (LH), and length of treatment in days (LT). Under the heading "T", the type of treatment is indicated by use of the symbols "P" to indicate phenobarbital, and "D" to indicate Dilantin. A combination of the two is shown as "P-D".

Tables XLI to XLIV give data on the subtest scale scores obtained on the Wechsler-Bellevue. The abbreviations used in these tables follow the standard described in the survey of the literature, Chapter I, Section 3, footnote to page 18, of this thesis.

Table XXXV. - Description of the Male Idiopathic Epileptic Subjects, 1 to 18, and their IQs obtained on the Verbal (V), Performance (P), and Full (F) Scales of the Wechsler-Bellevue.

S	Age	Edn	AO	LD	LH	T	LT	V	P	F
1.	24	3	22	2	17	P	16	79	104	90
2.	20	8	13	7	77	P	77	95	83	89
3.	33	10	2	31	31	P	31	118	111	115
4.	17	7	2	15	32	P	14	75	96	83
5.	39	4	1	38	11	D	11	69	48	56
6.	20	7	8	12	67	D	64	74	59	64
7.	44	2	33	11	37	P	36	88	87	87
8.	21	7	10	11	33	P	21	64	59	58
9.	18	6	13	5	92	P-D	89	99	73	90
10.	28	3	24	4	37	D	30	86	84	84
11.	34	8	27	7	68	D	51	102	104	104
12.	21	5	17	4	60	P-D	25	80	104	91
13.	17	7	13	4	38	P	34	75	96	83
14.	16	5	3	13	27	P	24	69	76	70
15.	35	7	16	19	43	P	41	73	77	73
16.	17	6	6	11	76	P	72	77	70	71
17.	26	10	23	3	21	P	16	85	105	94
18.	22	7	19	3	61	P	35	76	72	72

Table XXXVI. - Description of the Male Idiopathic Epileptic Subjects, 19 to 37, and their IQs obtained on the Verbal (V), Performance (P), and Full (F) Scales of the Wechsler-Bellevue.

S	Age	Edn	AO	LD	LH	T	LT	V	P	F
19.	43	12	40	3	30	P-D	26	96	90	92
20.	20	9	9	11	17	D	16	89	88	88
21.	22	7	19	3	92	P-D	68	76	72	72
22.	37	6	14	23	78	P-D	62	73	100	87
23.	24	6	21	3	20	P	12	62	67	62
24.	32	7	2	30	40	P	34	84	79	81
25.	16	4	13	3	37	P	30	52	43	41
26.	19	1	1	18	14	P	8	54	34	41
27.	27	9	7	20	29	D	26	89	89	88
28.	17	2	13	4	95	P	64	50	37	38
29.	32	8	18	14	47	P	31	64	55	57
30	30	6	10	20	25	P	21	86	116	100
31.	21	8	3	18	29	P	21	87	92	88
32.	16	9	6	10	18	P-D	17	104	107	106
33.	22	6	17	5	61	P	54	66	55	58
34.	27	8	21	6	21	P	19	94	92	93
35.	18	5	13	5	7	P	6	86	92	89
36.	23	3	10	13	24	P	17	74	62	66
37.	25	3	12	13	65	P	49	54	61	54

Table XXXVII. - Description of the Female Idiopathic Epileptic Subjects, 1 to 16, and their IQs obtained on the Verbal (V), Performance (P), and Full (F) Scales of the Wechsler-Bellevue.

S	Age	Edn	AO	LD	LH	T	LT	V	P	F
1.	43	11	3	40	32	P-D	27	91	82	86
2.	17	8	15	1	30	D	29	82	81	80
3.	38	8	20	18	65	P	64	78	70	73
4.	18	6	4	14	21	P-D	15	77	68	70
5.	27	3	12	15	78	D	77	62	54	56
6.	16	8	15	1	18	D	17	85	75	79
7.	35	5	25	10	12	P-D	10	86	68	77
8.	32	7	8	24	85	P	83	71	58	63
9.	34	8	25	9	94	P	90	77	51	63
10.	18	10	7	11	42	P	25	121	118	124
11.	16	8	12	4	15	P	9	79	65	71
12.	23	9	16	7	34	P	28	106	88	98
13.	24	12	16	8	26	P	18	90	81	85
14.	40	7	12	28	9	P	3	82	96	89
15.	16	2	4	12	6	P	5	71	82	73
16.	33	1	14	19	52	D	50	54	49	50

Table XXXVIII. - Description of the Female Idiopathic Epileptic Subjects, 17 to 33, and their IQs obtained on the Verbal (V), Performance (P), and Full (F) Scales of the Wechsler-Bellevue.

S	Age	Edn	AO	LD	LH	T	LT	V	P	F
17.	28	6	13	15	15	P-D	48	85	72	78
18.	40	7	12	28	18	P	8	82	98	89
19.	38	8	26	12	73	P	68	78	70	73
20.	26	7	21	5	22	P	18	62	44	50
21.	17	7	12	5	16	P	9	84	81	81
22.	17	7	13	4	81	P	13	81	71	73
23.	40	10	10	30	22	P	4	76	67	68
24.	35	3	3	32	26	P	21	99	88	95
25.	19	8	12	7	11	P	9	71	67	65
26.	24	12	18	6	26	P	25	87	66	76
27.	17	3	13	4	19	P-D	16	63	51	52
28.	32	8	26	6	38	P	32	92	90	92
29.	27	8	12	15	13	D	9	71	66	67
30.	23	6	6	17	18	P	11	67	74	67
31.	18	10	15	3	23	P	22	121	118	124
32.	23	2	3	20	59	P	56	76	69	71
33.	43	10	14	29	28	P	26	92	87	89

Table XXXIX. - Description of the Male Symptomatic Epileptic Subjects, 1 to 16, and their IQs obtained on the Verbal (V), Performance (P), and Full (F) Scales of the Wechsler-Bellevue.

S	Age	Edn	AO	LD	LH	T	LT	V	P	F
1.	22	3	2	20	7	P	6	70	69	67
2.	23	4	13	10	9	P	9	52	48	46
3.	17	8	12	5	26	P-D	15	70	71	67
4.	43	8	42	1	12	P	12	111	106	110
5.	19	3	8	11	95	P	88	64	56	55
6.	35	5	1	34	12	P	10	73	62	66
7.	25	8	9	16	19	P	14	54	61	54
8.	45	8	17	28	21	P	19	104	97	100
9.	44	4	34	10	29	P	12	83	96	88
10.	24	1	10	14	62	P-D	61	62	37	47
11.	44	5	38	6	99	P	97	91	100	95
12.	23	2	1	22	84	P	81	82	41	59
13.	35	8	3	32	12	P	10	46	54	47
14.	45	8	43	2	9	P	8	99	96	98
15.	29	9	25	4	91	P	89	99	70	85
16.	21	6	12	9	56	P-D	41	79	70	73

Table XL. - Description of the Female Symptomatic Epileptic Subjects, 1 to 14, and their IQs obtained on the Verbal (V), Performance (P), and Full (F) Scales of the Wechsler-Bellevue.

S	Age	Edn	AO	LD	LH	T	LT	V	P	F
1.	23	8	11	12	22	P	20	72	81	74
2.	38	3	18	20	27	P	27	63	58	58
3.	26	3	21	5	42	D	37	65	45	52
4.	27	11	15	12	7	P	6	104	70	87
5.	26	8	1	25	26	P	24	88	85	86
6.	18	10	5	13	100	P	100	94	82	88
7.	45	2	43	2	67	P-D	66	106	111	108
8.	16	5	10	6	29	P-D	24	67	40	50
9.	34	1	3	31	78	P	78	56	48	49
10.	24	11	14	10	15	P	7	104	97	101
11.	22	7	8	14	28	P	21	62	47	52
12.	35	2	3	32	61	P	27	72	71	71
13.	16	5	12	4	36	P-D	24	52	39	40
14.	22	8	14	8	38	P	31	79	65	69

Table XLI. - The Subtest Scale Scores obtained on the Wechsler-Bellevue by the Male Idiopathic Epileptic Subjects'

S	I	C	DSp	A	S	V	PA	PC	BD	DSy
1.	4	6	6	6	0	9	11	10	13	10
2.	9	11	7	8	8	10	9	6	8	9
3.	11	14	9	11	12	12	9	13	12	10
4.	5	7	7	2	5	7	12	9	9	10
5.	6	4	6	1	2	6	1	1	1	1
6.	5	6	3	5	6	7	0	7	6	5
7.	5	13	7	6	4	0	5	9	4	7
8.	5	3	3	4	3	0	7	6	2	2
9.	7	9	6	6	7	10	1	4	4	1
10.	6	6	9	6	8	0	5	9	8	7
11.	8	12	6	11	10	10	7	11	11	10
12.	5	8	4	8	6	7	13	9	14	8
13.	5	7	7	2	5	7	12	9	9	10
14.	4	5	4	4	5	7	8	9	7	4
15.	4	4	9	2	4	4	5	7	4	4
16.	4	7	6	6	6	7	8	6	6	4
17.	7	7	6	8	0	7	12	9	11	10
18.	4	4	4	9	7	6	7	7	6	3
19.	4	10	7	6	10	11	0	5	8	4
20.	8	6	6	8	8	11	8	12	7	8
21.	4	4	4	9	7	6	7	7	6	3
22.	4	6	4	0	0	4	11	9	12	4
23.	3	4	2	6	3	0	6	6	7	2
24.	9	4	6	8	7	9	8	8	6	3
25.	1	4	2	1	0	4	1	4	1	2
26.	2	0	2	1	2	5	2	2	1	2
27.	9	6	7	9	8	6	6	8	9	9
28.	3	3	0	1	0	4	1	1	4	1
29.	3	5	2	2	4	4	3	1	4	2
30.	8	7	10	8	6	7	10	9	14	14
31.	5	6	6	10	10	8	8	9	10	6
32.	8	10	9	11	10	9	10	11	14	9
33.	3	5	7	1	3	6	5	2	4	5
34.	6	12	4	10	10	9	12	5	10	8
35.	8	8	3	0	0	10	9	11	11	7
36.	4	8	4	6	0	0	5	5	6	4
37.	2	0	2	1	2	4	3	2	8	4

Table XLII. - The Subtest Scale Scores obtained on the Wechsler-Bellevue by the Female Idiopathic Epileptic Subjects 1 to 33.

S	I	C	DSp	A	S	V	PA	PC	BD	DSy
1.	7	9	4	9	6	9	3	10	5	4
2.	5	8	9	6	6	7	11	6	7	8
3.	5	7	2	8	5	6	3	8	2	3
4.	5	9	4	5	6	7	5	8	6	6
5.	2	3	4	2	3	5	2	1	9	1
6.	4	7	7	9	7	9	9	5	6	8
7.	5	5	7	8	8	8	5	4	4	2
8.	4	6	2	2	7	6	0	8	2	2
9.	5	7	6	2	5	8	2	5	2	0
10.	11	12	13	12	11	14	13	11	15	12
11.	5	9	6	6	4	7	8	4	5	6
12.	11	8	10	10	10	13	7	7	12	9
13.	8	8	6	7	9	9	7	8	9	2
14.	7	5	4	5	6	8	9	10	8	5
15.	3	5	3	6	7	0	8	9	10	4
16.	3	4	0	1	0	3	3	0	2	1
17.	4	5	6	6	4	7	6	6	6	4
18.	7	5	4	5	6	8	9	10	8	5
19.	5	7	2	8	5	6	3	8	2	3
20.	3	2	4	1	3	6	3	0	2	1
21.	5	10	7	6	0	7	4	10	11	7
22.	7	5	4	6	7	9	7	4	7	7
23.	3	5	6	4	3	6	3	2	4	2
24.	8	13	7	10	7	11	1	11	11	5
25.	3	4	6	4	6	6	5	4	7	5
26.	6	6	7	9	8	9	5	5	10	2
27.	4	3	4	4	2	4	3	4	4	4
28.	8	8	7	8	10	8	5	11	9	7
29.	5	5	4	4	0	6	10	6	6	3
30.	3	3	4	6	3	4	5	5	9	7
31.	11	12	13	12	11	14	13	11	15	12
32.	6	8	7	6	0	8	11	8	4	1
33.	7	5	7	9	7	10	6	10	10	5

Table XLIII. - The Subtest Scale Scores obtained on the Wechsler-Bellevue by the Male Symptomatic Epileptic Subjects, 1 to 16.

S	I	C	DSp	A	S	V	PA	PC	BD	DSy
1.	4	4	6	6	2	5	6	4	6	5
2.	3	2	2	0	1	3	1	3	5	1
3.	4	7	2	4	5	5	6	10	7	6
4.	9	9	13	12	9	13	10	11	10	3
5.	3	5	4	2	3	6	5	4	3	3
6.	4	5	4	6	3	6	1	5	2	3
7.	2	0	2	1	2	4	3	2	8	4
8.	8	11	10	11	9	9	9	18	7	4
9.	4	5	7	0	0	7	6	8	12	2
10.	3	7	0	1	6	5	3	1	2	0
11.	5	6	9	8	7	8	9	11	7	4
12.	5	7	7	8	8	6	3	1	2	2
13.	1	0	2	2	0	2	0	2	5	1
14.	11	7	4	9	0	10	9	9	8	2
15.	7	9	13	9	7	11	5	5	8	10
16.	5	5	3	8	9	7	10	7	4	4

Table XLIV. - The Subtest Scale Scores obtained on the Wechsler-Bellevue by the Female Symptomatic Epileptic Subjects, 1 to 14.

S	I	C	DSp	A	S	V	PA	PC	BD	DSy
1.	4	4	7	3	8	4	11	10	7	4
2.	3	0	4	1	4	4	4	4	0	2
3.	4	5	4	0	4	4	3	2	1	1
4.	7	14	10	11	9	9	5	9	5	4
5.	8	10	6	6	7	8	6	10	8	7
6.	8	5	10	11	7	11	9	5	11	8
7.	11	11	10	3	11	13	9	13	8	7
8.	5	4	3	3	6	5	1	5	1	2
9.	1	3	3	1	3	2	1	0	3	1
10.	8	14	9	9	8	12	9	8	14	6
11.	3	5	3	1	4	5	3	4	2	2
12.	5	6	3	1	4	7	1	7	5	4
13.	2	1	3	1	0	4	1	2	2	3
14.	4	9	4	6	6	7	3	6	6	5

APPENDIX 2

ABSTRACT OF

A Psychometric Study of Institutionalized Epileptics on the Wechsler-Bellevue.[1]

This study was designed with the purpose of evaluating several hypotheses as to the intellectual performance of institutionalized epileptics. It was hypothesized that:

1. Institutionalized epileptics have IQs which are lower than those of the general population.

2. It is characteristic of the epileptic patients to do significantly higher on the VIQ than the PIQ.

3. There is a characteristic epileptic subtest pattern.

4. This subtest pattern should conform to the various organic patterns which have been found in the literature.

5. There is mental deterioration in epileptics.

The sample was drawn from a population of 596 institutionalized epileptics at the General Hospital, Woodstock, Ontario. It would not be valid to generalize the results of this study to epileptics in general; however, there is

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[1]Ph.D. Thesis presented by William P. Angers, in 1955, to the Faculty of Arts of the University of Ottawa. 142 pages.

no reason why these results could not be generalized to institutionalized epileptics excepting those groups who were rejected from this study.

Of this hospitalized group, 159 had been administered the Wechsler-Bellevue scale. Form I had been administered to forty-seven of these and the other 112 had taken Form II. The forty-seven who had taken Form I did not constitute a good sample for two reasons. First, there were wide deviations in length of hospitalization, duration of disease, time of testing, etc. Second, this group was too small to give much reliability to any breakdown of the results.

Of the 112 who had been administered Form II, two were on tridone treatment, one was on myoline, and three were on mesantone. It was decided to eliminate these six to better equalize the sample. In order to minimize the confounding effects of natural mental deterioration at the more advanced ages, three subjects aged 50 and one aged 48 were rejected. Finally, two subjects who had obtained college degrees were eliminated, inasmuch as their educational attainment was far above that of the other subjects.

Thus the final sample consisted of one hundred subjects among which seventy were diagnosed as idiopathic and thirty who were classified as symptomatic. All had been administered Form II of the Wechsler-Bellevue within

a period of one hundred days after entering the hospital.

The sample characteristics indicate that these subjects have low intellectual ability, and that the VIQ is significantly greater than the PIQ.

The application of the Wechsler, Rapaport, Allen, and Barnett scatter patterns, as well as the ranking technique, indicated that there is a characteristic pattern for institutionalized epileptics. This pattern consists of significant negative deviations on the DSy and S subtests for both diagnostic categories; however, the idiopathic groups tend to show positive deviations on the PC and BD subtests. The application of Klein's regression weights yielded no positive results.

The application of the mental deterioration indices, while not entirely consistent, showed definite indications of mental deterioration for both of the diagnostic categories. The study presented evidence which indicated that there is more mental deterioration among symptomatic than among idiopathic subjects. A new index which was developed in this study by the present writer yielded high indices which were not too variable, and may provide a tool for differential prediction of deteriorated and normal subjects.

Thus, the empirical results obtained in this study indicate that hypotheses one, two, three, and five are verified. Hypothesis four was not critically tested because of the demonstrated lack of validity of the organic patterns.

These results are discussed in terms of the previous findings of other investigators, and the direction which future research might take is analyzed in some detail.

As a result of the patterns obtained in this study and others, it would be possible to set up a number of studies which would be designed to test various hypotheses as to the reasons for the deviations on certain subtests. Such studies might serve to resolve the discrepancies which exist between the present types of pattern analysis. The results of these studies should provide excellent external criteria for the validation of scatter patterns.

It would seem that further applications of the multiple regression technique to epileptic samples might be worthwhile, following the establishment of definitely valid scatter patterns. Once a scatter pattern which is highly reliable and valid is established, the application of the multiple regression technique should yield weights with high predictive capacity.

The ultimate solution of the various problems which face those workers who are vitally interested in the epilepsies will probably come about only through the combined efforts of investigators trained in many fields which often seem divergent.