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EXACT AND INEXACT METHODS IN NEUROLOGY
AND PSYCHIATRY

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It has been said that being upon the threshold of a new era of national expansion, our own specialty of neurology and psychiatry must keep pace with general progress and become energized along yet unexplored lines. Whether or not this be true, I cannot bring myself to believe that we will achieve any acceptable measure of success, if we allow the momentary glamor that inexact methods of investigation cast about them, to divert us from those principles of scientific study that have heretofore served us so well and which alone merit being called "exact."

You will have noticed that although addressing the American Association of Neurologists, I have referred to neurology and psychiatry as representing but one branch of medicine. This I have done because it has been the manifest tendency for these two fields to become ever closer and closer in their relations to each other. While the rest of modern medicine shows a deplorable inclination more and more to split up into special fields, neurology and psychiatry show an unmistakable disposition toward amalgamation. This is most gratifying. A generation or two ago matters were altogether different. Then neurology constituted a branch of internal medicine, while in most universities psychiatry was not at all taught or, as was yet the case in one European university at the time when this association was founded—in 1874—was taught by a member of the philosophical faculty.¹

That was the period when the "soul" was looked upon as a special independent immaterial entity and therefore not subject to the laws that govern bodily life. The "soul" was sought in the ether, beyond the clouds, everywhere but there where it actually is—in the body.

¹ Koenigsberg.

This attitude remained unchanged until the inductive method of investigation brought experimentation also into the field of psychiatry. Then it became only too evident how dependent were the psychic functions upon material formations, the brain and nervous system. The more progress was made the more manifest became the dominating rôle that the nervous system played in bringing about the bodily as well as the mental manifestations of life. In the light of modern science the bodily and psychic functions are but different forms of the same brain and nerve activity. And it is this recognition that joins neurology and psychiatry into one inseparable whole. To-day we can speak of neurology in an extended sense as well as in a restricted one. Neurology in its extended sense is no specialty but bears the most intimate relation to all branches of medicine in so far as the activities of all the organs of the body are innervated and all bodily functions are activated and regulated by the nervous system. On the other hand, neurology in its restricted sense confines itself to the investigation of those molecular changes of brain and nerve substance that bring about sense impressions and by means of the association paths elicit those reactions which we denominate psychic processes. From this point of view neurology represents the basis of psychology as well as of psychiatry. To be more exact we should speak only of brain and nerve physiology instead of psychology, and of nerve and brain pathology instead of psychiatry. It would be most deplorable should the attempt so often made to bring about a dissociation between neurology and psychiatry meet with success. It is manifest that scientific investigations of the diseases of one and the same organ, even when, in view of its complicated physical and psychic functions, they are conducted in different ways, will be best promoted by combined organization, and by a conjoined and correlated effort. The teachings of Griesinger and Westphal already served to implant and to fixate the fact that the study of mental disease, that is brain disease, cannot be conducted with any hope of success unless continuous consideration be given to the other diseases that may affect the nervous system, and that the study of neurology is in many ways supported and assisted by the study of psychiatry. The truth of this at once becomes evident when we consider how impossible it is to separate the neuroses and the psycho-neuroses and recall that most

mental diseases manifest themselves not only in disorder of judgment, volition and psychic activities of other kinds, but at the same time also show disturbance of reflex action and disorder of other physical processes. I am sure all of us have noticed how more and more the conviction is spreading among neurologists and psychiatrists that their two specialties are becoming interwoven and cannot be dissociated. Certainly unless there be harmonious coöperation in these two fields of medicine no understanding of the borderland states of nerve and mental activity as well as of other unsolved problems can be attained.

The more stable the notion becomes that it is unscientific and would lead to inexact methods of study were the correlated branches of medicine, neurology and psychiatry, to be artificially separated, the more favorable is the outlook for the future development of both of them. If we now ask ourselves to which methods our specialty owes its past success, and which investigational direction promises the greatest future progress, it must be self-evident that those methods only can be recognized as exact, as scientific, that stand upon the groundwork of fact. The method of speculative investigation that constructs theories as to how things should be or how things might be from its imagination alone, or draws unwarrantable generalizations from single observations must in our work be relegated to the forgotten past.

Among the exact or scientific methods of investigation which through their accomplishments have earned a place of standing in neurology and psychiatry, I count above all clinical observation, the oldest and best tested auxiliary of the entire science of medicine; furthermore anatomic-microscopic examination of the structures of the body, furthermore the microscopic examination of the blood and other fluid components of the body, among which must be included above all the complement fixation test of Wassermann with its various modifications, Abderhalden's sero-diagnosis, or test of organic function, as well as the examination directed toward a study of the secretions of the ductless glands. In the light of past experience no one of these methods can of itself bring about the scientific progress we desire, and it would be an error to rely upon any one method and neglect the use of the others. They all supplement and control one another and what one cannot bring about of itself they all effect when employed together.

It can of course not be my purpose to enumerate all the individual advances, so well known to you, that neurology and psychiatry have made; all I desire is to map out the main routes in order to indicate the direction that future investigations will have to take.

More and more has clinical observation taught us that in the field of neurology and psychiatry as in all other fields of practical medicine, we must learn to individualize. Health and disease are not antagonists; they represent merely different manifestations of the same vital activity. According to modern views an individual is sick only as compared to himself and his own previous state of health, not as compared to an arbitrarily constructed "norm," and the very same manifestations which in the one are distinctly pathological may in another still lie within the confines of health. It is impossible to determine precisely where health ceases and disease commences. The one passes into the other unnoticeably by means of endless intermediary stages, and for this reason the borderlands play so important a rôle in all of modern medicine and in our own special field. It is for this reason we strive for an individual pathology, which must be predominantly conceived as a pathological physiology and above all represents the view that disease is a restriction of efficiency which varies from case to case. Present-day medicine no longer knows the division of human beings into two classes, the healthy and the sick, but deals only with individuals, no two of whom are precisely the same and each one of whom must be treated in accordance with his own individuality. This fundamental principle has by no means yet been adopted by physicians to the degree one would expect, and it is for this reason I have not considered it superfluous to refer to it again upon the present occasion.

Our diagnoses are still far too much cast in one common mold and our therapeutic ordinances are too little influenced by the modern principle of treating not the disease but the man.

By means of an individual pathology clinical observation will also succeed more and more in recognizing disease processes of nervous and mental life which to-day are yet very much in the dark. The anatomic-microscopic method of investigation seems at present to have come to a standstill. For decades it has held sovereign sway in all fields of medicine and also in neurology and

psychiatry, and that our specialty has been enormously advanced through this method of study need at this late date not be unfolded. Every one of us knows that only through anatomical and histological investigations has a satisfactory basis been derived for the recognition of the dependence of psychic processes upon the constitution of brain and nerve tissues. In the course of time, however, it has become more and more evident that the gross and delicate structural changes that we are able to recognize already represent the end products of disease from which we can learn nothing regarding the beginnings of the disease itself. This shortcoming becomes a veritable hardship in our investigation of the nature of functional disturbances. True we know that there are functional disturbances dependent essentially upon morbid ideas. Others moreover are based upon variations in the blood supply, upon the resorption of toxic materials, etc., although it is as yet not possible for us to demonstrate the existence of any structural alterations. Yet in all these instances cellular damage upon which the abnormal function is dependent must exist. A priori we may assume that this cellular damage is originally too minimal to be recognized by our existing microscopes. We are then obliged to speak of "functional" diseases. Gradually the destructive process progresses, until it can be demonstrated upon the cadaver. Of course the direct proof *intra vitam* of its existence is never possible. It still remains for experimental investigation to cast more light upon this problem. In animal experimentation alone, when the animal is killed, and the process of disease interrupted at any stage of its course, can each step of the instituted organic change be carefully observed and a chain of events continuous from the beginning to the end, be obtained.

In so far as conclusions from analogy are at all permissible, that is, in so far as we are entitled to draw conclusions regarding the behavior of human tissue from the comportment of animal tissues placed under the same or similar conditions, experimental investigation, beyond any doubt, still presents a wide scope for activity in our field of work. This is shown by the more recent experiments regarding the localization in the cerebral cortex. Not only the localization of the anterior limbs in the lobus quadrangularis and of the posterior extremities in the lobus semilunaris superior, but also the more precise localization of certain

directional movements within these areas has become part of our knowledge. It however appears to me that an essential prerequisite for favorable progress lies above all in our coming to an agreement concerning certain fundamental questions which are of importance not only for pathology but also for therapeutics. Here I will but recall the neuron theory. Quite generally at present the neurons or nerve units are looked upon as ganglion cells together with their pertaining dendrites and neurites, and their endings of delicate arborization. According to this theory there exists no continuous nerve network but only neurons connected by continuity and contact. By others, on the other hand, the significance of the neuron as a physiological and histological entity, is denied, and the fibrillar substance (neurophil) is looked upon as the bearer of nerve activity, while the ganglion cells are held to serve as nutritional centers for the metabolism of the nerve tissue. May this one indication suffice to demonstrate how far distant we still are from the goal that science desires to attain; that of being able to recognize facts and to so explain them that no difference of opinion can exist. But just as the doctrine of the neuron is still far from a definite decision, so it would seem that the hopes placed in the Abderhalden method, which just now is very much in the foreground, are to be but partially fulfilled.

The literature concerning the theory of the defensive ferments has already assumed such enormous proportions that I shall limit myself to a restatement of the essential underlying principle. Abderhalden starts from the premise that all organs whose function is disordered cast off cellular components into the circulation. There, not having passed through the intestinal tract and not having been transformed or disintegrated into an assimilable state by means of the digestive juices, they act as foreign bodies and bring about the formation of defensive ferments in the blood. The defensive ferments so to say take the place of the digestion that would have resulted had these cellular components passed through the intestinal tract. The sero-diagnostic test now consists simply in bringing the blood serum in contact, *seriatim* with the various organs. Where these organs remain unaltered the proof is given that no specific defensive ferments are present (for otherwise the organs would have been attacked); where however, the process of decomposition can be demon-

strated by means of the ninhydrin test, this occurrence can be explained only by the presence of specific defensive ferments and for this reason the respective organs of the individual from whom the blood serum has been derived must be diseased, or no defensive ferments would have been formed. The theory seems very plausible. The technical execution is extraordinarily difficult and gives contradictory results when but the slightest error is made. Even when the ninhydrin test gives a positive reaction, we can never be sure that this is not due to the entrance of germs into the dialysation thimbles, the tested organs therefore being no longer entirely aseptic. Moreover the color distinctions are so delicate that under improper illumination the grossest errors may take place. Much complaint has been made of these sources of error. On the other hand many investigators have expressed their entire satisfaction with the method, provided it has been carried out with proper care and precision. Stress has been laid upon the fact that the Abderhalden test has a far greater value than the Wassermann test, as the latter is limited to the proof of the existence of lues. Fauser was probably the first to apply these tests in mental disorders and his results have been corroborated by subsequent observers, so that we are now justified in speaking of a special sero-diagnosis of nervous and mental diseases. There is at present much evidence before us tending to show that in dementia præcox, breakdown products of the protein of the brain cortex and of the genital glands, in dementia paralytica breakdown products of the cortex and of some other organs are present in the circulation and gives rise to protective ferments which may be demonstrated by the Abderhalden method, whereas in none of the psychoses and neuroses, known as "functional" and "constitutional" can the presence of such ferments be demonstrated.

While it may as yet be questioned whether all that has been expected of the Abderhalden method will become an accomplished fact it is even now certain that the method of investigation directed toward a study of the processes of inner secretion does furnish us with very serviceable results. Investigations of recent years have cleared up the relationship between a number of nervous and psychic disorders and the hypo- or hyper-function of glands of internal secretion especially of the thyroid, the hypophysis and the generative glands, and have made it seem neces-

sary to focus our attention upon these ductless glands as possibly being at fault in periodic asthenias of the nervous system as well as of the body in general. The alteration which we look upon as resulting from disorders of internal secretion are so characteristic, that their diagnosis to-day presents but little difficulty. The firmest support of this method has been the experiment. The removal of the thyroid, the hypophysis, the adrenals, the ovaries or the testicles in the animal is regularly followed by definite symptoms of hypo-secretion; the administration of this same organic substance to healthy animals by feeding or injections regularly produces symptoms of hypersecretion. Both hypo-secretory and hyper-secretory disorders thus artificially produced correspond entirely with the observations made in man when these corresponding organs have become diseased. I firmly believe that this method also will lead to further disclosures. Less valuable for neurologic and psychiatric diagnosis have been the microscopic and chemical examination of the blood. Very many investigators have demonstrated that certain nervous and mental diseases are accompanied by qualitative blood changes manifesting themselves as hyperemia, anemia, leucocytosis, polycythemia, poikilocytosis, etc. The findings are however not sufficiently characteristic to warrant any definite and invariable diagnostic deduction.

My own experience, covering thousands of blood examinations in cases of nervous and mental disease, in many instances extending over months and embracing a long series of experimental investigations regarding the alkalinity of the blood, has convinced me that their sole value lies in the possibility of recognizing complications dependent upon well-known disorders of the blood state itself and in differentiating some of the acute infectious processes of the central nervous system as well as in recognizing the presence of some organic basis for affections which upon their face appear to be of a functional nervous character. The blood changes often found in epilepsy and in the various psychoses, all come within the limits of physiological variations, or are due to some temporary accidental cause. In my estimation therefore the examinations of the blood in nervous and mental diseases have been of little value in advancing our knowledge of these affections. It may however, well be that the im-

perfectedness of this procedure will be overcome with an advance in our microscopic and chemical knowledge, so that we will then be able to recognize changes that at present still escape detection. All the methods I have mentioned are supported by facts which may be used as a basis for the advancement of neurologic and psychiatric knowledge.

All these methods effectuate something, the one more, the other less. They mutually complete and control one another. But we must not err in expecting too much from any one method and use that one to the exclusion of the others. Any deductions when based upon facts and arrived at without prejudice must be respected even when they differ from our own deductions derived from the same set of facts. Thus many of us will admit that the results of surgical intervention in cerebral neoplasms have been unsatisfactory, the mortality being great and the condition of the survivor frequently a deplorable one. So also we will subscribe to the statement that "the indefiniteness of gliomatous formations make them extremely unfavorable for operation," but when these statements are used as a basis for the deduction that "it is probable that compounds will be discovered that can be injected into the spinal fluid that will cause gliomas to shrivel in the same way that gummas disappear under the administration of potassium iodide, mercury or salvarsan," we must characterize the procedure as more or less fantastic. Nevertheless it is based upon fact and analogy and, being exact, may lead toward progress.

There is however, one method that of recent years has received much attention and which in my opinion is not only fantastic but also inexact and which I believe promises nothing for the future development of our specialty. This is the Freud-Breuer method of psycho-analysis. This brings us into the contested field of functional diseases proper, the psycho-neuroses, upon which I have but touched. I am perfectly ready to admit that here pathogenic factors may unfold their action in ways undiscoverable by the microscope, chemical analysis or experimentation, but in the endeavor to learn what these factors are we must make use of explanations only that are in accord with laws that have been recognized as natural ones. No argument is possible with any investigator who believes that in psychiatry any

but natural laws obtain, or whose exposition is dependent upon philosophic arguments, capable of course of proving anything that is desired.

While the Freudian method is not void of a basis that bears a guise of exactitude, inasmuch as it is an adaptation of association psychology, it nevertheless is essentially a system of psychology of the unconscious mind, dealing with inferences or hypotheses of dream construction, condensation, displacement, dramatization, etc., as though they were established facts, yet having adduced no proof of their correctness beyond that furnished by psycho-analysis itself.

All Freud's terms are purely metaphysical abstractions. The theory of repressed memories of sexual traumas in childhood, the repressed desires as revealed in dreams and the association test for unearthing repressed sexual complexes from the unconscious mind are all insusceptible of scientific proof and therefore inexact. I agree fully with Höche in the opinion that the use of the psycho-analytic method would force neurologic and psychiatric investigations into false channels and that the teachings of psycho-analysis are theoretically and empirically based upon an inadequate foundation and its therapeutic value is unproven.

No persistent progress in the development of psychiatry and neurology can be possible if it be allowed to be swayed by an attempt to prove something by means of preconceived opinions which themselves first require to be proven. Long enough has our study of the psychoses allowed itself to be deluded by capacious attempts to explain the causes of mental activity not from facts gained by experience but from imagination alone; long enough have observation and experiment been violated in order to make them accord with seductive theories.

Whatever progress has been made in our understanding of neurologic and psychiatric problems, certainly has in no way been due to psychoanalytic work.

I will now bring my remarks to an end, although many important methods of diagnosis and treatment have not been mentioned. It was my purpose in the main by the juxtaposition of exact and inexact methods to indicate the direction which the science of neurology and psychiatry would in future have to take should it not be hampered in its development.