The Revolution in Psychopathology
and its Implications for Mental Retardation

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I. Introduction

It is a great honor to be invited to address the Psychology Section of the American Association on Mental Deficiency. It has been some 20 years since I was privileged to address you -- at the Richmond Meeting on a problem in the Epidemiology of Mental Disorders. Little did I know at that time that during the following 20 years during which time I became busy with other matters, the face of mental deficiency, even its new name, would have changed so much. Those of you, who unlike me were part of the current revolution -- were in fact its front line soldiers -- may not be as aware of it as are outsiders like me, and that is perhaps why your program committee saw fit to invite me. In fact, during 15 of those 20 years, while teaching courses in current trends in research in abnormal psychology, I used to skip the topic of Mental Deficiency, since the field was at a standstill. During
the last five years, I have had to devote more and more time to this topic. What has brought about this rise in interest, research and knowledge?

A revolution has been brewing in the entire realm of psychopathology -- both in the field of the mental diseases as well as in the field of the mental deficiencies, and I stress deficiencies, because the fact that there is more than one type is now generally accepted. It is my purpose to contrast the effect of the revolution in both fields and indicate the relative advances made and what the future holds in both areas. While I may be suffering from the common illusion that the neighbor's lawn always seems greener, I do feel that progress and research in mental deficiency is advancing rapidly, and in several directions.

Before doing so, let me contrast the definitions of the two areas. While the distinction between mental disease and mental defect is itself worthy of an entire discourse, I shall for the purpose of this talk, define disease as a progressive process which, unless attended to adequately by remedial effort, will lead either to death or to severe reduction of efficiency. A defect is a stationary condition which leads only to reduced efficiency. The purpose of therapy from this point of view, is either to prevent a disease, or to reduce a disease to a stationary state -- that is, a defect, and then teach
the patient to live with his defect -- by adjusting to it, compensating for it or even exploiting it. You will note that I have not included happiness or unhappiness in my definition -- not that it does not belong -- but it is so difficult to define and would involve us in moral, ethical and esthetic issues which are beyond us now. Furthermore it is debatable whether the mentally retarded themselves (by contrast with their families) suffer from "unhappiness". From this point of view, schizophrenia is a disease as long as it is progressive even though it may not lead to death but merely to reduction of efficiency. Phenylketonuria is a disease unless it is prevented by phenylalanine-free or restricted diet, from birth on, or, if detected long after birth, it may change from a progressive disease to a stationary defect, as soon as the child is placed on a proper diet.

II. The Revolutions in Psychopathology

The current revolution is not the first in modern times. If we begin the modern period with Pinel, the first revolution is the introduction of moral therapy in the beginning of the 19th century. In mental defect, Itard introduced the first revolution by his attempt to educate the wild boy of Aveyron. Both moral therapy for the mentally ill and education for the mentally defective failed. The first because immigration and industrialization overcrowded the hospitals, the second because idiots and imbeciles were poor pupils. Nevertheless, both of these revolutions, short-lived though they were, left a rich heritage
which still serves us well today.

In the field of the mental diseases, the overcrowding of the hospitals led to stagnation and it was not until the middle of the 20th century that we began to overcome this handicap. General Paresis and Pellagra yielded their hidden etiologies in the first few decades, and the shock therapies came into use in the 30's. In the field of mental defect, the concept of defect was extended to include the morons and higher borderline levels and these lent themselves to the benefits of education. The greatest revolution during this period was the introduction of intelligence tests, an achievement to which nothing comparable can be pointed to in the field of mental illness. Finally, just as mental disease was found among those whose reasoning powers were unaffected (moral insanity) and emotional difficulties were included in the mental diseases, so social competence was added to intellectual deficit in the diagnosis of mental deficiency.

This brings us to the current revolution. What are its ear marks in the mental diseases? The following ear marks of the revolution are evident:

The revolution that I refer to was not unlike a political revolution where long simmering forces unleash a popular reaction against the status quo, law and order are overthrown, prison doors behind which the previous regime confined its opponents are thrown open, new power centers emerge, the national treasury is raided and the revolutionaries
settle down to become conservatives, eventually to be overthrown in turn.

The revolution in psychopathology has not been so drastic. It occurred quietly, without public furor, but its effects are no less telling. Law and order in psychopathology as represented by the diagnostic and legal procedures surrounding hospitalization, treatment, and release have been radically modified in the area of mental disease. The area of mental retardation was practically eliminated as an independent category in the new nomenclature. Whether these operations were a success is still debatable. Our admission policies have been liberalized with the result that commitment is becoming rarer and voluntary admissions are more common. The hospital doors have been thrown open, the prison aspect of our institutions is gone, release rates have been doubled in the mental diseases, but admission rates have risen in both disorders. What were formerly custodial, locked-door, institutions have been changed not into open-door hospitals, but revolving door hospitals. Each year about 70-80% of the admissions are released but some 40% are readmitted. The wall between the community and the hospital has been breached; the hospitals are always full but not with the same patients. Clinical psychologists, sociologists, anthropologists, statisticians, biometricians, biochemists, geneticists, pharmacologists, behavioral scientists, public health workers and others, hardly heard of in the halls of psychopathology during the 30's
are now, if not resident, at least frequent and interested visitors. Funds for research, rather scarce in the 30's are now, if not ample, at least available from the national treasury. The separation of mind and brain, a firm tenent of the 30's, is no longer regarded as a stumbling block in integrated attacks on mental disorders.

To summarize the results of this revolution briefly, we can say the following: First, responsibility for the mental patient is no longer the psychiatrist's alone. It is shared by the community, the family, and the school and these three social institutions are at present ill-equipped to handle the problem. Second, the detection of the presence of mental disorder is no longer the province of the psychiatrist alone. Psychologists, sociologists, anthropologists, social workers, public health nurses and officers, educators, business and labor leaders, must help in this regard. Third, in dealing with the mentally disordered, we are no longer exclusively concerned with diagnosing their illnesses; we are also concerned with their strengths as well as their weaknesses.

In the mental deficiencies, the revolution in management is not as evident. The hospitals are still gaining residents. The release policies which have improved tremendously for the mental diseases are not as striking yet for the mentally defective. Instead there has been a tremendous rise in the number seeking admission to the institutions for mental deficiency. I have pointed out elsewhere that the improve-
ment in the lot of the mentally ill in our hospitals is at least in part due to the shortage of man-power in the age group 20-30 from which schizophrenics are largely drawn. This shortage in the reservoir was produced by the lowering of the birth rate during the depression. With some 10 million souls fewer in the 20-30 year age group we should have experienced a decline in schizophrenics. Instead there has been a rise in admissions but also a rise in releases. Perhaps the shortage of severely ill people has brought the milder cases to the hospitals and this in turn brought about an air of therapeutic optimism. By the same token, mental deficiency, largely recruited from pre-adolescents, is experiencing an increase because of the recent rise in the birth rate. That is why we seem to be suddenly inundated with young patients in mental defect as well as in mental disease. Furthermore, the advances of medicine and the gradual reduction of infant mortality have also contributed to the saving of lives of those who in earlier times would have succumbed in infancy, only to develop mental deficiency and kindred ailments.

But the greatest impact on both types of mental disorder has come in the wake of arousal of public interest in the lot of the mentally disordered and in increase in tolerance. For the mentally retarded, the impact that the parents of retarded children made on the improvement of care is one of the most striking phenomena of our day. The fact that the parents of the most severely retarded are often
found among our most liberal, most productive, far sighted citizens
has prevented the stigma of mental illness from attaching itself to
mental defect. The accidental nature of severe retardation, attested
to by many surveys made this possible.

Our entire concept of remission from psychosis has undergone a
tremendous change. From the days of Esquirol and Pinel, approximately
one third of the patients has improved markedly, one third has improved
only slightly while one third has deteriorated. It used to be that only
the markedly improved group was released. The increased tolerance in
the present era has pushed the middle third out into the community,
either permanently or for some period of time. This increase in toler-
ance is due to many factors including the influence of the somato-
therapies, the improvement in hospital management, and the reduction
in the number of severe cases, brought about by the lowering of the
reservoir of the population from which schizophrenic patients are drawn.

Perhaps the greatest factor in the redefining of remission comes
from the adjustment that the family and society are making to the re-
mitted patient. Formerly, any erratic behavior was taken as a symptom,
or as a warning of worse things to come -- that the psychosis is return-
ing and that the patient must be sent back to the hospital. Today we
are beginning to view slight aberrations as personality quirks, harm-
less in nature, and to be adjusted to, rather than looked upon with
concern. We have known for a long time that remitted patients are more
law-abiding, less aggressive by and large, and not nearly as prone to get into mischief as the rest of the population. We have also known that they often exhibit behavior which we tend to classify as compulsive, senseless or wasteful, paranoid, depressive, quarrelsome etc. As long as we regard these quirks as idiosyncrasies, and not as harbingers of full-blown episodes to come, we can live with them, and the patient, too, can accept them as slight lapses. Suppose he goes through a series of wasteful efforts in a compulsive manner in performing a given task -- this can be contained. The first shock of required adjustment to such senseless behavior may jolt the family -- but, the alternative of returning the patient to the hospital is no solution.

It is important to point out that not every relapse should be regarded as a failure on the part of the family. Illnesses have their own cycles, and when the patient feels the need for asylum, he should receive it. However, society and family should not aid and abet, or create this need.

Professor Landis (1962) has recently prepared a book to be published by Holt, in '62, reviewing all the extant autobiographies of mental patients. There are about 500 of these. There are only three autobiographies of relatives of patients "Good by my Son" (Woolson, 1960) "The Layman looks at the Doctor" (Fierce & Pierce, 1929) and the "Cliff's Edge" (Hackett, 1954). We need a counterpart to "The Mind that Found Itself", which might be called "A Family that Found Itself"
through the acceptance of a remitted son or daughter, wife or husband, or books on "Life with a schizophrenic" or "I married a manic-depressive."

It is not yet established, but the evidence points to the possibility that carriers of certain dysgenic traits are also among our most talented. The father of a phenylpyruvic oligophrenic is a Nobel Prize winner, and a Kierkegaard can repay society for a thousand schizophrenics whose lives were, perhaps, needlessly wasted. This may sound like a revival of the link between insanity and genius -- but this is not my intention. What I am trying to say is that the forbears, as well as offspring of mental patients, do not exclude genius.

The provision of half-way houses, industrial training, out patient clinics and day hospitals has also been a tremendous boon.

It is likely that the training of retarded children will produce more easily assimilated workers than the rehabilitation of the mentally ill. Unfortunately, we do not have the shortage of man power in industry which some of the European countries are experiencing. This may be the reason why wide scale industrial training for the mentally handicapped seems to be more successful on the continent and in England than it is in this country.

III. Revolution in Research

In order to discuss adequately the current revolution in research it is necessary to introduce the well known concept of scientific
models through which most progress in science is usually described. The scientific model is merely a name for a structure of definitions and assumptions about a given set of phenomena which is parsimoniously organized and provides hypotheses for testing through observation and experimentation the tenability of the definitions and assumptions which underlie the models. Scientific models are more commonly found in the more advanced well-articulated sciences. Whether the field of mental disorders is ready for scientific models may be questioned but unless we provide even rudimentary models very little progress can be made in integrating the tremendous increase of knowledge occurring in the field. Furthermore, we must recognize that psychology is far more basic a science than the so-called physical sciences which appear to be so highly advanced. There is nothing in modern physical science that was not once as vague and intuitive as say, anxiety, is today. Let us take a look in cave during the ice age before the advent of fire and listen to an imaginary symposium on the causes of the feeling of subjective warmth.

An old savant, accustomed to keeping warm under blankets, proposes that blankets are the source of warmth, and the number of blankets its proper measure. A younger man, athletically inclined, insists that running is the source of warmth, and the distance or speed of running the proper measure. A sun-bather is of the opinion that bathing in the sun is the source of warmth, and duration of exposure to the sun
a good measure. A medicine man confounds the issue by pointing out that his patients feel warm without benefit of blankets, sun, or running, and insists that the possessing demon who has entered the patient's body is the source of warmth, with the size or strength of the demon being the appropriate measure. Predictably enough, the symposium fails to resolve the issue. The participants remain so greatly at odds, in fact, that no report of the proceedings appears.

Several aeons later, however, someone discovers how to make fire mechanically (the incendiary effect of lightning having previously been noted) and demonstrates that by increasing the number of faggots he can increase the subjective warmth of all those present, while by decreasing that number he can diminish subjective warmth. The breakthrough has occurred.

Passing now to early recorded history, we find that the Babylonians measured warmth in four steps, ranging from the hottest day of summer to the coldest day of winter. It is a long step from this crude scale to the invention of the thermometer, once it is noticed that mercury expands and contracts, yet we can imagine that the populace might have complained about the inaccuracy of the new instrument because it registered the same degree of warmth for two days in which the degree of subjective warmth differed markedly. Eventually it is seen that it is the virtue of objective units that they not only measure what they purport to measure but they also help clarify the
concepts behind the dimension that is scaled. Thus, without the objective measurement of temperature that the thermometer afforded, the role of humidity and pressure in the production of subjective warmth would not have been isolated. Thermometers, rulers, scales, clocks did more than eliminate self-reference; they also extended the boundaries of measurement to regions beyond the reach of self-referred measurement.
The scientific models which have been proposed for the aetiology of mental disorders are: (1) the social cultural model (2) the developmental model (3) learning theory (4) genetic (5) internal environment and (6) brain function.

The social cultural model stresses the social-cultural milieu as the breeding grounds for mental disorder.

A consideration of the social-cultural model leads us directly beyond the institutional walls and requires field studies in the general population for a full understanding. In the field of mental disease the evidence for the aetiological role of these factors rests on the findings that lower socio-economic status, social disorganization, overcrowding, isolation, and anomie tend to produce higher rates of mental disease. They also tend to produce higher rates of mental defect. In the case of the mental diseases it is not always possible to find the causal link between the social-cultural factors and the illness, and it has been claimed with some evidence that low socio-economic level is not the cause but the effect of mental illness. The data provided by English studies fit this hypotheses well. While it is doubtful whether social cultural factors can give rise to psychosis, conflicts arising from the social cultural matrix may give rise to other types of mental illness such as neurosis, psychopathic personality, character disorders, alcoholism, drug addiction and delinquency. Whether the social cultural conflicts are the causal agents or merely the eliciting or precipitating agents
is still a debatable question. In the case of mental defect, it is a little easier to trace the possible connection. Lower social cultural status is usually accompanied by lowered maternal health during pregnancy and by lower educational facilities during childhood. The first may give rise, as we shall soon see, to interference with intra-uterine development which may prove to be causal of subsequent retardation and the second may give rise to pseudo-mental retardation. This condition arises in individuals deprived of the stimulation and training needed to attain mental development. These are pseudo-retardates, because, for the most part they can be reclaimed with proper care and it is from their members that emotional disturbances and delinquent behavior may arise because of the frustration they suffer. Thus, enlisted men during World War II who were found to be mentally unqualified for service and were placed in labor battalions on the basis of their score on verbal intelligence tests, were found on follow-up to have a normal distribution of Porteus Maze Test scores which is relatively free of the verbal factor. Thus, the demands of a particular situation may produce pseudo-retardates who could function well in other situations. Our general conclusion is that social-cultural factors may elicit subnormality or occlude it, but rarely create it, once the person has passed into physiological maturity.

The second scientific model, the developmental model, which though dependent to some extent upon social-cultural factors is also largely
dependent on the biological. This model, largely in the hands of Freudian and Meyerian inspired workers, has now taken a turn into more objective areas. Ethologists have entered with investigations of the instinctual behavior of animals, and experimental psychologists with the investigation of early life experience of animals. Both of these types of studies tend to indicate that the early hunches regarding the influence of early experience on subsequent personality were essentially correct but, thus far, no evidence of their role in producing psychopathology is evident. "Maternal behavior" especially has been implicated, ranging from the demonstration by Birch and Schneirla that mothering requires the cooperation of both mother and offspring and that maladaptive behavior or rejection can result from defects in either one, to Harlow's dethroning of filial love into love for soft terry cloth. The failure of the offspring raised on terry cloth mother surrogates to develop psychosexual maturity and their failure to develop maternal behavior towards their own offspring are being watched with keen interest by all workers. Perhaps the most striking recent development has been in the paranatal field, where deviant gestation events seem to underlie a good many subsequent deviations. We have actually pushed back some of the causes of psychopathology into the uterine environment or to congenital conditions. This is our new frontier. Apparently, the moment when the deprivation or trauma occurs seems to be an important determiner of subsequent psychopathology. This is a burgeoning field in which such
factors as toxemias of pregnancy, intercurrent illnesses during pregnancy, preconception injuries to the germ plasm through radiation, early childhood deprivation, etc. loom large. Such facts as those revealed by the Pasanick like regarding the higher incidence of toxemias in the pregnancies associated with subsequent development of behavior problems, reading disability, etc., in the offspring, fall into this category. The first 9 months of life, which we do not even count in chronological age seem to be far more important for subsequent development than we had anticipated. The fact that these toxemias are also associated with low socioeconomic status has often led to diagnosing these children as pseudo-mental defectives rather than as basically mentally defective. These pseudo - pseudo-mental defectives have to be recognized for what they are -- victims of organic injury rather than social deprivation. The classic Roberts survey of the City of Bath in which it was found that the siblings of the low I.Q. children (below 50) were normally distributed with regard to intelligence while the siblings of the higher I.Q. children (70-80) were largely from the same level of intelligence, also falls into place here. Apparently, the excess of extremely low I.Q.'s is largely due to paranatal and genetic factors.

The most exciting hypothesis emerging from the developmental model is that provided by Pasanick and his coworkers regarding the continuum of reproductive casualty. In a series of well documented retrospective investigations, he has found five clinical entities associated with
complications of pregnancy and prematurity: cerebral palsy, epilepsy, mental deficiency, behavior disorders, and reading disabilities. Tics were found to be associated with complications of pregnancy, but not with prematurity. The association of speech disorders with paranatal factors is not entirely established in cases dis-
sociated from cerebral palsy or mental deficiency. Thus, interference with the foetus will produce a condition which varies on the one extreme from stillbirths through more severe conditions in those born alive ranging from cerebral palsy, epilepsy and mental deficiency to the somewhat lesser conditions of behavior disorders, and reading disability. By the time the child comes for examination, there is usually no neuro-
logical sign of his suspected early brain injury, and only the history of gestation difficulty is present as an indicator of the possible source of the difficulty. Since evidence of brain injury during the paranatal period must, at the present time, remain an inference rather than an observation, we shall be unable to resolve this issue until more direct evidence becomes available.

One of the more puzzling facts that the psychopathologist has to deal with is the rather striking differential in incidence of mental disorders between males and females. Girls show a higher incidence of nail biting and general emotionality but boys have higher rates of mental retardation, epilepsy, reading disability, to mention only a few of the disabilities traceable at least statistically to the influence of
gestational difficulties. In adulthood, women do not differ from men in schizophrenia, but have higher rates in the other major psychoses. This differential sex-ratio is not limited to the mental disorders. In two thirds of human ailments, females fare better than males and the longevity advantage for females is such a well-entrenched fact that it has become one of the earmarks of western culture.

Attempts have been made to attribute some of the greater vulnerability of the male to social and cultural pressures. But the higher vulnerability of the male holds true through the entire animal kingdom. Even the male of the lowly housefly is more vulnerable than the female and this can hardly be blamed on social-cultural expectation. In each of the conditions included in Pasamanick's continuum of reproductive casualty, the males are more affected than the females. A recent study by Stott of the University of Glasgow presents some additional evidence for the reproductive casualty continuum in explaining impairment of temperament which might usually be regarded as merely a reflection of life experience and in this way reflect social rather than biological vulnerability. By comparing a group of mentally defective and scholastically very backward children with normal controls, he first establishes the higher incidence of disturbed pregnancy in the affected group and finds a personality type of "unforthcomingness" which though related to pregnancy stress is not associated with other benchmarks of pregnancy stress such as physical handicap, infantile ill health, congenital mal-
formation. Apparently, if the pregnancy stress occurs in the third trimester of pregnancy, the "unforthcomingness" syndrome can occur without the other anomalies accompanying pregnancy stress. This condition seems to be independent also of maternal deprivation, cultural adequacy of the home, stability of mother, unfavorable family situation, etc. The central feature of this syndrome is absence of natural assertiveness and will to effectiveness. Normal children who do not lack these qualities seek new experience and overcome reasonable difficulties. The unforthcoming children suffer from lack of confidence, resulting in avoidance or inhibition in the face of any new situation or problem; and the child is usually too timid to stand up for itself and is retiring and "mousey" in its general manner. Hence, even in children who show no other signs of pregnancy-stress, this syndrome may interfere with learning.

There is sufficient reason to believe that at least part of the excess ratio of male to female disability in childhood is attributable to vulnerabilities developing during the gestation period. While one must not overlook the influence of social expectancy in aggravating further the vulnerability of the vulnerable male, one could also turn his attention to preventing vulnerability in the first place by proper maternal care and education. Here is where the majority of the problem may lie and here is where we must direct our efforts towards improvement.

Apparently one hope of dealing with most reading disability and learning disability is prevention, not at the school grade level, but at
the intra-uterine level, preventing such occurrences as toxemias of pregnancy and other conditions which may affect the surviving infant adversely. Thus, maternal health and its maintainance may be one way of curing a condition which by its very nature makes the male more vulnerable, and this to be sure may have nothing to do with such environmental factors as attitudes of society and expectancy of society for the male child.

Pasamanick and his colleagues find that speech disorders are not found significantly more frequently in gestations which were accompanied by complications in pregnancy. This leads to the inference that the sex ratio with regard to speech disorders is independent of the continuum of reproductive casualty and that therefore the speech difficulties are more innate and less subject to environmental stresses in the intra-uterine environment. However, there is a possibility that psychological factors may also be involved in the development of speech difficulties because more multiple pregnancies and more later born children were found in the speech defective group suggesting the role of psychosocial factors in the etiology of speech disorders. Perhaps twins learn from each other certain speech inadequacies which they reinforce in one another. The prevention of some of these psychologically and socially disabling disorders may lie in the guidance of mothers in the early management of speech behavior in their children.

The genetic model is well known through the work of Rüdin and his
school and the work of his colleague and collaborator Franz Kallman in this country. There is no longer any question of the importance of genetic components in such diseases as the functional psychoses, and even in some of the neuroses; but this does not mean that heredity is enough. Men do not inherit diseases as they inherit money, they merely inherit a predisposition. The big question now is, how does this predisposition work to produce the illness? Genetics has stopped begging for admission into psychiatry; instead it becomes necessary to demonstrate not that it works, but how it works.

Perhaps the most striking contrast between the scientific advance in the two fields has occurred in the genetic model. Genetic investigations in the field of mental illness have made many strides forward, but the results have been largely based on population studies in which statistical evidence from studies of the blood relatives of probands, monozygotic and dizygotic twins, constituted the contributions. Some recent developments have enabled geneticists to count the number of chromosomes in the human cell, though we have as a consequence lost two chromosomes -- we now have only 46 instead of the former claim of 48. Beadle's work in finding out the biochemistry of genic action also opens up the possibility of supplying missing substances needed for health but not produced by the mutant gene, or of preventing the accumulation of substances which the mutant gene's enzyme system cannot deal with adequately. In the field of mental deficiency, the identi-
ification of trisomy in the 21st chromosome in mongolian mental deficiency and the identification of the inborn errors of metabolism in phenylketonuria, methemoglobinemia, galactosemia, and a variety of other diseases does not have any counterpart in the functional psychoses. It is these breakthroughs, even though they account for a very small percentage of the total, that have raised the optimism of workers in both types of disorders that eventually they will all be brought under control. Another possibility is opened by the discovery that the parents of mental defectives, though free of the defect themselves are carriers of the dysgenic genes. Since the identity of carriers can now be determined by biochemical tests, genetic counselling can help in the future prevention of mental deficiency. Thus, heterozygous carriers of the mutant gene for PKU can be detected by phenylalanine tolerance tests.

Perhaps the most valuable approach to the problem is to contrast the possibilities that may arise in the interaction between heredity and environment. The variability that characterizes environment is for the most part immediately apprehensible and palpable. The variability inherent in heredity can only be surmized. Scientific models can be postulated in which heredity can vary from being equal for all to being distributed in some specific way (in a normal distribution, for example) to being limitless in its potential. The present distribution of intelligence in the population could be achieved by a combination of the variability inherent in the environment and either a con-
stant inheritance limited for all, a distributed limited inheritance for all or an unlimited inheritance.

Perhaps the most striking differences in point of view is, on the one hand, the model proposed by the Pasamanicks who postulate that man is conceived (not born, conceived) equal but life experience eats away at the Urstoff which each of us possessed in equal amounts at time of conception, reducing some of us to subnormality while others are able to progress normally. On the opposite end of the scale is the assumption that there is a genetically inherited limit on each of us which we can never transcend despite the most favorable environment. At another pole is the possibility that under favorable environments, man's inherited capacity is limitless. Only research can decide which of these models is the most tenable.

The learning model focuses essentially on the role of previous experience on subsequent behavior regardless of when the experience occurs. This is a fast developing field in which the analogue to neuroses, psychoses and mental deficiencies is sought in animals through such techniques as conditioned emotional responses, avoidance conditioning, and others. These analogues have already demonstrated a similarity to human conditions which is too close for comfort for those who believe that man's diseases and defects cannot be understood through animal work. Brady has demonstrated the production of ulcers in monkeys through techniques not unlike those which produce ulcers in executives, and the
disruptive effect of high anxiety on learning has also been demonstrated. Recently, the Beta hypothesis of Dunlap has been revived at the Maudsley Hospital and by Wolpe. This technique has its paradigm in Dunlap's famous demonstration that typing teh for the can be eliminated by wilfully practicing the error and thus extinguishing it. It can be used effectively in the reduction of tics, enuresis, and to some extent stuttering, without the introduction of substitute symptoms.

The effect of radiation on mental deficiency rates has recently been suggested by Gentry who found an association between the incidence of mental deficiency as measured by admission rates in a given locality and the geologic structure of the rocks in this area with regard to their radio-active bearing minerals. The significance of their findings for mental retardation is an intriguing one, and substantiation of the finding would be a most welcome undertaking. The fact that radiation impairs the learning ability of animals has been demonstrated in the laboratory.

The internal environment consisting of the blood and plasma and other body fluids as a basis for a scientific model has recently come in for a good deal of attention. Almost everything secreted or synthesized by the body has been offered at one time or another as the cause of schizophrenia. In fact, the biochemists have become so active that they have won first place over psychology as the science with the richest repertoire of negative findings. Apparently, before body fluids can be
compared in normals and abnormals, it is necessary that their food intake be equivalent or their \( N^{+} \) intake be in balance. In several painstaking studies significant differences were found between schizophrenics and normals only to discover that they reflected not schizophrenia but excessive coffee drinking on the part of schizophrenics and tooth-paste use on the part of the normals. Psychologists have for a long time known that motivation influences test performance. Now the biochemists are finding out that nutrition affects body fluids. Such work has recently been dubbed "Pure drug and food psychiatry." At all events, the biochemists have the easier job -- they can circumvent differences in nutrition much more readily than psychologists can overcome differences in motivation.

The scientific model for psychopathology which has made great strides forward in recent years has been the neurophysiological model, which involves study of brain centers, blood-brain barriers and neural conductivity. Perhaps the most exciting findings are, on the one hand, the eliciting of sensory, perceptual and conceptual behavior through direct brain stimulation à la Penfield and on the other hand, the evocation of behavior through implanted electrodes. If the brain is truly the seat of the mind, increase in knowledge of brain function is bound to be reflected in increased understanding of the mind. Hess's pioneer work in implanted electrodes picked up by Hebb, Olds and Milner has now been reported successfully in human beings in Scandinavia. Semmes Jacobson
is reportedly finding that pleasurable and unpleasurable feeling tones can be induced through stimulation with implanted electrodes and that some of the patients report sexual stimulation as one of the accompaniments.

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. Thus, two people may have inherited the same predisposition, but because of differential stress or 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, para-natal existence, genetics, 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.

Surveys of the prevalence and incidence of mental illness have been made by a variety of investigators. As far as schizophrenia is
concerned, it is generally agreed that about 1% of the population suffer from this disease. Regarding the other forms of psychoses, there are 2-4% manic depressives, and a total of some 8 to 12% of each generation seem to suffer from some type of disabling mental disorder. When all types of mental deviations are included -- neuroses, character disorders and minor ailments, the proportion rises to 86% in the Midtown study and to equally high proportions in other field studies.
The European surveys in mental deficiency have thrown a considerable light on the results of the epidemiological approach in this field. Sir Aubrey Lewis in a recent report has summarized the outcome of the British experience as follows (and these findings are reflected in the recommendation of the Royal Commission on Mental Disorders):

(1) The fact that the siblings of the idiots and imbeciles have the normally expected distribution of intelligence and the fact that their parents have the same distribution of occupations as the general population leads one to believe that these conditions are largely either paranatal accidents or genetically rare recessives.

(2) The fact that the siblings of the feebleminded (morons) are for the most part also feebleminded and come from socially and economically unfavored levels leads to one of two possible conclusions:

(a) the more favored families have as many feebleminded but keep them out of institutions or out of trouble or even out of "feeblemindedness" by proper training suited to their needs.

(b) feeblemindedness has a stronger hereditary component than idiocy and imbecility.

The British Royal Commission influenced by the above findings has eschewed the term mental deficiency in favor of (1) severely subnormal (imbeciles, idiots and those feebleminded who cannot lead independent lives) and (2) psychopathic personality, with or without marked limitation of intelligence.
In general, there is little difference between families who retain their idiots and imbeciles at home and those who institutionalize them, except for the factor of the mother's mental health. The mothers who kept their unfortunates at home were found to be healthier mentally. The defective child in such a home usually filled a material and emotional need. On the other hand, the defectives in institutions had a higher proportion of defective and maladjusted siblings. It is interesting that the birth of a defective child did not limit procreation in either type of family.

I have discussed the past and the present, what of the future? Since part of the problem is the distinguishing of the congenital mental deficiencies from the socially induced mental deficiencies, psychological assessment is an indispensable technique. We have gone as far as we can go with the global intelligence tests and with paper and pencil techniques. To assess the capacities and shortcomings of the mental defective, new approaches are required. Binet, Goddard and Terman did a tremendous service to the feebleminded by providing the mental age scale, but their followers did a tremendous disservice by throwing out those psycho-physical and experimental techniques which, though measuring individual differences, did not correlate with the central intelligence factor. Physiological, sensory, perceptual, psychomotor, as well as specific conceptual techniques are needed to assess the abilities and disabilities of the patient and focussed interview techniques are needed to evaluate
his personality.

At the present time, the intelligence tests, standardized as they are on normal populations, give a clear picture of the defects of the patient, i.e. of the low altitude of his intelligence, but give no idea of the breadth of his various abilities. Furthermore, as Dr. Helen Schucman has shown, the initial test is hardly as good an indicator of future development as is the gain from initial to retest. The old dictum that mental deficiency was incurable may still hold true in some instances, but as long as there is life, there is hope of learning, and while the patient may not learn as much as a normal, what he learns may prove quite useful to him and to society. And sometimes, surprises do occur. One of the big surprises has been the gradual disappearance of many mentally defective children in follow-up studies. Apparently, the peak for discovery and institutionalization for mental deficiency is age 14, when the school closes in on the slow learners and finds them defective. After adolescence many of them can no longer be found in institutions or in treatment. Since there is no evidence for higher mortality, perhaps, slow as they are, many of them finally "learn", for even an IQ of 50 can theoretically attain a mental age of 10, at the chronological age of 20! This may happen more often than we now suspect. With the use of these techniques, better classification, better prognosis, and treatment more suitable to the individual case will be forthcoming for the wide variety of the mental deficiencies.
Another problem that must be faced is the dependence of the recognition of mental deficiency upon the social-cultural milieu. Perhaps the greatest difference in this respect arises between European and American practice, the Europeans being able to retain more of their feebleminded in the community. Thus, the Netherlands, with a population no smaller than New York State, has an institutionalization rate only 1/3rd as high, and Amsterdam, a rate only 1/10th as high as New York City.

The dependence of the criterion for detection of mental deficiency on the social milieu is most strikingly expressed by Book, (Book, Jan A. Genetic Etiology in Mental Illness, The Milbank Memorial Fund Quarterly 1960, 38, 193-212) in the following terms: "Just where, on the slope of the (normal) curve, pleasant physiological stupidity changes into social or medical problematics is a matter of conjecture. More important than such conjectures is the fact that the malignancy of inferior intelligence is a function of technical and social developments and public tolerance." The only solution that suggests itself is to organize cross-cultural teams of psychiatrists, psychologists, sociologists, biometricians and epidemiologists to investigate the prevalence and incidence of the mental deficiencies in various cultures. A beginning in this direction may be made by utilizing the draft-registrants in the various NATO countries and screening these registrants (not draftees) by teams composed of international experts in mental deficiency. The utilization of psychological test performance, work history, social adaptability and similar factors
would go a long way in describing the varieties of mental deficiency that are recognized in various cultures as well as those that would be recognized as such in one culture but not in another.

Summary.

Whether we are aware of it or not, a veritable revolution is taking place in psychopathology. The impact of this revolution has been most striking in the administrative and management efforts devoted to the mentally disordered. While many factors have made this revolution possible, including such factors as changes in birth rates, population composition, socio-economic and industrial changes, perhaps one of the most important has been change in attitude both on the part of the professional group as well as of the laity with regard to the potential for improvement that exists even in the most severely affected cases. The increased hopefulness of the professional worker and the greater tolerance of the community for mental deviation are the basis for our current optimism. But this era of optimism would be shortlived if we did not continue to make the scientific progress in uncovering causes, prevention and reeducation. The scientific progress in mental deficiency has been most striking even though it has concerned only a small fraction of the problem. For several decades mental deficiency was a neglected field. Now, from being the stone which the builders have rejected, it may become the corner stone of the edifice, giving new directions to
the discovery of the causes of deviations in behavior. How to prepare a new generation of practitioners and research workers who can continue to make progress is one of our several challenges. It is clear that no single discipline can encompass the field. There is a need for a new type of mental health worker, who, steeped in his own discipline, will nevertheless be sufficiently conversant with the progress in adjacent fields to benefit from it and in return let it benefit from his endeavors. An interdisciplinary team in which men of good will from different fields can work, if not together, at least side by side to permit exchange of new ideas and discoveries -- where to train such people and how, remains the most crucial problem for the field of psychopathology.
Effect of modality shift on reaction time in schizophrenia

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