A CROSS-CULTURAL APPROACH TO PSYCHOPATHOLOGY AND ITS IMPLICATIONS FOR DIAGNOSTIC CLASSIFICATION

JOSEPH ZUBIN
CHIEF OF PSYCHIATRIC RESEARCH
BIOMETRICS RESEARCH
NEW YORK STATE DEPARTMENT OF MENTAL HYGIENE
AND PROFESSOR OF PSYCHOLOGY COLUMBIA UNIVERSITY

If space had permitted, I would have liked to define culture and psychopathology. Instead, I am going to proceed within the vague boundaries that these terms generally connote, and hope you will follow me. I shall not draw the distinction often made between cultural and social factors, but include both under the same rubric. My concept of psychopathology will become clearer as I proceed. Recently, we have begun an investigation of the differences in the diagnosis of mental disorders in the United States and in the United Kingdom; this essay will indicate why this study was undertaken, how we intend to proceed, what progress we have already made, and what outcome is hoped for.

The need for cross-cultural investigations arises from the fact that the data on hospitalized mental patients show tremendous differences among countries and even within regions of the same country. For example, manic-depressive psychosis, a fast-disappearing diagnosis in our own hospitals, occurs with a frequency in the U.K. that is ten times that in the U.S. (Kramer, 1961). Variation in incidence and prevalence rates has many
the organized system of medical care does make data more readily available in the U.K. than in the U.S. In both countries, data on unrecorded cases must come through studies of the general population. Such studies, however, are very expensive and very cumbersome, since the proportion of "cases" in the general population is very small, and large samples must be examined in order to get reliable data.

Since the National Health Service is able to provide systematic information on a larger proportion of those needing help than available in the U.S., characteristics of patients in the U.K. are well worth examining as a guide for the United States health needs and services.

*Cultural factors in the initial detection of mental illness*. The 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, such as policemen, sheriffs, etc. In both countries, and especially in the U.K., 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 and cultural norms. As a result, sociocultural forces tend to bias the apparent prevalence of mental illness. Gauging the true prevalence of all illnesses suffers from this difficulty, as Joseph Berkson (1946) has pointed out, but there are certain criteria by which the presence or absence of most nonpsychiatric illness can usually be established independently of the patient's behavior (action,
feelings, attitudes, emotions and thoughts). In most mental disorders, however, the patient's behavior is the sole basis for making diagnoses. To the degree that such deviant behavior constitutes the basis for suspecting 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. Furthermore, the environmental factors may play a large role in determining what label to place on the patient when he comes to the attention of the diagnostician.

*Theoretical assumptions regarding the nature of mental illness.* The theoretical models for mental disorders that now vie for acceptance are too numerous to review here. We shall limit ourselves to discussing a few in order to illustrate their implications for diagnostic classification. 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. To some the entire concept of mental disease or illness is anathema. Diagnosis is either impossible or of no value in this system, or, as one contributor to this book would insist, downright malevolent.

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

Between these two extremes there are various com-
promises. 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 psychosis, mon-
golism, PKU, etc.), we shall have to depend on be-
havioral deviations from sociocultural norms for our
diagnoses. Since these deviations are so highly dependent
on the environmental context that provides their frame
of reference, different environments may well elicit dif-
f erent types of deviation, and cross-environmental com-
parisons would be impossible.

The dependence of psychopathology on sociocultural
expectations is well attested to by Barbara Wooton, who
points out that "... antisocial behavior is the precipi-
tating factor that leads to mental treatment. But at the
same time the fact of the illness is itself inferred from
this behavior. ... 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 the
social norms ... 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" (1959, p. 225).

This being the case, we may raise the old question of whether normal behavior is indeed differentiable from abnormal behavior along a continuum or if there is a qualitative difference between the two. This is an age-old issue which has never been adequately dealt with. But it is interesting to inquire where the discontinuity, if it exists, is to be sought: in the patient or in the observer—i.e., in the behavior of the patient or in the behavior of the community with regard to the patient? If discontinuity exists in the community, so that once an individual passes a threshold of deviation, he is regarded as abnormal, we do not have to postulate discontinuity in the patient's behavior. In fact, the individual immediately adjacent to him on the continuum, who differs from him by only a small degree, may still be regarded as normal. Hence, it would be a vain hope ever to find universal characteristics of mental disorder, since they are detected only by deviation from local norms. On the other hand, if discontinuities exist in the patient's behavior or characteristics (biochemical, metabolic, etc.) a search for such discontinuities would be rewarding.

Another possibility to consider is that the discontinuity in the behavior of the community or the patient may rest not on a single dimension but on patterns of several dimensions. In that case, no single dimension may exhibit any sharp discontinuity. Instead, the patterning of the dimensions may identify the disorder even when all the individual dimensions remain continuous.
Thus, an individual who has an IQ of 70 may still be within the normal range. One who has a social quotient of only 70 may also be within the normal range. But given the combination of IQ 70 and social quotient of 70, the individual may be regarded as retarded by a given community.

If we exclude the school of thought that denies the usefulness of diagnosis entirely, these differing points of view both agree that there is more to mental illness than deviations from the expected norms. There may 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 sociocultural forces, it may be useful as an independent criterion in the diagnosis of the mental disorders.

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 socioeconomic level, we still 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. Insofar as sociocultural 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 cannot be directly comparable. Even the self-reports (or absence of reports) of inner feelings that are elicited by the psychiatrist are culturally influ-
enced and interpreted by both the patient and the examiner, which again may lead to increased variability across cultures.

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

The unreliability of psychiatric diagnoses has been documented in a multitude of studies, and our general conclusion from these studies is that with but few exceptions they concur in finding diagnosis unreliable.

The basic rationale for our proposed bilateral study is that the detection and diagnosis of mental disorders today depend to a significant extent on aspects of the individual's behavior that deviate from socio-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 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 cul-
tural milieu in which the patient finds himself. For this purpose, systematic interviewing and objective recording of behavior during the interview, along with objective evaluation of the content of the interview, are necessary if comparable results are to be obtained for different interviewers.

However, there may be more to mental disorder than this externally observable deviation in behavior. Unless we find the additional factors that underlie the external behavior, we will never be able to make comparisons across cultures except for those illnesses with behavioral characteristics that are universal despite culture. What can these additional factors be? Apparently, if one makes the assumption that underlying the externally observable behavior is a graded vulnerability differentiating 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 that characterize a vulnerable individual while remaining immune to environmental influences. If such techniques are not discovered, we could settle for *culture-fair* measures, by which we mean those that, though amenable to the influence of cultural forces, 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 intrauterine existence. This is no place to argue the question of the origin of this vulnerability, but it is neces-
sary to recognize that some assumption regarding it 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 mildly noxious stimuli to determine their response to such stimulation. It would be ideal, of course, to perform such studies on newborn infants, to determine which individuals seem to be more sensitive to stress-producing loads. This, however, is a hazardous procedure, and furthermore we do not know whether the immediate response to the stress-producing load would be indicative of future responses, since it may be the repeated presentation of such stimuli which is 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 the early adult schizophrenic for signs of deviation in some culture-free or culture-fair response to indicate his vulnerability. Whether this deviation is the cause or the result of the illness cannot be determined now. However, if longitudinal studies reveal the presence of these deviations in individuals long 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 done rather widely, 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 that may differentiate the vulnerable from the nonvulnerable. Hopefully, such techniques would not be as amenable to the influences of cultural forces as are the behaviors now used for diagnostic purposes. A third approach is behavioral, and focuses attention on the initial components of the response to specific stimulation in the various sense modalities. The first 1,000 milli-seconds following stimulation offer an opportunity for obtaining culture-free indicators of mental illness, since the cultural influences may not be able to make themselves felt until after the initial component of the response is finished.

Culture-Dependent Techniques

Observational and Interview Techniques

If we accept the assumption that mental disorders are now detected and diagnosed on the basis of sociocultural 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 that varies from clinician to clinician and is unsuited to the purposes of scientific investigation.

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

The application of rating scales to the classification of mental patients has a long history despite its relatively recent development. Father Moore (1933) 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 developed earlier through clinical observation. The Malamud-Sands scale was the next one to be developed. Since then, Lorr (1953) and Wittenborn (1955) have provided scales for psychiatrists for rating the behavior of mental patients.

It should be remembered, however, that these modern rating scales do not specify the kind of interview on which they are based. The usual free-wheeling clinical interview is the chief basis for these rating scale evaluations, and therefore they can never transcend the limitations of the original interview. In order to make ratings more comparable, systematic structured interviews must be introduced.

(1) Structured Clinical Interview (Burdock and Hardesty, 1962) The purpose of this instrument (SCI) is to focus on the general social and psychological adjustment of the interviewee. It consists of open-ended questions that are quite neutral in tone and content but that nevertheless permit the interviewee to express psychopathological ideation and behavior. For this reason it is most
suitable as an initial instrument for community surveys as well as for admission services in hospitals and clinics.

If this instrument yields a score that makes the interviewer suspect that he is dealing with a possible psychiatric case, the more probing instruments can then be applied to determine further the nature and extent of the psychopathology. If the interviewee fails to show any psychopathology on this instrument, he can tentatively be regarded as "normal." Interviewees who give evidence of psychopathology in this neutral instrument tend to have severer illness than those who require probing to elicit their psychopathology. The interview consists of a schedule of some 135 open-ended questions and 178 inventory items which are to be marked *True or Not True* on the basis of the interviewee's answers. The reliability of the total score, representing the severity of psychopathology exhibited by the interviewee, is obtained by comparing the results of two independent observers. The intraclass correlations between observers have ranged from .83 to .92 for groups of patients from 26 to 83 in number. Utilizing the score on the Ward Behavior Inventory (see below) as an independent criterion, the validity of the SCI ranges from .30 to .68, while the validity of an unstructured interview with the same criterion was only .22. The following subscales have been developed: anger-hostility, conceptual dysfunction, fear and worry, incongruous behavior, incongruous ideation, lethargy-dejection, perceptual dysfunctioning, physical complaints, self-deprecation, and sexual deviance.

(2) *Mental Status Schedule (Spitzer, Burdock, and Fleiss, 1963)* This instrument 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 thinking. 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.

(3) Social Adaptation Schedule, now reworked as The Psychiatric Status Schedule (Spitzer, Endicott, and Cohen, 1966) 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 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 either to supplement the examination of mental status or on a separate occasion to serve as an independent instrument. It is expected that a new instrument, combining the Mental Status Schedule and the Social Adaptation Schedule into an integral Psychiatric Status Schedule, will be provided.

We have not yet developed an instrument for the anamnesis or case history. 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 to focus on particular critical periods in the history of the individual. It is proposed to begin with a focused interview dealing with the question of the status of the patient a year before he came for help and, by focusing on this particular period, to 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 be on early childhood, including particularly the history obtained from the family. In all these aspects of the anamnesis, at least two members of the family ought to be interviewed for cross-checking purposes. Although
this may sound impractical for everyday use, it should not be beyond the range of many research projects. In fact, the Katz Adjustment Scales (Katz and Lyerly, 1963) 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.

(4) Ward Behavior Inventory (Burdock et al., 1960)
This instrument capitalized 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 one 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 National Institute of Mental Health nine-hospital collaborative study of phenothiazine therapy conducted by the Psychopharmacology Service Center (Cole, 1962) and an unpublished study of the efficacy of a psychic ener-
gizer for senile persons. Future work with the WBI will focus on analysis of patterns of items and on identification of clusters of patients possessing similar symptomatology.

An example of the value of such systematic interviews is demonstrated by the following experiment. One of our structured interviews was videotaped so that it could be presented to groups of psychiatrists for their clinical judgment and diagnosis.

In addition to requesting an over-all diagnosis, we asked them to fill out ratings on our inventory for such factors as excitement, paranoid projection, anxious intro-punitiveness, perceptual distortion, motor disturbance, hostile belligerence, apathy and retardation, grandiose expansiveness, and thinking disorganization (Lorr, 1953). The psychiatrists were all seasoned veterans of psychiatry; nevertheless, of the 35 participants, 14 diagnosed the patient as neurotic and 21 as psychotic. An examination of their ratings revealed, however, that the groups differed significantly only in one respect—the rating on apathy. Those who rated the patient high on apathy diagnosed him as psychotic, while those who rated him low diagnosed him as neurotic (see Fig. 1).

In addition to direct interview using structured instruments, certain focused aspects of interviewing procedures have been utilized for more objective evaluation of specific patient characteristics such as flatness of affect, intelligibility of speech and similar traits. While the structured interviews may elicit material that is largely culture dependent, the techniques to be discussed now might belong in the culture-fair category. By this we mean that though they are imbedded in a given culture,
Figure 1. Mean symptom profiles of a psychiatric patient as viewed by two groups of clinicians who differed on diagnosis.

they nevertheless have equivalents in other cultures. Examples of such culture-fair behaviors are response to greeting, bereavement, reinforcement or praise, etc. Individuals in all cultures respond to such situations, but the type of behavior is colored by local norms.

In the course of our studies on the experimental analysis of the interview, we found that the rate of emis-
sion of self-referred affect statements can be lawfully modified in acute schizophrenics by asking questions that act as discriminative stimuli for eliciting affect (described in Zubin, 1958); and by giving reinforcement such as verbal expressions of agreement—mhmm, yeah, etc. (described in Zubin, 1958; Salzinger and Pisoni, 1958, 1960, 1961). We were able to show in the process of the conditioning period (i.e., it is effective both in the beginning or middle of the interview) that a minimum number of reinforcements is necessary for conditioning to take place, and that rate of extinction varies as a function of rate of acquisition (Salzinger and Pisoni, 1961).

The rate of emission of affect statements was also successfully modified in normal subjects; and a comparison of normal and acute schizophrenic subjects showed the schizophrenics to extinguish faster than the normals (Salzinger and Pisoni, 1960).

Similar interviews with chronic schizophrenics led us to conclude that they can be described more accurately as having a low rate of responding in general, rather than as having "flatness of affect" in particular. Their low operant levels for self-referred affect made it impossible to measure their reactivity to reinforcement (Portnoy and Salzinger, 1964).

Most recently we have devised a technique which makes interviewer questions unnecessary. Under these conditions we have obtained monologues—extended uninterrupted samples of continuous speech—from acute schizophrenics. We found that, depending upon the specific reinforcement contingency in effect, we could in-
crease either the general speech rate or the rate of a specific response class like self-referred affect (Salzinger, Feldman and Portnoy, 1964).

Comparisons of the rate of repetition of words in schizophrenic and normal speech samples revealed that schizophrenics tended to use the same words more frequently than normals for passages 900 words long (Hammer and Salzinger, 1964).

Furthermore, the rate of conditioning of schizophrenic patients (i.e., the degree to which a patient becomes influenced by the interviewer) appears to be a prognostic indicator. Those patients who condition more easily are more likely to leave the hospital at the end of a 180-day period (Portnoy and Salzinger, 1964).

**Communicability**

In order to measure the degree of communicability of schizophrenic speech, 200-word samples from the above-mentioned interviews and monologues were selected and subjected to the *cloze procedure* (which consists of systematically deleting words from continuous speech passages and having other subjects guess the words that have been so deleted). Samples from schizophrenic and normal persons were compared, and we found that normals communicate better than schizophrenics (a larger number of correct words were guessed). Furthermore, differentiation between the patient and normal subjects was clearer for the second 100 words of the sample than for the first 100 words (Salzinger, Feldman and Portnoy, 1964).
We have recently replicated the above study using the same samples but a different group of predictors, and separating the 100-word sections (each subject got all samples, but the 200 words were not presented consecutively). The results were almost identical with those obtained in the earlier study. Despite the separation of the two 100-word samples, the second 100 words still differentiated schizophrenic and normal subjects better than the first 100-word section.

We have also added two other techniques for assessing the communicability of schizophrenic speech. The first we have referred to as the Method of Reconstruction. It consists of having subjects sort speech segments of equal length into the order they think they were spoken. Comparisons of the schizophrenic and normal samples revealed that other normal subjects had greater success in restoring the original order of the normal speech than of the schizophrenic samples (Salzinger, Portnoy and Feldman, 1964).

The second procedure we have referred to as the Method of Unitization. It consists of having normal subjects edit unpunctuated speech samples by dividing them into grammatical sentences and crossing out words they feel do not belong. The results indicated that schizophrenic speech is characterized by having more words crossed out (intrusions) than normal speech samples. Number and length of grammatical units did not differentiate normals from schizophrenics.

We have also related the results from the cloze procedure and reconstruction method to outcome of illness and found that the better a patient communicates, the
shorter his stay in the hospital; and the more difficulty subjects had in ordering patients' speech samples, the longer these patients remained in the hospital.

The results of these more recent studies, together with the results of the earlier ones, have led us to propose the notion that the basic deficit in the schizophrenic patient's behavior is that he is controlled primarily by stimuli immediate in space or in time. For this reason he has difficulty in sorting, shows less object constancy (at least in the more deteriorated stages), and extinguishes faster after conditioning; in language he shows "loose association" and poor ability to communicate—since language communication requires that the speaker react to long-range stimuli and not simply to short-range associations.

Culture-Free Indicators

Though no measures can be said to be completely culture-free, the way in which culture affects certain measures (as pupillary response to light stimuli) is indirect, unlike the direct way in which it influences primarily conceptual measures like vocabulary. The major way in which culture will tend to influence the culture-free or culture-fair tests is probably 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, in his motivation,
attention and cooperation, etc. In other words, the influence of culture is specifically on 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 or culture-free techniques have been constructed to minimize.¹

One of the best established findings about schizophrenia is that schizophrenics are retarded in reaction time as compared to normals. Since speed of response is to a large extent motivationally determined, it could readily be argued that this difference is not specific to schizophrenia. In order to eliminate this source of irrelevant difference, motivation must be either measured, permitted to vary at random, or kept at a high level.

Since measurement of motivation is rather difficult, we chose first to allow random variation. The subject was instructed to lift his finger off a brass plate just as soon as he saw the light or heard the sound that served as stimuli. There were two light stimuli, red and green, and two sound stimuli, high and low tones. The stimuli were presented in random order. Our chief concern was not with the primary reaction times but with the influence on reaction time of shifting from one stimulus to another. There were three types of sequences possible: (1) no shift, the second stimulus being identical with the first;

¹ Such designs include obtaining complete functions rather than isolated points of measurement for each individual; comparing slopes of functions rather than level; measuring functions under idling state conditions and under load conditions; and finally, using the range of variation within a population as a basis for assessing observed deviation.
(2) shift within the sight or sound modality (red to green or vice versa, high to low tones or vice versa); and (3) shift between modalities (Fig. 2).

**Figure 2.** Mean simple reaction time to sound and light stimuli as a function of type of stimulus sequence for schizophrenic patients and normals. (From Figure 3, Sutton and Zubin, 1965.)
In Figure 2, the numerals I, II, and III refer respectively to these sequence conditions (Sutton and Zubin, 1965). In each case, the reaction time to the second member of the pair of stimuli is recorded. The data for male subjects are presented separately for sound and for light. It can readily be seen that normals are faster on all accounts, and that reactive schizophrenics are faster than process schizophrenics.

The influence of overall speed was eliminated by performing covariance analyses comparing groups on condition III (crossmodal stimuli) and on condition II (ipsimodal stimuli), with performance on condition I held constant. Both of these analyses discriminated patients from normals on reaction to sound, but not on reactions to light. Analyses comparing process and reactive patients were not significant.

The experiment has been repeated with a number of variations in a number of populations. To summarize, there is a consistent tendency across several studies for schizophrenic males to be disproportionately impaired on reactions to sound stimuli if the stimulus in the previous trial is a light. These findings hold for both acute and chronic patients. This impairment is over and above the differences in overall level of response between groups. Comparable analyses for reactions to light do not yield differences between patients and normals.

In a comparable study done on brain-damaged subjects, by Benton et al. (1962) at the University of Iowa, there was an exactly opposite finding. The shift from light to sound did not discriminate brain-damaged subjects from normals, but the shift from sound to light did. This
intriguing reversal between brain-damaged subjects and schizophrenics has not to my knowledge been followed up.

For both patients and normals, there is a general trend for reaction times to the second stimulus of a sequence to be shortest for identical sequences, longer for non-identical, and longest for crossmodal. The present data do not make clear whether this involves a primarily sensory or a primarily conceptual phenomenon, or whether these hypotheses need to be in conflict.

The question of the source of these effects has been explored in some recent work by Martin Hannes in our laboratory. In the work just summarized, the sequential probability of all stimuli is equated within any single run, every permutation of four stimuli taken two at a time occurring an equal number of times within a run. With this kind of program we have found that for normals the crossmodal retardation decreases with repeated testing and finally becomes zero over several days of repeated testing with the same program. It is possible, however, to manipulate the sequential probability of ipsimodal and crossmodal sequences so that these probabilities are not equal.

This is done in the following way: Only two stimuli are used, one sound and one light. These are presented in pairs, one second apart, with instructions to the subject to react to each. The pairs are separated from each other by intervals of 15 seconds. In one program, three types of pairs are used: Sound-sound (SS), light-sound (LS), and light-light (LL). These pairs do not occur equally often in any given run, but in the following ratios: \( SS = 1/4 \), \( LS = 1/4 \) and \( LL = 2/4 \). In such a program,
once a subject has received a sound as the first member of the pair, there is complete certainty that the second member of the pair will be a sound; i.e., \( P(S/S) = 1 \). However, if the first member of the pair is a light, the second member of the pair will be a light twice as often as a sound: \( P(L/S) = 1/3 \) and \( P(L/L) = 2/3 \). Therefore, this program decreases the probability of crossmodal sequence (LS) and increases the probability of ipsimodal sequence (LL). As in previous work, reaction to sound which was preceded by sound (sS, which is equivalent to Condition I above) is compared with reaction to sound which was preceded by light (ls, which is equivalent to Condition III above).

In Figure 3 are plotted the results of pilot work with two normals and two patients on this kind of program. On the abscissa are successive days of testing; the crossmodal retardation is shown as the difference between the two curves. Note that the normals begin with a smaller crossmodal retardation than the patients, and that for no individual does the crossmodal retardation tend to decrease continuously with successive days of testing. This is quite different from performance with the “random” program, in which there is a decrease in retardation over successive days of testing, finally reaching zero in normals.

Figure 4 shows a program in which the probability of ipsimodal sequence is decreased and that of crossmodal sequence is increased. After a light has occurred as the first member of a pair, there is complete certainty that the second member of the pair will be a sound. On the other hand, when a sound has occurred as the first member of a pair, the second member of the pair will twice as
Figure 3. Median simple reaction time to sound stimuli for two normals and two schizophrenic patients, as a function of successive days of testing on a program with low probability of crossmodal sequence. (From Figure 9, Sutton and Zubin, 1965.)
Figure 4. Median simple reaction time to sound stimuli for two normals and two schizophrenic patients as a function of successive days of testing on a program with low probability of ipsimodal sequence. (From Figure 10, Sutton and Zubin, 1965.)

often be a light as it will be a sound. Again, the comparison is between reactions to sound preceded by sound (I) and to sound preceded by light (III). As with the last program, the patients begin with a larger crossmodal retardation than the normals do, but the retardation decreases over successive days of testing—more rapidly for the patients than for the normals. This work indi-
icates that the degree of crossmodal retardation can be readily manipulated by altering the probability of crossmodal and ipsimodal sequences, and that both normals and patients are sensitive to the manipulation of conditional probabilities in the program.

In interpreting these data one must make some assumptions about the state of readiness of the subject. It is reasonable to assume that in all reaction-time experiments some aspect of the subject’s readiness is fluctuating from moment to moment, as measured either by the levels of muscular tension or by phases of the cortical alpha wave. For these experiments, there must also be some such preparation process, although it is less apparent how one prepares to observe with the eye rather than with the ear. In this connection, one might speculate on the possible role of descending inhibitory pathways which are present in most, if not all, sensory modalities. Shorter reaction time may then be taken as evidence that the stimulus occurred at the time of greatest readiness, or that the stimulus is one for which most “preparation” has been made. When the stimuli do not fall in with these “expectancies,” there is retardation or lengthening of reaction time. As has been shown, this state of readiness is strongly influenced by the character of the preceding trial—viz., whether the stimuli are in the same or a different sensory modality.

With respect to the differences between schizophrenic patients and normals, the studies strongly suggest that the state of readiness of the patient is disproportionately affected by recent events. In other words, the patient is “overprepared” by his last trial; and reaction time is
lengthened when the unprepared-for stimulus appears. In the random program, since all sequences are equally probable, best performance would occur if the subject assumed (correctly) that the next stimulus could be any of the four used. Therefore preparation for any one type of stimulus is maladaptive.

Our further studies with normals have made it apparent that in these experiments two effects are at work; one of which may be called the probability effect, in which reaction time to the uncertain or less probable stimulus is lengthened, and the other the sensory effect. The sensory effect is revealed by the fact that manipulation of the probability of crossmodal and ipsimodal stimuli does not produce identical results—there is something special about crossmodal stimuli which makes them peculiarly vulnerable to the subject's state of certainty. These observations have incidentally been supported in our evoked potential studies. In these, the program in which the crossmodal stimulus is uncertain has produced the larger change in the late component, presumably as a result of these subjects' greater degree of uncertainty.

We cannot summarize our results in pupillography here, nor certain other areas where cultural explanations of the observed differences are hard to find. The general results in pupillography are that the initial pupil size of acute schizophrenics (but not of chronic) is smaller than that of comparable normals. This holds true significantly for males, but does not reach significance in females. Both acute and chronic schizophrenics reach the point of maximum contraction upon stimulation by light sooner than normals. We concluded, following the interpretation of
pupillary diameter offered by Lowenstein and Lowenfeld (1950), that the acute patients show a deficiency in the inhibitory control of the Wetphal-Edinger nucleus by higher centers. In order to demonstrate this deficiency in chronic schizophrenics, we have to subject the pupil to a stimulus, or put it under some load.

Instead of sampling or measuring motivation, we can take another tack. If we find functions in which patients are more sensitive than normals to the stimulus input, we might deduce that motivation must be at a high pitch. We thought that the response to delayed auditory feedback of speech might be such a function, since schizophrenics might be bothered less by the delay and could, therefore, perform better. Unfortunately, this is not the case; schizophrenics have shown greater interference than normals. We have, however, found several functions in which schizophrenics excel. Although these results are still tentative, they do encourage the hope that more results of this type may be expected. The Bunsen-Roscoe or Bloch's law seems to hold for normals when reaction time is used as the response to varying parameters of intensity and duration during the critical period—10 to 20 milliseconds. Schizophrenics apparently have not heard of this law, and fail to obey it, or have a much shorter critical duration than normals. Similarly, in dichotic auditory stimulation experiments, when one ear receives either a more intense or a slightly earlier stimulus than the other ear, the localization of the sound will deviate from the center in the direction of the ear receiving the more intense or earlier click. The ΔI and the Δt stimuli can be matched so that the subject cannot discriminate
the displacement from center brought about by the two
techniques. Preliminary results indicate that values can-
not be found at which the schizophrenic will not discrimi-
nate the ΔI stimuli from the Δt stimuli. In other words,
the schizophrenic detects differences that the normal
cannot. In several other ways, it becomes apparent that
greater sensitivity to, or lack of integration of, input is
characteristic of the schizophrenic. It is very difficult to
find cultural explanations for such differences.

In support of the idea of patient-normal differences
in cortical excitability and responsiveness is an investiga-
tion by Shagass and Schwartz (1961, 1962). These work-
ers recorded evoked potentials to two discrete electrical
stimuli presented to the wrist and separated by brief
periods of time. From these electrophysiological data they
plotted the resulting “recovery” functions for the effects
of the first stimulus upon the amplitude of the evoked po-
tential to the second stimulus. Some types of mental pa-
tients—depressives—were found to require a longer
temporal separation between pulses than normal subjects
for the amplitude of the second evoked potential to return
to its base line, suggesting that they display less cortical
excitability and responsiveness than normals.

With the aid of objective measures of both varieties—
culture-bound and culture-free—a new approach can be
made to the development of more homogeneous diagnost-
ic groupings. At the present time, much of the research
in psychopathology suffers from the great heterogeneity
that characterizes today’s diagnostic classifications. Even
when there is full agreement on the part of a diagnostic
team regarding such diagnoses as schizophrenia or neu-
rosis, the individual patients in each category are far from a homogeneous group, even with respect to the variables which presumably characterize the category. Bleuler has pointed to this fact by substituting for Kraepelein'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 either direct or inverse factor analysis 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 would already be 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, discrepancy in shape, and discrepancy in level; and groups 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 or some similar
assumptions) a fractionation of the sample into homogeneous subgroups becomes possible.

Summary

The behavioral changes which accompany the development of mental disorder have been classified into two major divisions: culture-dependent 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, producing 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 that will be more homogeneous and more suitable for future investigations.

References


Sutton, S., and Zubin, J. Effect of sequence on reaction time in


DISCUSSION—Lewis L. Robbins

Not only mental illnesses, but all illnesses are characterized by someone’s noticing a deviation from an expected norm. A patient may be aware of a pain or shortness of breath; others may be aware that he looks different (for example, if he is jaundiced) or that he behaves differently because he may be weak or less animated. On the other hand, a chronic state of illness when suffered by an entire group may be considered normal, as, for example, when whole communities are infected with parasites that diminish energy.

Psychiatric illnesses are similar, although, as Zubin states, culturally dependent behavior and deviation from cultural norms play a larger role as symptoms. One may
question the inclusion of verbal self-reports in the category of behavior, but if one does, then our criteria for mental illness are at present almost exclusively behavioral. Patients' reports of disturbances of mood, thought, and anxiety are analogous to complaints of pain, fatigue, or awareness of organ dysfunction in the presence of organic disease.

Thus, the symptoms of all illnesses are detected by laymen. Where psychiatric illnesses differ somewhat is in the absence of agreed-upon signs and laboratory findings to support our diagnoses. Dr. Zubin's efforts to find such signs is an important effort in our field.

From the psychoanalytic viewpoint, culture plays a significant role in influencing which impulses must be repressed, which may be expressed, and how they may be expressed. Emotional disorders are viewed as ineffective interactions between the individual and his environment. The source of the drives is biological and the perception of the environment is both experientially and biologically alterable. Thus far, the greater weight of evidence lies in the psychological area, although certain biological variations are assuming considerable importance. Only to the extent that biologically determined factors cause or contribute to mental illness can we expect to find culture-free factors. Even these may not be evident without including behavioral data.

Zubin's search for culture-free determinants is a most desirable enterprise. He correctly assesses the difficulties inherent in this approach, and calls attention to the limitations and methodological inaccuracies of most clinical investigations. In these, the dyad of patient and doctor
not only introduces many subtle inter- and intra-personal variables, but also is inevitably influenced by clinical judgments. Obtaining rater reliability requires agreement on the phenomena to be assessed and how they are to be rated. As has been pointed out, there are wide variations among clinicians not only in regard to broad diagnoses but also, at times, on specific items, such as degree of apathy.

Zubin and many others have devoted much ingenious effort to solving the problem of how to preserve the richness of the clinical interview and at the same time improve the reliability of anamnestic data. Such forging of improved methodological tools is one of our primary needs.

Zubin's main emphasis is on studies that attempt to detect statistically significant culture-free differences between populations which have been discriminated by diagnosis. This is the model of a number of current studies, including those being conducted by Donald F. Klein at Hillside Hospital (which are referred to in my own chapter in this volume). This approach is useful in that it generates hypotheses, but is confounded by the fact that diagnostic differences are also associated with age, sex, social class, dietary factors, previous treatment, etc. Differences that are found may have little or nothing to do with the illness.

In reporting Sutton's crossmodal studies, Zubin does not describe the subjects utilized. It is not known whether they are acutely ill patients or chronic patients who have been hospitalized for a long period of time. As Zubin stated, "much of the research in psychopathology suffers
from the great heterogeneity which characterizes today's diagnostic classifications."

In the present stage of our knowledge it is unwise to reject any reasonable investigative approaches. That factors independent of cultural influences play a role in mental illnesses is highly probable. It is equally probable, however, that psychological and social factors also play a significant role, and we must develop methods of study that also permit their accurate assessment.