RESEARCH REPORT

The Biometrics Research Unit
of the New York State Department of Mental Hygiene

The 1955-1956 Annual Report of the Department of Research Psychology at the New York State Psychiatric Institute begins by noting that "Dr. Joseph Zubin, who had been Associate Research Scientist in this department since September, 1938, resigned January 15th, 1956 to become Principal Research Biometrician, heading a new Department [now Unit] of Biometrics Research..." While this move soon proved to be a stimulus for the development of significant new avenues of research, it by no means marked a sharp break with previous work. As Zubin has often noted, the late Carney Landis, when he was head of the Department of Research Psychology, actively fostered a variety of biometric studies, and indeed the annual reports of that department had eventually come to contain a separate section devoted to biometrics, in which the work of Zubin and his colleagues figured prominently. Much of this work would serve as the foundation of the new Unit's research program. In particular, already in progress for several years had been an extensive study of prognosis in early and chronic schizophrenia. In addition to interviews, a battery of tests was employed to sample a range of levels in the patients' functioning: psychophysical, psychophysiological, psychomotor, perceptual, behavioral, and conceptual.

Efforts to promulgate the biometric approach to the study of psychopathology had for a long time proved disappointing. The area of psychopathology was largely
dominated by traditional phenomenological and clinical approaches, and later by psychodynamic theories beginning with Freud. However, there were a number of forces at work which did eventually culminate in the major impact of biometric studies (Zubin, 1973). Such important, if diverse, figures as Pearson, Galton, Kraepelin, and Jaspers all saw the value of quantification as a way of introducing objectivity and sound evaluative techniques into areas heavily dependent on subjectivity. In addition, as the biological, social, and behavioral sciences developed the theories and techniques of their own disciplines and began to apply them to problems in the area of psychopathology in both laboratory and field studies, it became more and more clear that some universal language was required by means of which communication could take place among disciplines. Biometric techniques of classification and measurement held the hope of being able to provide such a language as well as providing a sound basis for truly interdisciplinary research.

In recently reviewing the period prior to the creation of the new department, Zubin commented,

"Apparently... the field was just not yet ready for [biometrics]. During the 1930's and on into the 1940's diagnosis was in the doldrums; prognosis was guarded, and the evaluation of therapy mainly negative -- hardly any reasons for clinicians to clasp biometrics to their bosom. However, in the 1950's the scene changed. There were so many therapies vying with each other, so many patients in need of treatment, that the great advantage that could be provided by biometric evaluation became clear." (1973, p. 443).
In keeping with this, the New York State Commissioner of Mental Hygiene, the late Paul H. Hoch, became interested in establishing a means of evaluating the impact of the major changes that were about to take place in hospital policy and treatment, and the Biometrics Research Unit was thus established. Appropriately enough, the interdisciplinary study of prognosis in schizophrenia, already begun, became Biometrics' first major endeavor. As it turned out, the scientific findings were something less than exhilarating ("This study had taught us that the then currently available clinical tools were neither prognostic nor diagnostic nor reliable nor valid," as Zubin recently summed it up), but the structure of the project set a productive pattern for Biometrics which has continued to the present day.

The need became so apparent for the development of better methods and instruments for tapping the various levels of patients' functioning, as well as for gathering comparative data on normal individuals and institutionalized and non-institutionalized populations of many types, that by the beginning of 1958, when the research grant supporting the prognosis project terminated, Biometrics Research already had several semi-autonomous groups of investigators developing new techniques and theoretical concepts and carrying out research in their own particular areas of interest. These groups were linked, at least initially, by a common interest in studying schizophrenics. Otherwise they developed their own projects and funded their own personnel and equipment needs with research grants from a variety of federal, state, and private agencies; then, as now, the permanent staff
directly supported by the New York State Department of Mental Hygiene was small relative to the total number of persons actually working in the Unit.

Within the first few years of the Unit's existence, research projects were actively underway in the development of rating scales and structured interviews (Burdock, Hardesty, Hakerem, and Zubin, 1960; Burdock and Hardesty, 1964; Spitzer, Fleiss, Burdock, and Hardesty, 1964); the search for dependable prognostic indicators (Burdock, Sutton, Cheek, and Zubin, 1957; Zubin, Sutton, Salzinger, Salzinger, Burdock, and Peretz, 1961); evaluation studies in clinics and hospitals (Staudt and Zubin, 1957); pupillography (Hakerem, Sutton, and Zubin, 1964), reaction time and sensory shift studies (Salzinger, 1957; Sutton, Hakerem, Portnoy, and Zubin, 1961), and studies on the effects of delayed auditory feedback (Chase, Sutton, First, and Zubin, 1961; Sutton, Roehrig, and Kramer, 1964); studies of the relationship between psychiatric hospitalization and the patients' positions in their immediate social networks (Hammer, 1963-4); formulation of a conditioning model for the interview, leading to studies on the conditionability and communicability of schizophrenic and normal speech and on the objective measurement of statements of affect (Salzinger and Pisoni, 1958, 1960; Salzinger, Portnoy, and Feldman, 1964a, 1964b, 1966); studies of social isolation in the aged (Tec and Granick, 1959-60; Granick and Nahemow, 1961; Bennett and Nahemow, 1965); studies of adolescent friendship patterns of schizophrenics (Kreisman, 1970). Such a listing can only suggest the diversity of the enormous number of individual studies, but it clearly testifies to the broad range of interests already represented
in Biometrics Research at this early period. It should also be noted that although direct intervention was not initially seen as part of the Unit's program, it soon grew naturally out of several lines of basic research. In its earliest form, it involved applied research in operant conditioning (behavior modification) with young hospitalized children (Salzinger, Feldman; Cowan, and Salzinger, 1965) -- work which eventually led to the training of parents (Salzinger, Feldman, and Portnoy, 1970) and, currently, mental hospital personnel. Along another line, there have been studies of the effects of a systematic home visiting program for elderly isolated persons in the community (Bennett, 1973) and of other resocialization programs for the aged (Weiner and Weinstock, 1973).

The several years subsequent to this early period saw an expansion of work in almost all the areas mentioned and the inception of two major new ventures. In 1962, a Biometrics Research Training Program in Experimental Psychopathology, funded by the National Institutes of Mental Health and administered through Columbia University, gave explicit recognition and financial support for what had already become an important function of the Unit: to provide students with experience and training in the many biometric techniques and approaches encompassed by Biometrics Research; the training grant itself was phased out about eight years later, but students continue to be affiliated with the Unit in various capacities, and much doctoral dissertation research continues to be carried out in the Unit's laboratories or under its auspices. And in 1963, a program was outlined for an International Study of Diagnosis of the Mental Disorders in the United States and
the United Kingdom (later called the Cross-National Project).

The multifaceted nature and increasing size of the Unit eventually led to formal organization into individual sections — a kind of federalist structure, as one long-time member of the Unit has termed it. Several of these — Anthropology, Behavior Analysis and Modification (earlier, Verbal Behavior), Evaluation, Psychophysiology, and Sociology — existed in fact, if not in name, from the beginning. Biostatistics assumed the status of a separate section as it became increasingly occupied with the development of new concepts and techniques in addition to simply providing guidance on the design and analysis of research carried on elsewhere in the Unit. The Diagnosis and Psychopathology section grew out of the Cross-National Project's studies of diagnosis, to which most of its effort continues to be devoted. The Gerontology section, established as a distinct entity about five years ago, grew out of the sociological work in aging that goes back to the Unit's earliest years. The newest section, Family and Youth Research, is involved in extensive survey research on adolescent drug use, thus focusing on a critical contemporary problem as well as on an age group largely neglected in Biometrics' earlier work.

In a brief space, it is not possible to do justice to the past accomplishments and ongoing investigations of these nine sections, but certainly some details of their research, beyond the work already referred to, are called for.
The Anthropology section, directed by Dr. Muriel Hammer, has pursued the development of techniques for specifying the structure of social networks — i.e., the nature and degree of connectedness among individuals (Hammer, Polgar, and Salzinger, 1969; Hammer and Schaffer, in press). In part, such work is an essential precursor of any attempt to follow up the earlier finding (Hammer, 1963–4), mentioned above, that patients' positions in their social networks appear to have important implications for the diagnosis and treatment of their psychopathology. While direct evidence is lacking, theoretical consideration has been given to possible interrelationships of psychopathology, diagnosis, and social network structure (Hammer, 1972, 1973). Another major line of investigation has been sociolinguistic and, often in collaboration with the section on Behavior Analysis and Modification, studies have been carried out of the mutual comprehensibility of the speech of pairs of individuals as a function of the degree of interaction between them (Hammer et al., 1969; Salzinger, Hammer, Portnoy, and Polgar, 1970).

The Behavior Analysis and Modification section, directed by Dr. Kurt Salzinger, has emphasized study of the variables controlling a wide variety of normal and deviant behaviors. Verbal behavior is of fundamental interest, as shown by the basic work on normal verbal behavior (Salzinger and Feldman, 1973) as well as by the early verbal conditioning studies with schizophrenics and normals and the development of techniques for the objective measurement of the comprehensibility or communicability of speech. A theoretical principle, the immediacy hypothesis, has been formulated to encompass a wide diversity of
reported findings in the area of schizophrenia (Salzinger, 1971, 1973),
and has been supported in a direct test of its applicability to schizo-
phrenics' speech (Salzinger, Portnoy, Pisoni, and Feldman, 1970).

The Behavior Analysis and Modification section includes a sub-
section, directed by Dr. Suzanne Salzinger, engaged in developmental
studies with preschool children. Again, the emphasis has been on ver-
bal behavior, with studies on its conditionability (Salzinger, Salzinger,
Portnoy, Eckman, Bacon, Deutsch, and Zubin, 1962), on the development
of grammar and syntax (Salzinger, Salzinger, and Hobson, 1966, 1967),
on the relationship between psychophysical judgments and the verbal
scale the child employs in making such judgments (Salzinger, Salzinger,
and Patenaude, 1970), and, currently, on the communicability of the
speech of an ethnically diverse group of very young children with their
peers and their mothers. A recent collaboration with the Anthropology
section and with the Institute for Developmental Studies at New York
University was focused on the problem of learning disabilities (Deutsch,
Hammer, and Salzinger, 1974).

The Biostatistics section is directed by Dr. Joseph Fleiss, who
has explored a wide variety of statistical techniques particularly ap-
propriate to the treatment of the kinds of data frequently obtained by
researchers in the areas of psychopathology and mental health (Fleiss,
1973). In addition to its numerous consultative functions within the
Unit as well as elsewhere, this section has been concerned with the
reliability of ratings and the development of valid techniques for
measuring agreement among raters (Fleiss, 1970, 1971; Fleiss and Cohen,
1973), with the identification of homogeneous sub-groups in a hetero-
geneous population (Fleiss and Zubin, 1969; Fleiss, Lawlor, Platman, and Fieve, 1971; Fleiss, 1972), and with the development of a more satisfactory alternative to analysis of covariance (Fleiss and Tanur, 1973).

The Diagnosis and Psychopathology section, directed by Dr. Barry Gurland, makes extensive use of systematic structured interviews (Cooper, Kendell, Gurland, Sharpe, Copeland, and Simon, 1972) adapted for the specific purposes of its various studies and based on interviews and techniques devised by Wing (Wing, Birley, Cooper, Graham, and Isaacs, 1967) in England and by Spitzer (Spitzer et al., 1964) in the Biometrics Unit. This section, in collaboration with a team at the Maudsley Hospital in London, has supported an hypothesis that differences in the reported hospitalization rates for schizophrenia and affective illness between the United States and the United Kingdom could be attributed to the labelling practices of the clinicians making the diagnoses, rather than to any differences in observed pathology (Gurland, Fleiss, Cooper, Sharpe, Kendell, and Roberts, 1970; Kendell, Cooper, Gourlay, Copeland, Sharpe, and Gurland, 1971; Simon, Fisher, and Fleiss, Gurland, Sharpe, 1971; Sharpe, Gurland, Fleiss, Kendell, Cooper, and Copeland, 1974). Subsequent studies of geriatric patients, using instruments especially adapted for the geriatric age range (Gurland, Fleiss, Goldberg, Sharpe, Copeland, Kelleher, and Kellett, in press) have found the analogous result for reported admission rates of organic and functional disorders (Copeland, Kelleher, Kellett, Fountain-Gourlay, Cowan, Barron, and DeGruchy, 1974; Gurland, Kuriansky, Sharpe, Simon, Stiller, and Fleiss, 1973). In collaboration with Gerontology and
Sociology, this section is embarking on a cross-national community survey of the elderly.

The Evaluation section, directed by Dr. Robert Spitzer, now has to its credit a variety of extensively tested and widely used instruments, for both research and clinical purposes, for the reliable assessment of degree or type of psychopathology (Endicott and Spitzer, 1972a, 1972b; Spitzer and Endicott, 1971; Spitzer, Endicott, Fleiss, and Cohen, 1970; Spitzer, Fleiss, Endicott, and Cohen, 1967). Other major areas of concern have been the delivery of mental health services (e.g., a study of brief versus extended hospitalization -- Herz, Endicott, and Spitzer, 1974; a study of day versus inpatient hospitalization -- Herz, Endicott, Spitzer, and Mesnikoff, 1971), the development and application of computer technology for psychiatric diagnosis (Spitzer and Endicott, 1968, 1969, 1974a, 1974b; Spitzer, Endicott, Cohen, and Fleiss, 1974), and the objectification of the criteria for the various psychiatric diagnoses (Spitzer, Endicott, Robins, Kuriansky, and Gurland, in press).

Family and Youth Research, directed by Dr. Denise Kandel, has as its major current project an extensive longitudinal survey of interpersonal processes in adolescent drug use. The study is still in progress, but it has already been able to detail the extent to which peers, relative to parents, play a significant role in drug use (Kandel, 1973). The design of the study of drug-use patterns incorporates follow-up for the year beyond high-school graduation. The formation and dissolution of friendships in relation to drug use will also be examined.
The work of the Gerontology section, directed by Dr. Ruth Bennett, has followed two principal lines: the study of aged individuals and the study of the social factors affecting them. Social isolation has been a major focus of interest, especially as it relates to an aged person's risk of mental illness, likelihood of being institutionalized, adjustment to an old age home or other site of relocation, and general functioning in a wide variety of settings and situations (Walton, Bennett, and Nahemow, 1964). The section encompasses a range from experimental studies of behavior in restricted settings (Nahemow and Bennett, 1967; Bennett and Nahemow, 1972; Main and Bennett, 1972) to broad survey research aimed at characterizing or evaluating entire institutions or communities in relation to their aged populations (Bennett, 1964).

The Psychophysiology section, directed by Dr. Samuel Sutton, consists of laboratories for the study of pupillography, reaction time, vision, audition, and -- most recently -- evoked potentials. Initially aiming to assess central nervous system functioning in mental patients, particularly schizophrenics, this section has devoted considerable attention to two persistent and fundamental problems plaguing research in this area. One is the search for experimental tasks on which at least some groups of patients would perform "better" than normals, thus obviating the ubiquitous "poor motivation" and "inattentiveness" as the principal factors invoked to explain patients' results relative to normals' and providing some reasonable assurance that valid psychophysical measures are being obtained. A few such tasks seem to have been found (Zubin, Salzinger, Fleiss, Gurland, Spitzer, Endicott, and
Sutton, 1975).

The second problem is the identification, through reliable experimental techniques, of more meaningful and homogeneous subgroups (diagnostic categories) than have been arrived at on the basis of clinical procedures alone. An iterative strategy is being employed in which a post hoc data analysis identifies subgroups, within the initial subject samples, differing with respect to some criterion measure which is then used as an independent variable in selecting groups of subjects for the next experiment. By gradually refining diagnostic groups through such a sequence of experiments, it is expected that experimental findings will shed much more light on specific diagnostic and etiological factors associated with well-defined groups of patients (Sutton, 1973).

This section is studying not only basic sensory and perceptual functions, but also much more complex variables such as objectively measured correlates of criterion level and the "meaning" or "value" a stimulus has for a subject (Sutton and Tueting, in press). The various laboratories have applied their techniques to the study of a wide range of phenomena, including the effects of intensity and temporal variables on patients and normals (Zubin and Kietzman, 1966), the effect of ritalin on hyperkinetic children (Prichep, 1974), differences between diagnostic categories (Zubin et al., 1975), and similarity of responses in twins (Bock, 1974).

Finally, the Sociology section, directed by Dr. David Wilder, has studied the operation of large "people processing" organizations or institutions, such as schools and mental health facilities. A principal
aim is to specify the mental health implications of guidance and allocation decisions as they affect the people being served (Wilder and Blumner, 1972). Currently, the mental health care delivery system of one county in New York State is being studied from a social systems perspective.

In all of this diversity, it may seem surprising that Biometrics Research retains a high degree of cohesiveness. In part this is a reflection of the fact that Zubin's own work has always been enormously wide-ranging, as further testified to by the diversity of his students and colleagues, in Biometrics and elsewhere, in their contributions to a recent book on psychopathology (Hammer, Salzinger, and Sutton, 1973). Beyond that, it must be emphasized that critical to the nature of the Unit is that it occupies a position as neither a department of a larger institution, such as a university or hospital, nor as an independent institute made up of separate departments, but as something in between. The relationship between the Unit and the New York State Psychiatric Institute, where its main offices are located, and other institutions such as Brooklyn State Hospital, where the Unit has maintained continuously active laboratories for many years, is perhaps rather unusual but not without precedent -- witness, for example, the Social Psychiatry Unit at Maudsley Hospital's Institute of Psychiatry, established in the United Kingdom by the Medical Research Council, and other such independent units established by the Council in various institutions. Such an arrangement, with the Unit having access to local facilities but with the entire system of state facilities also available as the need arises, appears to have fostered
great variety and flexibility in choice of research problems and strategies and perhaps should also be credited in large measure with the Unit's continuing problem-centered, rather than discipline-centered, outlook. The interdisciplinary studies that have thus arisen constitute another cohesive force.

In a search for integrative principles or common denominators in the substance of the Unit's research, Zubin has performed a kind of logical factor analysis from which have emerged four vectors: (1) Descriptive approaches to psychopathology, including the many systematic structured interviews, rating scales, and observation instruments developed by the Unit; (2) Behavior analysis, including the search for variables controlling the emission of a wide range of behaviors; (3) Etiological approaches, including the search for developmental, learning, genetic, ecological, and neurophysiological factors in the cause of mental disorders; and (4) Intervention approaches, in both their preventative and ameliorative aspects, including studies of high-risk groups, social structures, and methods of resocialization or therapy. The many studies referred to earlier in this report can be seen to fall within the scope of these four vectors.

In a brief summary of the Unit's accomplishments, perhaps the first area which must be mentioned is diagnosis, where the introduction of new interviewing and rating techniques, the development and application of reliability measures for assessment and diagnostic data, and the objective indicators of psychopathology developed in the Unit's behavioral analysis and neurophysiological work all point to much improved diagnostic procedures. While only a beginning has been
made in such areas of vital concern as etiology and prevention, the broad range of objective approaches being continually developed and explored is seen by the Unit as the best means of obtaining a better understanding of the circumstances which lead the vulnerable person we call "mentally ill" to succumb and of what we might do to prevent it. Indeed, much of the Unit's work can be viewed as an attempt to accomplish the objective description of the "circumstances," the "vulnerability," and the "illness" itself.

On the occasion of the Unit's first annual report, Zubin outlined the nature of biometric research in the following way:

"The Biometrician ... collects his data directly from the individual patient .... The Biometrician is responsible for determining the need for certain types of data, for designing the experimental procedures for their collection, selection of samples of patients, and evaluation and integration of results. Thus biometric method is independent of the particular disciplines to which it is applied and when new insights into mental disorders are found, be they biochemical, sociological, bacteriological, or psychological, the evaluation of the new techniques will often depend on biometric methodology."

This view is unmistakeably wide-ranging, and the diversity which has always characterized Biometrics can be seen to be an essential factor in the continuing vitality of the Unit's research.

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