I. Introduction

This is the third occasion in the last year that I have been called on to participate in a conference on Behavior Change. I wish I knew enough about the sociology of science to understand what lies behind this sudden wave of interest in the measurement of change and why one whose chief concern is with psychopathology should be in such demand. I can see why people engaged in research in learning theory, industry, brain washing, sensory deprivation, role theory, international relations, aging, etc., should be called in, but I was not aware that psychopathology had anything new to offer. However, on further consideration, I began to see why there might be a place for a psychopathologist on such a panel. First, much of classic psychopathology is not only changing, actually vanishing. The classic forms of behavior (dyssomnality, echolalia, echopraxia, etc.) which were ubiquitous in our state mental hospitals are no longer as visible. On the other hand, erratic behavior in the community is very probably on the increase since there are now twice as many released patients in the community as there were two decades ago. (1)

The changes in the behavior of patients and of the community towards patients, are sufficient warrant for considering psychopathology in this conference. How these changes came about is not yet clear.

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Whether or not this change in tolerance is an unmixed blessing remains an open problem. Some geneticists are already claiming that releasing schizophrenia into the community may have a dysgenic influence on the next generation. Thus, though the marriage and reproduction rates of schizophrenics have remained well below the corresponding rates for the general population, the relative increase in these rates from the 40's to the 60's was considerably higher in the schizophrenics. (18)

The open door hospital policy which is largely responsible for these increases, will have to undergo careful scrutiny in order to determine the impact of these changes on the community and on the released patients. If the latter fail to adapt, become a drag on their families, increase the crime and delinquency rates, prognostic studies will have to be instituted to screen out the good from the bad risks. In the 40's, released patients had a much lower arrest rate than the rest of the population, in the 60's the patient rate has already climbed up to the general rate!

There is an additional reason why psychopathology should be considered in a symposium on behavior change. The alteration in behavior brought about by mental disorder is a most astonishing and shocking change! No other illness or condition brings about such dramatic alterations in so short a period, with the possible exception of the transitory alterations in epilepsy. Thus far, descriptive phenomenology has been our only means of recording these changes. While men like Karl Jaspers, Eugen Bleuler, Adolf Meyer, Emil Kraepelin and Sigmund Freud have given us rich phenomenological descriptions of these changes in behavior, measurement of these changes is still wanting.

*Despite Kraepelin's hope of 70 years ago that through psychological tests we could detect the vulnerable or sick individuals because of their extreme positions at the end of the distribution, no such generally accepted tests have yet been produced except for mental retardation. When one examines the phenomenological basis of diagnoses
today it becomes clear that the mentally ill are detected and diagnosed through deviations not from psychological test means, but, from social-cultural expectancies. Detection and diagnosis is still much more a social than a scientific procedure. These deviations are either in the form of unpredictable or unexpected social behaviors in the family, at work, or in society, or in the form of reported inner feelings and attitudes which the observer does not recognize as belonging within the expected range of normality. Since these behavioral changes depend for their detection on the observer, the biases of family, friends, neighbors, clinical psychiatrist or psychologist will enter to produce considerable variability in the final judgment regarding the presence of an illness and its diagnosis.

The definition and measurement of change in behavior also offers some difficulties. Change in physical measurements, depending upon length or motion, can be gauged in static Euclidean space by the distance travelled and the time elapsed. In measuring psychological change, this analogue can not be used, since the initial measurement is not static, but is itself a change from the moment before measurement. Thus, psychological change is not measured from two static points -- initial and final, but from two dynamic points, an initial change and a final change. From this point of view, psychological change is an acceleration rather than a velocity, and Euclidean geometry may not be adequate to the situation.

The changes in behavior accompanying mental disorders have been attributed to a variety of aetiological factors, and around each of these a suitable scientific model can be erected. In reviewing this field of aetiology, the following scientific models seem to dominate: (1) social-cultural model (2) developmental model (3) conditioning or learning model (4) genetic model (5) internal-environment model and (6) neuro-physiological or brain function model. Until recently, the first 3 models -- social-cultural, developmental and learning were the most prominent. In recent years, genetics, internal-environment and brain function models
have become more popular.

The social-cultural model is built on the assumption that all mankind is vulnerable to mental disorders and that given sufficient deprivation, stress-producing loads, or other alterations in our environment, our behavior will be altered to the point where our ability to continue living normally as independent individuals in society is endangered. The evidence for social-cultural-environmental pressures as aetiological agents come largely from studies of socio-economic status, isolation, educational and social deprivation and social-cultural uprooting in immigration or migration or rapid acculturation. Even the most sanguine environmentalist will not be satisfied with merely pointing to the above mentioned factors as "causal" agents, but will try to determine just how these malignant factors bring about their deleterious effect. While the story is far from told, there is already sufficient evidence to at least question whether these factors "cause" mental disorders.

The early ecological studies which demonstrated a negative correlation between socio-economic status and rates of certain mental disorders such as schizophrenia were found to suffer from the well known "ecological fallacy" of attributing the correlation between rates to the correlation within people. In some of these studies, the association between mental disorder and area of residence was traceable to the proportion of individuals living in isolation, regardless of whether the area was high or low on the socio-economic ladder. (20)

Since so many more "loners" lived in the poorer districts, it appeared as if the poorness of the district produced the illness, while in fact, the high rate of disorder was fed by the high proportion of "loners." Whether the "loners" drifted into the poorer areas is not always very clear. Recent studies from England, however, tend to lend credence to the "downward drift" hypothesis. Morrison (31) has recently shown that though the distribution of occupations of schizophrenics in their premorbid state was below that of the distribution of their normal peers in the general population, the distri-
bution of the occupations of their fathers was not different from that of the rest of the population.

In a more recent study, Goldberg, E.M. (17) following up on Morrison's work, Miss Goldberg found that:

"The main evidence of individual downward drift is the ability of schizophrenic patients to win places at grammar schools, though they end in semi- or unskilled jobs. The employment histories showed that in their adolescence many patients pursued varied careers, a considerable proportion aiming at professional or technical jobs; they still fitted broadly with the career expectations of their home environment.

The discrepancies in social performance between father and son could be mainly attributed to the disease process. Patients whose illness had an insidious onset at adolescence did not attain any professional or technical skills; those whose illness started acutely before admission dropped in social class shortly before admission; while those who were mentally subnormal as well as schizophrenic did not achieve any level of skill at all.

This social drift appears to affect the highest and lowest social classes most severely. Only one patient out of 13 grammar school boys attained social class I or II status, and over half of those in social class V had dropped out of the labour market by the end of the survey. On the other hand, two thirds of the patients in social classes III and IV survived in jobs requiring a moderate degree of skill."

The fact that economic depressions and wars do not increase mental disorders significantly and the fact that when age, sex and ethnic group are controlled, even immigrants do not show markedly higher rates than the general population, lead one to conclude that the aetiological claim for the social-cultural forces is not proven. A more thorough review of the evidence which has been presented elsewhere leads to the belief that social-cultural forces may elicit a mental disorder or may even occlude it, but cannot cause it unaided. However,
much more research is required to transform this belief into fact.

Despite this conclusion, the fact remains that the detection, diagnosis and even rehabilitation of the mentally ill today rests on a social-cultural framework, deviations from which identify the mentally ill, and return to which constitutes the basis for improvement. Barbara Wooton (57) has formulated this issue in the following way:

"...the anti-social behavior is the precipitating factor that leads to mental treatment. But at the same time the fact of the illness is itself inferred from this behavior: indeed it is almost true to say that the illness is the behavior for which it is also the excuse. But any disease, the morbidity of which is established only by the social failure that it involves, must rank as fundamentally different from those of which the symptoms are independent of social norms.

"This distinction will, moreover, still remain even if we reach the stage, as we very well may, when every mental process has its known physical accompaniment, and when our present dualistic language, along with the distinction between 'organic' and 'functional' disorders, can be discarded. For even then it will still be true that some abnormalities are deplored because they cause fever or boils, others because they induce a disregard of property rights -- even though it may be shown that the latter no less than the former, are associated with happenings in the stomach, the liver or the brain, and can be cured by suitable pills, injections or electric shocks. Even in this case a social judgment is still implied in the decision to rank the thieving tendency together with its bodily concomitants as symptoms of disease or dysfunction; for if it had not been for their social consequences, these physical concomitants would never have been reckoned as abnormal at all. In a sense, therefore, the effect of extending physical
'explanations' to cover all forms of aberrant conduct would be to infuse into certain conceptions of physical health elements of value-judgment comparable to those which already bias the terms in which mental health is defined. Long indeed is the road to be travelled before we can hope to reach a definition of mental-cum-physical health, which is objective, scientific and wholly free of social value-judgments; and before we shall be able, consistently and without qualification, to treat mental and physical disorders on exactly the same footing."

In summarizing the social-cultural model, we might point out that the current revolution in management in psychopathology with regard to hopefulness of treatment, reduction of patient population, rehabilitation etc., is to a considerable extent a social-cultural change involving change of attitude on part of patient, family and therapist. Hence, though social-cultural forces may not be so important in aetiology of some disorders they are of great importance in detection, treatment, and rehabilitation.

The developmental model for aetiology is built on the assumption that mental disease develops as a result of some specific deprivation or interference during a critical period in development when the specific deficit or interference is crucial. Evidence for this model is provided by the recent investigations of Pasamanick, et al, (36) and their collaborators on the role of intrauterine events on the continuum of 'reproductive casualty.' They postulate that certain untoward events such as intercurrent illness, toxemia and other interference with the foetus during the first 9 months of life will produce mental and physical disability ranging from still birth, through live births with epilepsy, cerebral palsy, mental deficiency and finally even those who appear unscathed at first may not escape entirely but develop such lesser ailments as reading disability. One of the most exciting events in the developmental area has been the investigation of the impact of early experience on subsequent personality and its deviations. While the evidence from human infant remained controversial, the evidence from animal studi...
seemed at first to yield data which appeared too closely in keeping with Freud's hunches to give much comfort to those who had refused to accept his clinical surmises. Gentling of animals in their infancy following the credo of tender love and care, actually produced less emotional adults, but to the great surprise of most investigators, shocking the infants was equally effective and most recently, Theodore Schaeffer at Columbia (47) has found that merely lowering the temperature a few degrees is equally effective. Thompson's (54) demonstration that emotional mother rats give rise to emotional pups, Harlow's (21) demonstration that monkeys raised on surrogate mothers and not permitted to play with their peers, tend to develop poorly in the psychosexual sphere, and Melzack's deprived dogs (29) are still other triumphs for the developmental model as a possible causal factor in emotional disorders.

The conditioning or learning model postulates that the source of the deviant behavior of the mental patient is to be sought in his reinforcement history. An example of this theory is Bateson's (3) double-bind model in which the mother's ambivalence in her relationship to her offspring produces ambivalent behavior and other types of deviation in him which we recognize as schizophrenia. While Bateson's double-bind model has aroused considerable interest in psychodynamic circles, it has thus far defied experimental testing of any of its hypotheses. Several more experimentally founded models have been provided by psychologists. Thus, Sarnoff Mednick (28) bases his approach on the evidence that the early or acute schizophrenic conditions more quickly, and shows greater stimulus generalization (less steep gradients). These are related to the higher level of arousal which is attributed to early schizophrenia.

Since higher arousal leads to greater conditionability, and also to wider generalization in laboratory experiments, it is plausible that the higher arousal state of the schizophrenic may account for his more rapid conditioning and wider generalization. An additional finding is that the early schizophrenic takes longer to recover from stress-producing loads. This triad of

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events -- greater arousal response, wider generalization and slower recovery from stress, produces a vicious circle, increasing the early schizophrenic's vulnerability to stress and brings about the high levels of anxiety often seen in early cases. As this triad of conditions continues, the patient grows more and more tense, less adjustable and finally settles into a state of chronicity. Pursuing this model further, Mednick postulates that the high level of anxiety and fear is sometimes fortuitously relieved by some tangential event or thought. Since these intrusions have a tension-reducing value, they become part of the patient's repertoire of defense against excessive anxiety. In this way, there is no need for the concept of repression. Simple reinforcement of a competing act or thought is sufficient. The tangentiality of the schizophrenic and the intrusions in his thinking may then have two sources; (1) wider associative trend because of the wider stimulus generalization and (2) the anxiety relieving aspect of an intruding thought.

Questions may be raised why the neurotic does not develop psychotic behavior, since he too has a high level of activation (anxiety). Perhaps the answer to this question is to be sought in the quicker recovery from stress or in the lesser tendency to generalize, both of which may break the vicious circle which is established in the schizophrenic. Some of the confusion in this field could be reduced if a distinction could be established between operant and respondent conditioning, the former showing, at least for the early cases, quicker conditionability and quicker extinction but wider generalization (Mednick, 1958, Salzinger, 1960), the latter, on the other hand, may be slower on both accounts. (Shipley, 1934) A further separation between early and chronic schizophrenics or between process and reactive schizophrenia is also necessary to reduce the confusion in this area.

The genetic model no longer needs to beg for admission thanks to the work of the Rudin school as it is not clear whether Shipley investigated chronic or early cases.
exemplified by Kallmann's investigations. The studies of monozygotic and dizygotic twins have recently undergone further scrutiny by David Rosenthal. (40, 41, 42, 43)

He found that when rates of concordance among twins are examined in successive admissions rather than in resident populations the rate of concordance for the former is much lower than for the latter. This is attributed to the tendency for more severe cases to remain in the hospital and thereby cause an inflation of the concordance rate. Furthermore, in discordant monozygotic twins, as compared to concordant, fewer relatives were found to have schizophrenia. In general, in discordant pairs, the affected member suffered more often from reactive than from process schizophrenia and generally had a better prognosis. The question now is no longer whether genetics is important, but how does it bring about its effects. The discoveries of the genetic underpinnings of phenylketonuria, mongolism and other types of mental deficiency lead one to hope that the actual genetic deficiency in the functional psychoses may soon become known. On the other hand, the tendency for schizophrenic females to have more frequently schizophrenic mothers than schizophrenic fathers, and mutatis mutandis for schizophrenic males, point to the importance of such environmental factors as sex-identification, (40) or is it genetic linkage?

It should be recognized, however, that strictly speaking, there are no exclusively genetic or environmental disorders. All disorders are both genetically based and environmentally elicited. Without the hereditary-environmental interaction, no disease, in fact no development at all, would be possible. What then is meant by a hereditary disease and by an environmental disease? PKU is a hereditary disease in our particular social-cultural-physical environment because of the presence of phenylalanine in our diet. Had our diet been free of this substance the phenylketonurics in our society would never develop mental deficiency and, in fact, PKU would never have been discovered. On the other hand, if only the poor, or only the mountaineers
had developed this illness, and the error of metabolism were unknown, we would have regarded this illness as environmentally produced. Cassell, J. (13) has pointed out that in the North Carolina county which he is studying, and which is poverty-stricken, diet-poor, and otherwise environmentally deprived, there is a high prevalence of three diseases -- schizophrenia, tuberculosis, and suicide. He contends that these three illnesses are equivalent in his population, elicited by the poor environmental conditions and regards them as environmental diseases. In passing I have suggested that he give them one comprehensive name -- "Schizotubercide." In two of these illnesses, tuberculosis and schizophrenia, we have already obtained tentative evidence for a hereditary component. In the third no evidence for a hereditary component has yet been discovered.

Thus, a disease is regarded as hereditary in our particular SCP environment when the specific genotype of the patient is associated with a high probability of the development of the disease, but when the specific environmental factors required for eliciting the disease have not yet been established. In so far as at least some of the offspring may inherit the genetic defect and transmit it, the hereditary component of the illness must be recognized. On the other hand, a disease is regarded as environmental if most genotypes in our SCP environment will develop the illness when they are exposed to the specific environmental agents which have been identified as aetiological -- viz. -- the particular virus in measles; the double bind, if eventually verified, in schizophrenia, and the pattern of factors precipitating suicide, if indeed suicide be the end product of a disease.

Thus, a disease is regarded as definitely hereditary if we already have evidence of the presence of the specific genetic component and have not yet discovered the specific pattern of environmental components required for eliciting it. On the other hand, a disease is regarded as environmental if we have found the specific pattern of environmental components but have not yet discovered the pertinent genetic factors. In diseases where both the hereditary and environmental aetiology is known,
the question never arises. In the end, however, all diseases will probably be found to require both a genetic as well as an environmental component. Apparently, heredity is no more the cause of an illness than the automobile is the cause of an automobile accident. The interaction between specific hereditary and environmental factors required for the emergence of an illness must be sought if we are to detect the vulnerability of an individual before the illness overcomes him.

Genetics may be viewed as a biochemical mechanism in which the genes serve as precursors for the production of certain enzymes whose absence prevents the organism from prospering. There is, therefore, considerable hope that an investigation of the internal environment of the body may reveal the particular metabolic deficiency or excess which characterises the patient. A particular error of metabolism may, of course, be inherited or acquired. A considerable amount of effort has been spent in the attempt to relate schizophrenia to metabolic error. Certain fractions of schizophrenic blood have produced metabolic changes and changes in such behavior as rope-climbing in rats as well as transitory changes in the psychomotor behavior of normal human subjects. Presumably similar fractions from the blood of normals do not produce such changes.

Perhaps the most exciting new development, originating right here at McGill, is the discovery of the ability to manipulate behavior directly through implanted electrodes (34). This has given new significance to the work of the neurosurgeons who carried out psychosurgery in the late 40's and early 50's. The attempt to detect deviations in the neurophysiological substrate of mental patients through the means of electrodes implanted in various portions of the brain, by recording evoked potential or by introducing current through these electrodes, and the recording of evoked potentials from the intact brain through the scalp, are opening up new possibilities for the detection of the neurophysiological anomalies correlated with deviant behavior.
What kind of a mechanism can be suggested which might explain mental disorders from a neurophysiological point of view? Whether we assume a genetic basis, or some acquired metabolic imbalance, how can such mechanisms explain, for example, the types of behavior included under the rubric of schizophrenia. One of the models most attractive to behavioral investigators implicates three aspects of the central nervous system function - sensory afferents, the reticular activating system and cortical association activity or, if you wish - sensory input, alertness or arousal and memory storage. Without entering into specific brain localization problems, it seems that, as far as sensory thresholds are concerned, and as far as retrieval from memory storage is concerned, schizophrenics are for the most part, not notoriously different from normals. Whether they differ from normals in level of alertness or in lability is difficult to decide. Mednick as noted earlier postulates a difference in level, the schizophrenic showing a higher level of activation. My own inclination is to assume a difference in lability. This may explain the inordinate variability in response of schizophrenics. It is not that their responses to stimulation are intrinsically more variable, but since response varies with level of alertness, given a continuously varying level of activation, the response will vary accordingly.

But even if the level of alertness were not at fault, it is still possible that the three systems - input, storage and alertness, though each be intact in itself, may nevertheless interact differently in the case of schizophrenics. An interaction difference may explain such findings as greater latency in simple reaction time when the signal is switched from one modality to another, difficulties in sorting or in categorizing behavior, loss of set, etc. That the cortical-recticular interaction is an important component in the evaluation of incoming information has been demonstrated in a variety of animal experiments (22, 23). The interaction between sensory input and memory storage in the encoding and decoding of neural information, has been pointed to by Elkes.(15) He states following Neisser (33) that two
types of information processing may be distinguished — that which deals with serially presented single inputs and that which deals with simultaneously presented multiple inputs. The distinction is between asking questions one at a time and letting each answer determine the next question, or asking all the questions at once. Response to the latter may be a function of the multiply-connected "reticular mixing pool" and any negative or positive deviation in this substrate may account both for the failings of schizophrenics as well as for the successes of geniuses respectively.

The final scientific model is the epidemiological model, which seems to be a super-model including each of the above models as partial factors in the explanation of the mental disorders but requiring careful field studies to determine the relative role of each of them. Mental disorder is conceived as the end result of a series of probabilistic events, each of which must occur in interaction with others to produce the disorder, although the threshold value for each factor may differ from person to person and from one disorder to another. Thus, two people may have inherited the same predisposition, but because of differential stress, nutritional or deprivational factors will not both develop the illness. The virtue of epidemiology is that it takes in all possible factors ranging from radiation, paranatal existence, genetics, to social-cultural environment, etc. Thus, the epidemiological model both permits and requires the weighing of each of the submodels in the total picture of causation; the difficulties of assessing their relative importance, and of devising studies which will not overlook some of the factors, are too well known to need re-emphasizing here.

While many of the social-cultural, developmental, learning, genetic, biochemical and neurophysiological claims remain somewhat in doubt, they nevertheless lend credence to the possibility that the mental disorders will be found to be characterized by either the deviations which are now postulated by these models, or by deviations of the same general scope that have
not yet been postulated. Whether they are the cause or the effect of the disorder remains to be seen, but the testing of the hypotheses generated by these models depends to a large extent on the detection of some type of deviant behavior which characterizes the patient. The psychologist with his behavioral techniques is the court of last resort for probing the various hypotheses emanating from all of these models. How prepared is the psychologist to test these models behaviorally? How well can he meet the current challenge?

Our unpreparedness for dealing with these problems was brought home to me recently when some of my colleagues and I discussed the problem of designing a cross-cultural study on the incidence and prevalence of mental disorders. An actual proposal for this study was drawn up and I would like to present it to you.

The data on hospitalized mental patients as is well known show tremendous differences among countries and even within regions of the same country. The variability in incidence and prevalence rates has many sources of variation which are inevitable today, resulting from our lack of knowledge. Others inhere in the diagnostic task itself since in the last analysis, diagnosis is based on human decisions that are never flawless. But there are some sources of variation which are avoidable under properly controlled conditions. The assumption that the sources of irrelevant variation can be reduced was the underlying rationale selected for the proposed study.

A catalogue of the sources of these variations would include: (1) initial detection of mental illness; (2) theoretical assumptions regarding the nature of mental illness; (3) the specific methods of arriving at the diagnosis.

1. Initial detection of mental illness

The initial detection, rather than diagnosis, of mental disorders is made largely by laymen - the patient himself, his family, friends, neighbors, the
community and its public officials - policemen, sheriffs, etc. In the US and especially in the UK, because of the National Health Service, the general practitioner plays the role of a secondary screen, before the psychiatrist is brought in. Thus, at least the initial detection of mental illness is based largely on those aspects of the patient's behavior which deviate from expected social-cultural norms. As a result, social-cultural forces tend to bias the apparent prevalence of mental illness. While all illnesses suffer from this difficulty, as Joseph Berkson has pointed out, (7) there are certain criteria by which the presence or absence of most non-psychiatric illness can usually be established independently of the patient's behavior (actions, feelings, attitudes, emotions and thoughts). In most mental disorders, the patient's behavior is all we have as a basis for making diagnoses. To the degree that such deviant behavior constitutes the basis for suspected mental illness, environmental factors (cultural, social and physical) may inhibit or facilitate the bringing of certain types of patients to the psychiatrist for diagnosis. This is one reason why different cultural groups may show different rates of diagnosed mental illness; and this source of variability is definitely attributable to environmental influences.

An example of the cultural differences in initial detection or in diagnosis or in both is afforded by data recently provided by a cross-cultural study at McGill University. (32) They sent questionnaires to the network of psychiatrists and social scientists with whom they had established contact through their semi-annual review publication. This questionnaire contained a list of 26 symptoms or signs, inquired about the main locale in which the respondent worked, and made his observations, and the cultural group which predominated in his practice or field work and included a variety of other questions. The results indicated that the following items were never reported as infrequent in schizophrenics: (1) social and emotional withdrawal, (2) auditory hallucinations, (3) delusions (in general) and (4) flatness of affect. These 4 symptoms reportedly occur trans-culturally but in the remaining 22 items out of the 26, definite associations were found
between frequency of reported appearance of a symptom and some broad socio-cultural grouping. Thus, delusions of destruction and religious delusions are quite infrequently reported except in Christians and Muslims. Visual hallucinations apparently appear most often in African and near Eastern groups and delusions of jealousy are most common in Asians, irrespective of religion. Depersonalization seems to be most frequent in urban populations while delusions of grandeur are most frequent in rural populations.

Since this study was based on a questionnaire, it is not clear whether the traits under examination differ in frequency among the different socio-cultural groupings or whether social-cultural factors biased the answers to the questionnaire.

The role of the general practitioner in referring patients in the UK was studied by Rainsley and Loudon (39). Substantial variation in rate of referral among practitioners was found which could not be accounted for by specific social and demographic factors, selective recruitment of psychiatric patients, clinical severity, diagnosis, age, civil state, or occupation. General social and attitudinal factors on the part of the general practitioner and the community were largely responsible for the variation in referral rate.

2. Theoretical assumptions regarding the nature of mental illness

The theoretical models for the mental disorders that now vie for acceptance are so many that this is hardly the place to review them. We shall limit ourselves to a few and illustrate their implication for diagnosis. One school of psychiatry denies any specificity to mental disorders, maintaining that there is only one kind - the failure to adapt or adjust to the environment. Diagnosis is either impossible or of no value in this system.

At the opposite end of the spectrum is the school which maintains that psychiatric diagnoses are based on pathognomonic factors or syndromes of such factors
which are universally characteristic of each category of disease in all environments. While there is substantial agreement in this school regarding the universality of symptoms of psychosis, especially the frank psychoses, the agreement regarding neurosis, character and personality disorders is far from unanimous.

Between these two extremes there are various compromises. In the middle of the range may be found the point of view which assumes that until indices that are independent of behavior become available (as was the case for general paresis, pellagra with psychos, mongolism, PKU, etc.) we shall have to depend on behavioral deviations from social-cultural norms for our diagnoses. Since these deviations are so highly dependent on the environmental context which provides their frame of reference, different environments may well elicit different types of deviation, and cross-environmental comparisons would be impossible.

If we exclude the first school of thought, which denies the usefulness of diagnosis entirely, the two other points of view both agree that there is more to mental illness than the deviations from the expected norms. There must be in addition some vulnerability, perhaps in the neurophysiological substrate which characterizes those who develop mental illness. If part of this neurophysiological substrate is relatively free of differential social-cultural forces it may be useful as an independent criterion in the diagnosis of the mental disorders.

3. Specific methods of arriving at detection and diagnosis

Even if the environmental forces elicited the same or similar types of deviation from a patient regardless of his country of residence or socio-economic level, we could not achieve diagnostic comparability. The individual factors in the patient's behavior are weighted so differently by the family, the community and the diagnosing psychiatrist that a consequent increase in
the variability of detection and diagnosis must result. In so far as the social-cultural norms differ from country to country and even within different regions of the same country, it is to be expected that deviations from such shifting frameworks can not be directly comparable. Even the self-reports (or absence of reports) of inner feelings that are elicited by the psychiatrist are culturally influenced and interpreted by both the patient as well as the examiner, which again may lead to increased variability across cultures.

Still another source of variability comes from the differences in diagnostic procedures and labels attached to the same patients by different examiners even within the same culture and sometimes even within the same hospital.

The unreliability of psychiatric diagnoses has been documented in a multitude of studies. As an example of such studies one can point to the recent investigations of Beck, et al., (4). They found that agreement was reached in only 54% of the cases, but that there was almost perfect agreement for a specific symptom (depth of depression), an indication that for observations of behavior good agreement exists. Two-thirds of the disagreements seemed to be chargeable to the nosological systems itself which in addition to its lack of clear criteria requires impractically fine distinctions (e.g. between psychophysiological reaction and conversion reaction) and which forces decisions between neurotic symptoms and personality disorder when both are present. The remaining third of the discrepancies were attributable to variability in procedure on the part of the examiners.

Kreitman, (25) has reviewed the studies in which different observers examined the same patients or comparable groups of patients. He found only 5 studies of this type in the literature, a testimony to the fact that careful studies of reliability of diagnosis are rare. In all but one of these studies, the examinations that were compared with repeated examinations. In only one study were the patients observed simultaneously.
by the same group of observers, as is planned in the proposed project. The percentages of agreement varied with the different diagnostic groupings. When broad groupings were used, agreement ranged from 89% to 50% for the psychoses; from 46% to 24% for the neuroses. For the more specific diagnoses, the agreement was lower. Pasamanick (36) allotted after ward assignment to groups of female patients quite homogeneous in age, residence, educational status, type of admission and marital status, who had been admitted to the same hospital had been randomly assigned to the different wards. The greatest discrepancy in diagnosis between the wards was for neurosis and character disorders. The organic disorders seemed to have drawn the highest agreement in all the studies.

These sources of variation will continue to plague us until science has made more progress in this field. Meantime, how can we reduce the variability in the making of diagnoses? Perhaps the most useful approach today is to objectify the methods now in use as far as possible. In order to establish a more objective criterion for detection and diagnosis, a careful investigation of the methods used to arrive at a diagnosis must be undertaken under comparable conditions and by more than one investigator so that the evidence for deviation in behavior, and its interpretation, can be arrived at through an examination of the data obtained by the individual investigators. Secondly, in order to buttress the data provided by interviews, investigations of the physiological, sensory, perceptual, psychomotor and conceptual responses of the patients under laboratory conditions must be undertaken, as well as carefully controlled anamnesis, investigations of family and social interaction, of biochemical and generic factors and of other pertinent variables.

The rationale for this study is, therefore, the assumption that by objectifying diagnostic procedures we may be able to remove many of the sources of variability which now plague comparative epidemiology.

While we have come a long way from the days when
mental disorders were regarded as variations of the same underlying general illness, progress in the objective differentiation of specific mental disorders has been painfully slow. Perhaps we can hurry along the scientific historical process by means of objective investigations to clarify the clinical dilemma. Although the naturally developing historical process may itself be sufficient to resolve the discrepancies, it will be a long delayed hope, for the historical road is beset with traps. The desire to hasten the historical process is the motivating force for this study.

The basic rationale for the proposed study is that the detection and diagnosis of mental disorders today depend to a significant extent on aspects of behavior of the individual which deviate from social-cultural norms. These deviations constitute the symptoms on the basis of which the diagnosis is made. Some of these symptoms may be found to be universally characteristic of patients across all cultures, others may be more culture-dependent. In the case of those categories of illness whose characteristics seem to be independent of culture there should be no difficulty in identifying similar disorders in different cultures. For those disorders which are manifested in behaviors that are culture-bound, it will be very difficult to identify similar disorders in different cultures since their characteristic behaviors will, of course, be different. The first step in the direction of preparing tools for improving diagnosis is to develop objective measures for detecting deviations from expected behavior in the particular cultural milieu in which the patient finds himself. For this purpose systematic interviewing with objective recording of behavior during the interview and with objective evaluation of the content of the interview is necessary if comparable results are to be obtained for different interviewers.

However, there is more to mental disorder than this externally observable deviation in behavior. Unless we find the additional factors which underlie the external behavior we will never be able to make comparisons across cultures except for those illnesses which have behavioral characteristics which are universal despite
culture. What can these additional factors be? Apparently, if one made the assumption that underlying the externally observable behavior there is a graded vulnerability which differentiates those who develop the illness from those who do not, it might perhaps be possible to obtain indicators of this vulnerability which are culture-free or culture-fair. By culture-free measures we mean those which characterize a vulnerable individual but which remain immune to environmental influences. If such techniques are not discovered we could settle for culture-fair measures by which we mean measures that though amenable to the influence of cultural forces nevertheless still permit the detection of vulnerability across cultures.

What is the nature of this vulnerability? It may have a hereditary basis, or it may develop as a result of trauma-producing experiences very early in life or perhaps even in the intra-uterine existence. This is no place to argue the question as to the origin of the vulnerability, but it is necessary to recognize that some assumption regarding vulnerability is important for analyzing the development of deviant behavior of the type we call mental disorders.

We have two choices before us. If we assume that this vulnerability is produced by environmental stresses and strains then it might be possible to subject individuals to a variety of stimuli of a noxious sort to determine their response to such stimulation. It would be ideal, of course, to perform such studies on neonates so as to determine which individuals seem to be more sensitive to stress-producing loads. This, however, is a hazardous procedure, and further we cannot tell whether the immediate response to the stress-producing load will be indicative of future responses since it is the repeated presentation of such stimuli which may be basic to the development of vulnerability. On the other hand, to try to determine a genetic basis for this susceptibility is again a problem which is beyond us at the present time. For this reason, we might avoid the problem of the etiology of these conditions and simply test in the early adult schizophrenic for signs of deviation
in some culture-free or culture-fair response that would indicate his vulnerability. Whether this deviation is the cause or the result of the illness cannot be determined. However, if longitudinal studies reveal the presence of these deviations in individuals before their clinical symptoms appear, we may have more faith in the possibility that they are not produced by the illness. One area for the investigation of such indices is the biochemical analysis of the body fluids. This is now rather widely investigated, and is hopefully yielding results that will be of interest. A second approach is to try to examine the neurophysiological response system which may yield indicators of vulnerability. In this study we propose to make a thorough sampling of those techniques which have been proposed as possible indicators of deviancy in patients as opposed to normals and in this fashion try to develop a battery of techniques that might differentiate the vulnerable from the non-vulnerable. Hopefully, this technique would not be as amenable to the influences of cultural forces as are the behaviors which are now used for diagnostic purposes.

A third approach is in the behavioral area but is limited to responses which occur within the first 1,000 milliseconds of the application of a stimulus. It is hypothesized that such events are not as readily influenced by culture and experience as are events lasting longer. But even, if they do bear a cultural impress, they transpire so rapidly that the cultural-experiential impact cannot loom very high. For example, the startle pattern seems to be a transcultural response to a sudden noise, parts of which, the eye blink, occurs within the first 40 milliseconds after stimulation on the average and seems to be relatively free of habituation. The entire startle response seems to be finished by about 1500 milliseconds after stimulation. While the psychopathological correlates of startle (Landis, C. and Hunt, W.A. The Startle Pattern, New York: Farrar and Rinehart, Inc., 1939) are not very striking, other types of responses that occur in the first 1,000 millisecond range do seem to be promising (Zubin, J. Introduction to Symposium on the First 1,000 Milliseconds. Annual Meeting of the American Psychological Association,
1963). Among these are: reaction time studies (11, 2) dichotic click stimulation (Babkoff, H. & Sutton, S. The effects of noise on dichotic temporal resolution. New York; 1963.) A pilot application of this method to schizophrenic and matched controls has yielded a significant differential; pupillographic studies (Hakerem, G., Sutton S. and Zubin, J. Pupillary reactions to light in Schizophrenic patients and normals. Annls. N.Y. Acad. Sci. (in press)

There is a hypothesis which finds favor with many American psychiatrists and psychologists that certain illnesses which may result from continued exposure to noxious stimulation may not exhibit initially any neurophysiological or biochemical signs. In such cases, a thorough survey of the historical development of the individual would have to be undertaken in order to identify the experiences which lay behind the development of the disorder. The decision whether to adopt the assumption of initial vulnerability or to reject it must be made on the basis of strategy rather than possibility. The assumption that traumatic experiences produce the illness without the help of any original hypersensitivity or vulnerability is not as susceptible to experimental testing as is the assumption that the patient possesses certain vulnerabilities which have led to the illness.

The latter requires direct experimental exploration of some leads which already exist. The former requires a retrospective analysis of past experience or a longitudinal prospective study of potentially mentally ill individuals - a much more difficult if not impossible task. However, adopting the assumption that there is some vulnerability in each patient to begin with, we may discover some patients in whom no vulnerability seems to be present and these might be the individuals who upon closer examination would reveal a life history which was quite deviant and subjected to many more traumatic experiences than those who do not develop the illness.

Let us assume that there are certain number of different types of vulnerable individuals (ABC...) in our culture (Culture I) and a certain number of types of non-vulnerable individual (NOP...). Perhaps these
types will be discovered through certain profiles of characteristics which each type exhibits over a variety of culture-free measures. Let us further postulate that individuals of Type A vulnerability in Culture I will exhibit a type of deviant (psychopathological) behavior which we designate as pattern I, whereas individuals belonging to type N exhibit non-deviant (Normal) behavior pattern II under Culture I. It is possible that in Culture II, things may be reversed, Type A may behave normally and Type N may exhibit deviant patterns. For example, if Type A has the inborn error of metabolism which will produce PKU, since Culture I provides a diet containing phenylalanine, etc., Type A will develop mental deficiency. On the other hand, in an individual of Type A living in Culture II which is free of phenylalanine, a normal pattern of behavior will develop. Similarly, if C represents a genotype vulnerable to neurosis, and 3 represents phobic behavior, it may be possible that in Culture I,

Table 1

Theoretical relationships between types of vulnerability and types of behavior under a variety of socio-cultural-physical environments.

<table>
<thead>
<tr>
<th>ENVIRONMENTS</th>
<th>I</th>
<th>II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Behavior</td>
<td>1</td>
<td>2</td>
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<tr>
<td>Type of Behavior</td>
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...
the result will be C3, i.e. the genotype C will develop phobias while in Culture II, C10 may result, i.e. genotype C may be normal. In these examples we have regarded the vulnerability types as genotypes, but the vulnerability may be phenotypical, having developed as a result of intra-uterine trauma or other environmental factor.

It will be seen that according to Table I any one of the vulnerability types (A, B, C...) could possibly be associated with any one of the psychopathological or normal behavior patterns, depending on the social-cultural-physical pressures. Similarly, any one who is characterized by psychopathology pattern 1 or 2 etc. could possibly possess one or another of the vulnerable or non-vulnerable substrates.

By providing objective measures of vulnerability and of expressed psychopathology or normality the differential effect of socio-cultural factors can be evaluated in an objective way.

It will be noted that Table 1 includes four types of individuals: (1) those who are vulnerable in Culture I and exhibit psychopathology e.g. A1, B2, etc., -- the mentally ill; (2) those who are not vulnerable in Culture I but who temporarily exhibit psychopathology N1, O3 -- the pseudo-mentally ill; (3) those who are vulnerable but do not exhibit any overt psychopathology -- A10, B12 ... etc. -- the latent cases; and (4) those who neither are vulnerable nor exhibit psychopathology N10, P12 -- the mentally well.

The visibility or the detection of the individuals who are vulnerable as well as of the overtly psychopathological depends to a large extent on the culture in which they live. Since the tolerance of communities for eccentricity varies considerably from culture to culture, the number of detected individuals belonging to the vulnerable and psychopathological class will also vary. Thus, the alleged greater tolerance for eccentricity in the UK and the lesser tolerance for drug addiction and alcoholism in the USA may explain in
part some of the discrepancies in incidence rates. If
objective indicators of vulnerability and deviant behavior
become available as a result of the proposed study,
future population studies can be made more comparable
across cultures. Let us now turn to the available cul-
ture-dependent and culture-free techniques.

a. The culture-dependent techniques

(1) Observational and Interview Techniques

If we accept the assumption that mental disorders
are now detected and diagnosed on the basis of social-
cultural deviations, it becomes necessary to develop
techniques and instruments for objectively measuring
such deviations. The clinical interview which now
constitutes the basis for diagnosis is an unstructured
free-floating interview which varies from clinician to
clinician and which is unsuited to the purposes of sci-
tific investigation.

Unless a systematic procedure is introduced for
collecting information, diagnoses will vary from ob-
server to observer even for the same patient. In order
to increase agreement among observers four controlled
procedures are being developed: (1) the Mental Status
Schedule; (2) the Social Adaptation Schedule; (3) the
Structured Clinical Interview and (4) the Ward Behavior
Inventory.

The application of rating scales to the classification
of mental patients has a long history despite its relati-
vely recent development. Father Moore (30) was one
of the first to rate the behavior notes in case history
material. He factor-analyzed the results, arriving at
dimensions not unlike those which Kraepelin had de-
veloped earlier through clinical observation. The
Malamud-Sands scale was the next one to be developed.
Since then, Lorr (26) and Wittenborn (56) have provided
scales for psychiatrists for rating the behavior of mental
patients. (a) Mental Status Schedule. (50)

This technique consists of an interview Schedule
for the mental status examination and a matching inventory of 248 dichotomous items descriptive of small units of pathological behavior. The schedule contains questions arranged in a definite sequence designed to provide for follow-up of incomplete responses. Most of the questions are open ended so as to encourage the patient to reveal his own mentation. Properly administered, the interview has the "feel" of the clinical evaluation. However, unlike the usual clinical interview the provision of a specific schedule of questions, a fixed order of presentation, and a uniform coverage of the same areas of psychopathology with each patient make it more likely that the differences observed will be due to actual differences among patients rather than to different interviewing procedures. This technique yielded reliabilities of the order of .90 or more when several groups of patients were evaluated independently by three psychiatrists. Moreover, it has distinguished significantly between the amount of psychopathology shown by inpatients, clinic outpatients and former inpatients on follow-up.

(b) Social Adaptation Schedule

This technique follows the form of the Mental Status Schedule in that the patient is examined by means of a structured interview and observations are recorded on an inventory of dichotomous items descriptive of small units of pathological behavior. However, it differs from the examination of the mental status in that the focus is not on symptomatology but on the presence of disturbed functioning as seen mainly in disturbances in social adaptation. The patient is examined for evidence of disturbed functioning in any of the following areas of adaptation: 1) use of leisure time, 2) friendship patterns and involvement in social activities, 3) work adjustment, 4) sexual and marital adjustment, 5) school or vocational training and 6) level of aspiration. The technique has been designed so that it can be used to supplement the examination of the mental status or can be used on a separate occasion as an independent instrument.

With regard to the anamnnesia, we have not yet developed an instrument for this area. It is important,
however, to realize that obtaining information on the entire spectrum of a person's developmental history is a research task of the first magnitude. In the experimental approach to this problem it is necessary to develop techniques which will focus on particular critical periods in the history of the individual. It is proposed to begin with a focussed interview dealing with the question of the status of the patient a year before he came for help and by focussing on this particular period, arrive at more objective information. A second focus might be the adolescent friendship patterns of the patient, since in some current research we have found this phase of development important in prognosis, especially with regard to type of onset. A third focus might bear on early childhood, especially based on history obtained from the family. In all of these aspects of the anamnesis, at least two members of the family ought to be interviewed for cross-checking purposes. While this may sound impractical for everyday use, it should not be beyond the range of a research project. In fact, the Katz Adjustment Scales (24) are based upon interviews with relatives of patients. Hopefully, the more intensive methods used in this research can form the basis for more practical approaches in the future.

(c) Structured Clinical Inventory (10)

This instrument is similar in form to the Mental Status Schedule but differs from it in purpose. Instead of focussing on mental status evaluation, it focusses on the general social and psychological adjustment of the patient and is intended primarily for use by the social scientist. Emphasis is placed on evoking immediate and salient pathology rather than on probing for a wide range of specific information as with the Mental Status Schedule.

(d) Ward Behavior Inventory (9)

This instrument capitalizes on the observational opportunities afforded nurses and ward-attendants in everyday contact with the patients. The WBI consists of 150 items rated true or not true. All the items
describe observable behaviors as seen during a 48-hour span of observation. Neither retrospective material nor dynamic inferences are included. Total scores reflect global pathology and provide evidence of change in response to treatment. The Ward Behavior Inventory has proved itself reliable when raters are properly trained and motivated (Burdock, Hakerem, Hardesty and Zubin, 1960). Reliability coefficients ranged from .40 for untrained raters to .84 for well-trained and well motivated observers. Follow-up studies indicate that the global pathology score correlates at a low but significant level with outcome in terms of length of time out of hospital. WBI scores of 107 patients followed for 1 year had a correlation of .23 with an Outcome Index (1961).

Several drug studies have proved the instrument sensitive to change. Among these are the NIMH 9-hospital collaborative study of phenothiazine therapy conducted by the Psychopharmacology Service Center (14) and an unpublished study of the efficacy of a psychic energizer for seniles. Future work with the WBI will focus on analysis of patterns of items and identification of cluster of patients possessing similar symptomatology.

(2) Conceptual techniques

(a) Verbal behavior

Another conceptual or experience-bound area involves verbal behavior experiments in which the output of the interviewer is manipulated through reinforcement techniques to yield measures of self-referred affect. Apparently patients differ from normals only in one aspect of verbal behavior in these experiments -- in their tendency to extinguish more quickly after reinforcement is discontinued. (44)

A measure of comprehensibility of schizophrenic speech has become available through the use of the "cloze" procedure. This technique demonstrated that the speech of schizophrenic patients is less predictable than that of matched normal subjects. This was shown to hold for early as well as chronic schizophrenics. (45)
Another conceptual measure which differentiates schizophrenics from normals is reading under the load of delayed auditory feedback. The female schizophrenics are more retarded than normal female controls in rate of reading while the male schizophrenics make many more errors than male normal controls under the influence of D.A.F.

Interviews with patients and informants close to the patient have been used to obtain information on performance and interaction within the household and in other primary social groups, for the classification of patients in terms of social role.

Standardized interview procedures have been used to obtain samples of speech behavior to be analyzed in terms of certain measures of vocabulary and grammatical structure for comparison with normal individuals of the same sub-linguistic (dialect) background.

(b) Thinking Disorder

A series of conceptual tests have been developed to detect deviation in the thinking processes of the schizophrenic. The Metalog Test, (11) which measures ability to shift, and a variety of sorting tasks have been utilized in the investigation of schizophrenia with special reference to over-inclusiveness, anomalous grammatical structure, etc.

The use of psychological tests as adjuncts to diagnosis dated back to Kraepelin's clinic. For the most part, the tests in use today, e.g. intelligence tests, vocabulary, sorting tests, projective tests, etc. depend heavily on social-cultural influences. A review of these tests would constitute a review of the armamentarium which clinical psychology has developed. As an example of one of the techniques which has proved useful in the diagnosis of psychotics, one can point to the work of Payne. (38) By utilizing a variety of conceptual tests Payne was able to differentiate three main aspects of thought disorder in psychotic patients: abnormal slowness or 'retardation,' 'over-inclusion' and 'concrete
ness. The schizophrenic group stood highest in over-inclusion, but did not differ from a depressed group in 'retardation,' while 'concreteness' did not show up as a characteristic of any psychotic illness.

(3) Sociological variables

In connection with an ongoing study of the residents of an Old Age Home, techniques have been developed for the investigation of the degree of isolation experienced by an individual and its significance for subsequent adjustment to a home for the aged. (55) Similarly, techniques for the measurement of persuasability, conformity, and integration have been developed. These techniques are perhaps the most significant for discovering the types of social-cultural deviations which relate to mental disorders. In the aged it was found for example, that the senile dementia cases proved to be quite conforming while the functionally ill were very low in conformity.

In the same vein, patients with senile dementia made a positive evaluation of a home for the aged while patients with functional psychiatric disorders evaluated the home negatively. On a measure of integration into the activities of the home and on a scale of anomic both types of mental patients rated lower than the normal residents. Neither group differed from the normals in persuasability. With techniques such as these we can discover the specific dimensions in which various types of the mentally ill deviate from social-cultural norms.

(4) Anthropological variables

While a comparison of American culture with such a closely similar culture as the British will probably not reveal differences as dramatic as comparison with an exotic culture, it is nevertheless important to identify differences that may contribute to the discrepancy in the rates of the mental disorders. At all events, since at least the detection of mental illness is highly influenced by cultural forces, care must be taken to determine the equivalence between the two countries.
with regard to such general customs as greeting, bereavement, courtship and other characteristics of social interaction.

In order to obtain the molecular characteristics which distinguish a measuring instrument, it will be necessary to find the concrete behavioral equivalents in the two cultures which characterize the categories found useful in detecting psychopathology. It will be necessary also to evaluate the relative importance within the different cultural systems of the corresponding concrete behaviors. To these ends careful anthropological investigation will be required. In attempting to establish normative base lines it would also be useful to assess the particular social-cultural milieu of the patient and the nature of the social groupings in which the patient has been a member. Questions should be formulated on the patient's household - its members, their activities, their child rearing practices, their contact with the patient, with each other, and with others outside the household; on the patient's employment in terms of social structural considerations - coworkers he was in contact with, the nature of his and their contact, etc.; and similarly with respect to other major involvements of the patient. With all of this, there should also be obtained a description of overall behavior -- not merely of the symptomatic behavior, but of the ordinary behavior of the patient.

Such information should be obtained from several informants.

The patient's entry into the hospital should be systematically observed, perhaps in terms of a simple interaction framework, which can be used also by observers of his initial interview and of his behavior on the ward. Another approach, which should be seen as complementary rather than alternative, is the direct intensive study of several selected subcultural groups for the careful establishment of behavioral, structural and evaluative norms relevant to the mental patient's behavior and to his incorporation in a community. As a supplement to these approaches, it might be useful to explore the possible value of such techniques as
the semantic differential (35) in comparing mental patients with culturally similar normal subjects. Such comparisons would yield information regarding attitudes, personal value systems and conceptual frameworks in which the patients deviate from the normals.

(c) Culture-free or culture-fair techniques

In order to simplify the presentation of the variety of techniques available for evaluating pathology in ways that are culture-free or culture-fair, a table* has been devised which presents the variety of responses the subject is capable of, and the types of stimulation which may be used to elicit these kinds of behavior (58)

It can be readily seen that as one ascends the columns of the table referred to above, one begins to get involved more and more with culturally determined responses but even the lowest rung on the ladder -- the physiological -- is not always entirely free of social-cultural influences. However, it seems plausible that, for example, the effect of hyperventilation on the EEG is less dependent upon culture than is speed of reading on the Stroop Cards. Some of the behavioral techniques which we have developed and which fall in this category of being less dependent on social-cultural norms are (1) pupillography (2) cross-modality reaction time and (3) some measures of temporal resolution in vision and audition.

Most clinically oriented workers wonder how functions so far removed from overt behavioral deviations can help in diagnosis. This has been trenchantly pointed out by Cartwright, Kirtner and Fiske, in a recent report (12). They say, "The business of neurosis and recovery exists and is exhibited only in the contexts of the self, family, friends, employers, and clinical practitioners;... A desirable conceptual variable in the domain of neurosis and recovery through psychotherapy would likely have at least one principal quality: observers in different roles can systematically agree or disagree about it. A second prerequisite would be that of inherent meaningfulness. All observers might

*Due to the complexity of the table, the reader is referred to the publication listed as Number 11 in the references (page 44)
easily agree that, following a sudden loud noise, a patient's galvanic skin response has changed in a certain direction and amount. But what such a change might signify would be unclear. In particular, its relevance to daily functioning in ordinary interaction with others is in doubt. Yet it is precisely for such daily functioning that the appropriate conceptual variables must have inherent meaningfulness.

It is apparent that an insatiable curiosity motivates these writers. We still don't know why the Wasserman test works, nor how aspirin brings about its effects. Why we should demand more from neurophysiological techniques before they are accepted as diagnostic aids in the mental disorders, is beyond my comprehension.

The culture free measures can serve two functions: first, though no measures can be said to be completely culture-free, the way in which culture might affect such measures as pupillary response to light stimuli is indirect, unlike the direct way in which culture influences primarily conceptual measures like vocabulary. The major way in which culture will tend to influence the culture-fair tests is likely to lie not in the function under measurement but in the subject's approach to the testing situation -- e.g., in the subject's understanding of the purpose of the test, in the degree of fear experienced, in his motivation, attention and cooperation, etc. -- in other words, specifically in those variables which also tend to contaminate comparisons of schizophrenics and normals even when they come from the same cultural background. But it is these very contaminations that the experimental culture-fair techniques have been constructed to minimize.*

* Such designs include obtaining complete functions, rather than isolated points of measurement for each individual, comparisons of slopes of functions rather than level, the measurement of functions under idling state conditions and under load conditions, and finally, the use of the range of variation within a population as a basis for assessing observed deviation.
Secondly, to the extent that it is possible to minimize cultural influences on such measures, the findings may reflect the presence of organic factors relatively independent of social-cultural aetiology in at least some part of the mentally ill population. One may then use similarity in response on the psychophysiological measures as part of the pattern of behavioral characteristics which may prove to be invariant across socio-cultural boundaries.

This culture-fair substrate which underlies the behavior of groups of mentally ill patients may also be used to investigate the possible differential effects of culture on behavior. If the underlying organic factors are identified, the individuals who are characterized by these factors and who exhibit behavior pathology can be compared with those who do not, to determine the types of differential interaction between physiological and cultural factors which led to pathology in one group but not in the other group.

This interaction between physiological and cultural factors is only one aspect of the interaction possible in our heuristic table in which the physiological, sensory, perceptual, psychomotor and conceptual responses are elicited by energy or symbol stimuli.

In actual experience, these heuristic elements do not occur in isolation any more than the chemical elements occur in the pure state in nature. For example, the experience of fear involves the entire spectrum of responses from physiological to conceptual. Following the usual analysis the sight (sensation and perception) of a fear inducing object, usually leads to an immediate appraisal of its dangerous character (conceptual based on stored memories) and is accompanied by visceral (physiological) excitation and may lead to flight (psychomotor). It has been possible to demonstrate experimentally that in order to obtain a "true" emotional experience, all of these levels of response are essential. Thus, merely inducing the physiological component through the injection of adrenaline will not evoke a true emotion (Maranon, 1924) nor
will the induction of an emotional mood by means of moving picture episodes lead to a true emotion when the physiological component is blocked (Schachter and eeler, 1962). The required interaction between sensory and conceptual responses is attested to by the recently developed detection theory of Tanner & Swets (1954) in which a manipulation of expectancy (a conceptual component) can vary the neural events which constitute the basis for the criterion of the threshold. The placebo effect, especially in pain studies, had been shown to be a reflection of conceptual expectancy. Even in animal experiments, such as Harlow's (1962) monkeys or Birch's (1956) rats, the role of stored memories in determining the response to stimulation is well known. The role of the interaction between physiological and conceptual components in therapy, especially in behavioral therapy, is now in the focus of attention.(59)

While the conceptual component, representing the stored memories of previous experience, seems to enter into most responses and thus there is always the chance that cultural effects will contaminate our search for culture-free or culture-fair techniques, it may be possible to reduce the conceptual component to a minimum, if not to exclude it entirely. Examples of such responses are the higher activation levels of early schizophrenics, which Mednick (1958) and others postulate. Even more free of cultural influences is Shagass' technique (Shagass and Schwartz, 1961) of measuring evoked cortical potentials to two rapidly succeeding stimulations of the ulnar nerve. The ratio of the voltages of the first evoked potential to the second differentiates schizophrenics from neurotics and normals. Finally, the linking of body fluids to psychoses may present another culture-free or culture-fair differential.

With the aid of objective measures of both varieties -- the culture-bound as well as the culture-free -- a new approach can be made to the development of more homogeneous diagnostic groupings. At the present time, much of the research in psychopathology suffers from the great heterogeneity which characterizes today
diagnostic classifications. Even when there is full agreement on the part of a diagnostic team regarding such diagnoses as schizophrenia or neurosis, the individual patients in each category are far from a homogeneous group even with respect to the variables which presumably characterize each category. Bleuler has pointed to this fact by substituting for Kraepelin's Dementia Praecox, the term, Groups of Schizophrenias. The heterogeneity in the category of neurosis is too well known to require documentation.

Heretofore, the technique applied to the statistical classification of patients has been factor analysis, either direct or inverse, of the correlations obtained from a sample including rotation to simple structure. Such techniques are elegant and quite suitable if the underlying population from which the sample is drawn has a multivariate normal distribution. Were this the case, there would be no need to search for better classifications, because to begin with, our population is already homogeneous. However, if we start with an assumption of homogeneity and wind up with a conclusion of heterogeneity, the only justifiable procedure is to reject factor analysis as inapplicable. For this reason, once heterogeneity is established, we discard factor analysis and base our new analysis on the test profile of each patient expressed in standard scores. The usual method of correlating profiles (inverse factor analysis) takes into consideration only the shape of the profiles and neglects entirely the distance between profiles. For this reason, we deal with two measures of distance: discrepancy in shape and discrepancy in level and group together all patients who show the greatest similarity with respect to these two measures. In this way, under certain assumptions (normality of multivariate distributions as well as zero correlation within each subgroup) a fractionation of the sample into homogeneous subgroups becomes possible. (Zubin, Fleiss & Burdock, 1962).

Summary

The behavioral changes which accompany the development of mental disorder have been classified into two major divisions: culture-bound and culture-
free or culture-fair. Present day methods of detecting and diagnosing mental disorder are largely based on culturally deviant types of behavior so that there is a need for developing culture-free or culture-fair techniques. Even the culture-bound techniques, however, suffer unduly from variations in their application which produce diagnostic variability that could be reduced by proper controls. Methods for introducing such controls are provided through such techniques as standard interviews and inventories of behavior that can be objectively scored and evaluated. Experimental methods have been developed for studying verbal behavior itself, the carrier-wave of our culture. These can be applied to differentiating diagnostic groups. Advances in the development of culture-free techniques are not as great. Yet, certain derivatives of reaction-time studies, pupillography, evoked potentials to ulnar stimulation, etc., promise well to provide us with serviceable tools. When these objective methods are applied to populations of mentally ill, the new techniques for fractionating populations into homogeneous subgroups may yield new classifications of the mentally ill which will be more homogeneous and more suitable for future investigations.

References


52. and Zubin, J. Effect of sequence on reaction time in schizophrenia. Presented at the International Colloquium on Biological Basis of Age Changes in the Speed of Behavior, St. John's College, Cambridge, England, August, 1963.


Prof. Zubin's paper on the behavioral concomitance of the mental disorders presents in effect, a program for a research strategy, it maps the plan of attack on the epidemiology and possible etiology of mental illness. The elements of Prof. Zubin's program, as I did understand it, are these: 1) A recognition that the identification and diagnosis of mental illness depends primarily on a social-cultural norm. Morbidity is established by social failure. 2) A recognition of great variation in the incidence and prevalence of mental illness in different cultural milieus, a variation which results from many causes and mitigates against the development of an orderly epidemiology of mental diseases. 3) An adoption of a concept of vulnerability or susceptibility. 4) The development of objective indicators of or measures of this vulnerability, measures which are either culture-bound in a known way or to a large extent culture-free. 5) The hope is that such procedures will lead to the development of diagnostic classifications for mental disease that serve more adequately than those that exist at present for the purposes of scientific inquiry and discovery. It is clearly an ambitious program, with far reaching implications and premises. At the level of comment the possibility of moving in the direction of a proper epidemiology of mental disorders is a most intriguing one; how far in the future its realization may be.

Anyone who has examined the available statistics of mental diseases in Canada, the United States or elsewhere knows that because of problems of classification reporting, and numerous cultural factors, these statistics are of virtually no interest at all from the scientific point of view, however useful they may
be for the bureaucrat, the administrator and the promoter. If by some means, as Prof. Zubin suggests, a way can be found to objectively and meaningfully find in a simple, reliable and preferably culture-free manner either vulnerability to or the presence of specific mental disease entities, then a proper epidemiology of mental diseases would have an opportunity to emerge. Such an epidemiology would permit the making of substantive statements about trends, psychical variations, cross-cultural comparisons and functional relations between variables. All this, I think, would contribute much to an understanding of the mental disorders.

A critical point in Prof. Zubin's program is acceptance of the view. He did not say this, but it was in his previous paper, commonly held among researchers, that present classificatory systems for mental disorders are not much good for research purposes, although having some make-shift utility for therapeutic, legal or other social purposes. Why is this so? The answer is obvious. A classificatory system is the product of clinical observation, the direct observation of behaviour and little else. It is phenomenological, holistic, concerned with the whole person and his welfare and shot through with ensuant impressions of causal connections of a social and developmental cause.

While this classificatory system may serve a valuable purpose at a certain stage of inquiry, its usefulness diminishes as the science becomes more analytical, quantitative and concerned with questions of a specific etiology of a genetic and neurophysiological type. What seems to be occurring here or, perhaps, what Prof. Zubin would like to see occur, finds its parallel in the classificatory system of many other branches of science and is indeed a persisting feature of the scientific enterprise.

Implicit in all this is a widening divergence of view between the clinician and the research worker.
On this issue I have about reached the position that a clinical orientation and clinical training are not only unrelated, but are in fact incompatible with research orientation and research training, except for those few rare souls who are able to live without conflict in both worlds at once. This problem, and it is clearly a central problem in modern psychology, and perhaps psychiatry as well, has recently been discussed in an interesting paper by Jane Lovinger in the May (1963) issue of the American Psychologist, called: "Conflict of commitment in clinical research". Since I think that I understand both sides of this issue and am sympathetic towards both sides and am indeed on both sides, this is a condition which, I think, is sometimes known as "sitting on both sides of a fence at once with both ears to the ground". I should like to agree with Jane Lovinger that the optimal creative condition requires that the holistic dissectionist's dialogue be sustained and tolerated rather than it degenerate into an acrimonious debate or monologue of either partner. Although I admire this optimistic outlook I feel that not only the divergence but the incompatibility between the clinical and the research orientation is very great indeed. Nonetheless, I am inclined to the view that, if this incompatible relation is sustained, the battle is lost. At any rate, regardless of his private views on the clinical side, Prof. Zubin is clearly committed to the dissectionist's research position. To the clinical person, his formidable technical armament may indeed seem frightening, that I am sure will lead to accumulation of complex data that will delight the heart of the statistical novice. Despite this it is clearly Prof. Zubin's hope that from these complex beginnings simplicity may result, and in the end vulnerability, may be described by a few simple relatively culture-free measures. What I am trying to say here is that in this area of research, although we hope for simple discoveries, we cannot hope for any discoveries at all without complex beginnings unless, of course, we are prepared to trust strictly to luck.
On this question of the classification of the mental disorders, I sometimes think that we are, perhaps, in the position of the Australian aborigine who made himself a new boomerang and then discovered that he could not throw the old one away.