THE CONTRIBUTION OF THE PHYSICAL SCIENCES TO PSYCHOLOGICAL MEDICINE

The Presidential Address Delivered at the One Hundred and Fourteenth Annual Meeting Held at Dublin, 13 July, 1955

By

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The honour which the R.M.P.A. has bestowed on me fills me with a mixture of pride and apprehension; pride that I occupy the Chair where have sat so many distinguished psychiatrists and apprehension lest I might be unequal to the task of upholding the noble traditions of my predecessors. In offering you my thanks and appreciation I wish to express my most devout hope that I will prove worthy of the mantle you have placed on my shoulders and pass it on to my successors un tarnished. It is pleasant to think that the Irish Division of the R.M.P.A. has held such a long and happy relationship with its Royal parent and that in the field of psychological medicine there has been no cleavage between the Sassenach and the Gael. I am proud to be the figurehead which expresses that unity today.

My first very pleasant task is to wish all of you who have come from overseas "cead mile failte". The Irish Division has been looking forward with eager pleasure to entertaining you and we hope that your stay with us will be full of enjoyment and that when you have to leave us you will carry away happy recollections of your visit.

It is fitting that I should refer to the Irishmen who previously filled this Chair, as a mark of respect to their memory. The first Irish President was Dr. Lawlor, who was the Medical Superintendent of this Hospital, in 1861. He was an outstanding figure in the psychiatric world at that time. Under the direction of Dr. Lawlor, the Richmond Lunatic Asylum, as this hospital was then known, had achieved a very high reputation for the manner in which the mentally ill were treated. Dr. Lawlor was in fact renowned for having initiated and developed a system of education of the patients as a front line of treatment in this Hospital. The following few lines from the Commissioners' Report for that year are sufficient indication of the advanced position to which Dr. Lawlor had brought his institution at that time:

"The most thoroughly organized school that we have anywhere seen was in the Richmond Asylum at Dublin. The system has been completely established..."
and the organization as perfect as any schools in the country... demonstrating not only the possibility of promoting good order and discipline by means of schools, but also of increasing the knowledge and improving the morals of persons while in a state of insanity."

Drs. J. E. Duncan, Conolly Norman, of this Hospital, W. R. Dawson, M. J. Nolan, of Downpatrick, and Richard Leeper were subsequently chosen as Presidents in the years 1875, 1894, 1911, 1924 and 1931, respectively. I would like to refer particularly to the great Irishman who was the last to occupy this Chair and of whom I had the great honour to be a colleague.

Richard Leeper, or as he was affectionately known by his friends, Dick Leeper, was probably one of the most outstanding figures in medicine of his day. When he took up the specialty of mental illness he brought with him rare and unusual qualities. His gifts as a raconteur, his delightful sense of humour, his great compassion, his insatiable pursuit of new scientific methods of treatment and his deep concern for improving the humanities which the chronically insane require, were the combined characteristics of a personality which created an indelible impression on all who had the pleasure of knowing him. Those who knew him will appreciate this tribute and those who did not know him will forgive me for taking time to salute the memory of a very great man. Ar dheis lambh De, go raibh a anam.

I would like to pay tribute also to the out-going President, Dr. Noel Harris. I had the great pleasure of being present at his induction in London last July and have also had the privilege of being in attendance at Meetings over which he presided during his year of office. I was deeply impressed with the dignity of his bearing, his great capacity for making everyone feel at home, and the obvious sincerity and earnestness which he brought to bear on his task as President. The excellent and tactful way in which he presided at meetings were proof of his gift of leadership. His valuable contributions to the literature of psychiatry and his eminence in the world of medicine need no bouquets from me. I am very happy to be his immediate successor and hope to pattern my conduct of the proceedings of the R.M.P.A. for the coming year on his good example.

It is now incumbent on me to turn to more serious topics. It is a tradition of the Association that the newly-installed President begins his term of office by delivering a Presidential Address on some topic of his own choice. Like the newly born infant, whose first cry is hailed with delight by the mother, the new President must give tongue so that his subjects may have audible proof of his vigour. I found great difficulty in selecting a theme for my Address. Many headings occurred to me, such as “The Scottish Influence on Psychological Medicine in England”, or “Eccentricities and Idiosyncrasies of Psychiatrists”. My muse, however, rejected these titles and decided that I should attempt to present my impressions of the effect of modern scientific advances on psychological concepts. I realize that to cover such a wide field is very ambitious, and I would ask you to bear with me for the many defects which are bound to appear in my summary. I have chosen, then, as a topic “The Contribution of the Physical Sciences to Psychological Medicine”.

Medicine today has progressed far beyond its conception as an art and has become a vast field of scientific knowledge which derives from a combination of research in practically all the other branches of science. The isolation of pathogenic organisms, the discovery of antibiotics, sulphonamides and other bactericidal substances, the advances in anaesthesia and surgical technique, are only some of the bewildering series of successes which have yielded to research in recent times. It must be admitted, however, that progress in
psychological medicine has not kept pace with that of somatic medicine. Scientific explanation of the aetiology of mental illness still remains obscure, and treatment is largely based on empiricism. The discovery of the technique of psycho-analysis did, however, mark a very forward step in the study of mental mechanisms and opened up new pathways of research. Today, there is a vast army of research workers throughout the world whose researches in the experimental and clinical fields have made considerable advances towards the unravelling of the mysteries of the human mind. I propose to make a survey of some of the achievements in the various related fields of science and to evaluate their contributions to psychological medicine as a whole.

It is axiomatic that the most complex structures are based on simple principles and components, which can only be discovered by dissection and analysis and that all advanced study must be based on a knowledge of fundamental anatomy. The engineer must begin by studying first simple materials and mechanical principles. The surgeon must acquire a detailed knowledge of anatomy. The sciences of psychology, pathology, chemistry, and others depend on the elucidation of basic principles by dissection and analysis.

While this axiom resulted in the extraordinary progress of mathematical, physiological and other sciences, as exemplified by the amazing discoveries in chemistry, physics and biology, its application to nervous and mental activity is comparatively recent. The first analytical approach was made by Freud. This approach, however, was based on subjective analysis and, therefore, was open to the suggestion that it was lacking in the exactness on which true science is based.

Three hundred years ago, Descartes first propounded that nervous and mental activity depended on mechanisms which had an anatomy and physiology; that nervous and mental activity was a response to external or internal stimuli; that the responses to stimuli were automatic, whether as a result of inherent or acquired influence. Thus the concept of the reflex was born. But its application to higher forms of mental activity did not receive scientific consideration until the advent of Thorndike, who in 1898 published the result of experimental research into the behaviour of animals under special circumstances. Experimentation on similar lines was carried out at the same time by Pavlov, whose publications have revolutionized the concept of the mechanism of mental and nervous activity. By these experiments, obscure and complicated psychological processes were analysed and placed on a comprehensible, scientific foundation. While criticizing the approach of the psychologist as not being sufficiently objective to be included amongst the sciences, Pavlov acknowledges the work of an American group of psychologists who had begun experimenting on similar lines to his own.

Pavlov, in attempting to divorce his studies and conclusions from all suggestion of subjectivity emphasized that the reflex was the basic principle of all nervous activity. On this account he even objected to the use of the term "instinct", holding that instincts are reflex responses to internal stimuli. His experiments with animals have successfully shown that reflexes may be conditioned and altered by the effects of environmental influence. He succeeded in transforming the unconditioned stimuli for a reflex into the conditioned stimuli for another. He showed that reflexes are the means on which behaviour depends. He showed that the organism was capable of acquiring reflex properties which served for protection, and that internal equilibrium, or homeostasis, depends on this principle of the conditioning of reflexes to environmental and internal stimuli. The discovery of the manner in which reflexes can be con-
conditioned opened a new path towards the understanding of psychological processes.

Today, conditioning of reflexes forms one of the most important tenets in theoretical and practical psychology and is recognized to be an essential feature in the development of personality. To quote Gardiner Murphy, "Since each individual encounters different patterns of stimulation and acquires different conditioned responses, personality may be conceived to consist in the conditioning which distinguishes one man from another". The modern psycho-analytical and therapeutic approach to mental abnormality, whether of the major or minor variety, is largely based on the principle of conditioning, even though such may not be admitted by psychological purists. Conditioning is an essential feature in education and training, for example, the special training of soldiers for warfare is a conditioning process in which the conative reactions to emotions are altered.

The principle underlying the conditioning of reflexes would seem to be the underlying basis of well-known aetiological concepts, including those of Hans Selye, whose contributions to the science of medicine are held in such high esteem today. His concepts of the unity of the organisms have not deterred him from seeking an explanation of the causation of mental and bodily disease on physiological, mechanistic lines. His researches have thrown considerable light on the relationship between mind and body, and the manner in which the psyche and soma react on one another to form a unified mechanism. His exposition of the General Adaptation Syndrome (specific and non-specific) and diseases of adaptation marks a highlight in medical science. His concepts of stress as a disease-producing agent and of the manner in which it produces disease, is an example of the application of careful study of mechanism as an essential part of the holistic approach.

In his most recent epigrammatic communication "the General Adaptation Syndrome and its Relationship to Mental Health", he recognizes the important part which conditioning plays in psychological and psychiatric problems and relates the phenomenon to physiological mechanisms. He emphasizes particularly the influence of steroid hormones which are released by stress, and refers to the manner in which the action of these hormones can be inhibited or accentuated by metabolic processes. The conclusion to be drawn from the result of these different scientific approaches is that all biological functioning, physiological or psychological, includes as a basic principle the simple mechanism of reflex action, and that while all stimuli must have a response, that response is subject to variation on account of previous conditioning at the psychological or physiological level.

While the principle and anatomy of the reflex, with its connections and associations within the brain itself and to and from the various organs of the body had been outlined, the energizing basis of the structure remained obscure and knowledge of the source of energy on which cerebral activity was based was very vague. The discovery by Hans Berger in 1929, later substantiated by Adrian, that the brain was the seat of electrical activity marked a phenomenal step forward towards the knowledge of brain physiology.

Following research by other distinguished workers such as Gibbs, Grey Walter, et al., it has been established that oscillatory waves of a constant rhythm are discharged by the brain and that the frequency and amplitude of these vary under certain conditions such as rest and activity, disease, metabolic or toxic disturbances. This study, electroencephalography, has made great strides in the short time that has elapsed since Berger's first observation. It
has become one of the most valuable aids in the diagnosis of brain disturbance such as epilepsy, brain tumour and brain damage. From observation of the use of the electroencephalograph in our own hospital, we have found that the electrical discharges are profoundly affected in cases undergoing insulin treatment and in a number of cases that had cortisone treatment and who developed psychiatric symptoms. It was also observed that a considerable number of cases with recently acquired psychiatric symptoms, of a schizophrenic pattern, displayed electroencephalographic abnormalities. While the electroencephalographic expert was unable to ascribe any typicality to these abnormalities, and even regarded them as somewhat equivocal, there would appear to be a definite association between these departures from normal EEG and certain types of acutely developing mental illness. If the progress made in recent years is any criterion, the co-relation between these electroencephalographic findings and acutely developing mental illness offers a field for fruitful research. Our own studies of the recent concept of traumatic sub-dural effusion, which are the subject of a paper at this Meeting, are sufficient evidence of the importance that must be attached to even equivocal electroencephalographic findings, when associated with clinical symptoms.

It may be now assumed that one of the requisites to healthy cerebral function is the preservation of the electrical equilibrium of the brain and, therefore, it is of the utmost importance to establish the source of electrical activity. Obviously, its generation depends on the activity of chemical and biochemical ingredients in the cellular tissue. The most important of these ingredients appears to be the potassium ion concentration which appears to be influenced by the hormones, particularly adreno-cortical hormones. Other influences which are known to affect the electrical activity of the brain are avitaminosis, toxic substances, such as alcohol, direct or indirect injury, cerebral contusion, etc. It would seem reasonable to assume that many, if not all, functional disturbances of the brain, such as encephalopathies, psychotic depression, types of schizophrenia, are associated with a breakdown or disturbance of the electrical mechanism. An electrical breakdown can be due to faults in generation, in storage or in transmission and, in the case of the brain, may be caused by reduction in the generating substances, e.g. potassium; by the introduction of disruptive substances; by deterioration of the insulating qualities of the cell membrane or nerve fibre; or by actual rupture of the lines of communication, e.g. the association fibres.

In this connection it is interesting or pertinent to refer to a theoretical aspect of the therapeutic effects of E.C.T. The fact that improvement by E.C.T. in depressed cases only persists for a short time and that in some cases the level of improvement can be maintained by repeating an E.C.T. application at long intervals, would seem to point to the conclusion that the passing of an electrical current in some way restores the equilibrium of the electrical activity. While such observations must, indeed, be regarded as purely theoretical considerations, the charging and discharging of electricity in the brain appears to play a vital part in the functioning of the brain. With the further development of electroencephalography in its application to mental disease and in relation to the bio-chemical activity of the brain, new light should be thrown on causation and on therapy.

For the purposes of this paper reference may again be made at this stage to the researches of Hans Selye. Selye has shown that mental stress is responsible for the production of psychic or psycho-somatic symptoms and that stress is always associated with the production of A.C.T.H. and adreno-corticoids. He
has pointed out that corticoids influence the metabolism of salt and water and, indeed, one of the most important considerations in the administration of cortisone is potassium concentration. The tie-up between stress, emotional or otherwise, the increased production of adreno-corticoids, with its consequent disturbance of potassium metabolism, and the disturbance in the electrical activity of the brain, would seem to be an important chain of events in the production of symptoms.

The foregoing considerations of physiological discoveries in the structure and method of functioning of the brain have encouraged further profitable studies of the mechanism of the nervous system. The amazing developments in the sciences of physics, chemistry, electronics and mathematics has resulted in the construction of complex machines which can perform functions that hitherto seemed to be the monopoly of the human brain. Electronic computing machines now exist which can carry out the most complicated mathematical problems, problems in which the qualities of discrimination and judgment are exercised by the machine. Automatic pilots, automatic computing gun sights, automatic radar control instruments, searchlights, etc., possess qualities of adaptiveness, predictiveness and purposiveness as essential parts of their function. Grey Walter's Conditioned Reflex Analogue and the Electronic Delayed Storage Automatic Computer of Cambridge, are instruments in which reflex responses can be conditioned to substituted stimuli similar to the conditioned reflexes of Pavlov. These achievements of science have led to a comparison between the mechanisms of these man-made machines and the mechanism of the brain.

The analogy has stimulated the application of a new method of study to the mechanism of the brain, the science of Cybernetics. Cybernetics has been defined by Ashby as "that branch of science which studies in complex mechanisms the lines of communication which may be established between part and part; the information which may be transmitted along them; the control which each part thereby establishes over the other; and co-ordination which is thereby achieved". The works of Wiener, Ashby, Grey Walter, McCulloch, and others, are convincing masterpieces of logical, mathematical, scientific deduction. There can be no doubt of the soundness of their demonstration of similarities in the mechanism of the nervous system and man-made machines and that the principles underlying one can apply to the other. They have shown that there is a basic principle, the feed-back, which is common to all mechanisms no matter how complex.

A feed-back may be defined as the return to the central, controlling source of activities, by various channels, of information from all the other parts of the mechanism. It depends on channels through which this information may travel from one part to another and, therefore, on the integrity of these channels. Anything which affects the integrity of these channels of information disturbs the co-ordination of functioning and results in defective functioning of the mechanism. "The inco-ordination of Tabes Dorsalis is a simple example of the loss of this information. The ataxia may be correctly ascribed to the loss of feed-back, for, as is well-known, if the lost kinaesthetic feed-back is replaced by visual information, the ataxia is markedly reduced" to quote Ashby. More complicated instances are the different types of aphasia, apraxia and agnosia, in which there is an obvious disturbance in the communications between associated areas of the brain, resulting in loss of feed-back.

"The law of reciprocity of connexions" a physiological axiom enunciated by Lorente de No, as the result of his physiological and histological researches, embodies the principles of feed-back in the functioning of the brain. It would
seem a reasonable conclusion that the principle of the feed-back of the cyberneticist and the reflex of the physiologist are one and the same. The simplest reflex arc is at the physiological level in which there is a receptor, an afferent line of communication to a cell, a line of communication associating with another cell, an efferent line of communication to an effector organ. The response is immediate and automatic.

On the higher scale of thought, the same principle exists, but the communication between cells is very much more complex, depending not only on associated nerve pathways, but also on direct influences from cell to cell by means of chemical and electrical interchanges, and on the influences of distant metabolic and glandular products, the result of nervous activity. The final response to stimuli then on the higher plane, may be regarded as the end solution of a problem presented by the stimulus.

Huxley and Wells have summarized this concept in the following words—

"So we begin to realize that the conditioned reflex is the unit of which our higher mental activities are built up... in this sense our thinking is a symphony of elaborately associated conditioned reflexes... It is because one reflex can inhibit and temporarily suspend another that our organized automatic activity is possible."

Following up the concept that stimuli in the higher plane create a problem which has to be solved, the main problem of existence is adaptation to the environment and to changes in the environment. Every new situation may be regarded as being a problem for a solution of which conduct and behaviour is the final explanation. The application of the cybernetic approach to the mechanism of cerebral functioning, including psychological processes, suggests the presence of compartments or areas in which stimuli are subjected to various processes before the nature of the response is decided. Such compartments or areas are not meant to signify separate anatomical areas, such as Broca's area, but a separate mechanism which may be all contained in one cell. The recent work of Cameron shows the extraordinary complexity and diverse activities of a single cell. These compartments may be approximately represented in the following rough schema:

1. Impressions are first received.
2. Selected, namely priority of attention is given to selected stimuli such as visual over olfactory stimuli.
3. Analysed, namely important data are distinguished from less important data.
4. Synthesized, namely different important data are related to one another.
5. Computed, for example, the speed of an oncoming car, the speed of a person crossing, and of distance, are computed so that an appropriate decision may be made.
6. Referred to problem-solving area of selected, analysed and computed data where
   a. The problem is solved.
   b. The incomplete solution is stored for future reference, for example, learning by mistakes.
   c. The solutions of solved problems are stored, which represents having learned to do something.
   d. Data without any problems are stored, for example, learning a poem.

In addition to the foregoing, high speed arcs must be presumed to exist between all areas in order to by-pass any involved process and an area called an
Automat, which releases automatic information stored in the storage area, such as the automatic production of the words of a song.

While this diagrammatic representation is purely hypothetical it complies with the logic of cybernetics and may be applied as a reasonable explanation of mental phenomena on the basis of our physiological knowledge. In sleep, for instance, all data-receiving areas close down except the vegetative ones, e.g. the digestive processes, and centres of urgency, e.g. the capacity of a mother to wake at the cry of her child. In sleep, the brain may be said to be open for urgent business only. Sleep may be further regarded in this way as the shutting down of the data-receiving area on account of data overloading. It is very probable that the solution of new problems only takes place during sleep when data receiving has been shut down. The problem-solving that occurs during wakefulness means only the integration of problems already partially solved or the calling into consciousness of answers to problems already solved and stored for ready reference.

On this basis abnormalities of mental functioning may be explained on the basis of disturbance in the arcs of association between the various areas. In Obsessional Neuroses, for instance, there is a vicious circle of thought which may be explained on the basis that data do not reach the problem solving area but are continuously fed back. The indecision of Anxiety Neuroses may be explained on the basis that the selector is defective and unable to provide a solution to a problem or problems. In effect, it is suggested that mental dysfunction can be logically explained by applying the principles of cybernetics.

To summarize briefly, it is suggested that the successful functioning of mind depends on the integrity of the following mechanisms:

1. A complex combination of reflex arcs, consisting of nerve cells and fibres, intimately associated with and, depending upon one another.
2. A system of production of various substances which affect the integrity of this nervous mechanism, namely, A.C.T.H., Corticoids, Minerals, etc.
3. The generation of electrical potential.
4. A complicated electrical mechanism which is essential to preserve the communications between the various areas through which the products stimuli must pass before a problem is solved and effect given to the solution.
5. The existence of special compartments within this mechanism for reception of data, selection, analysis, synthesis, computing and solving of data; of storage areas for unsolved and solved problems; for automats, which are the compartments which govern ordinary behaviour.

In making an analogy of the complicated mechanisms of modern, scientific achievements, with the mechanism of the mind, it is important to bear in mind that the functioning of all the man-made mechanisms depends upon a pre-setting and that without this pre-setting successful functioning would not result. It is clear that in any concept of mental functioning on a mechanistic basis that pre-setting is an essential postulate. The mechanistic concept does not, therefore, in any way come into conflict with the spiritual concept, which must be regarded as the pre-setting of all mental functioning. Indeed, the greater the knowledge, the greater must be our realization that behind it all must be an invisible Power without which this mechanism could not work, and that creation by man of complex machines is only a very small example of the creation of man himself by a Creator infinitely greater than, and far beyond the realization of the human mind.

The various scientific approaches to the explanation of mental functioning
by physiologists, neurologists, bio-chemists, electrologists, cyberneticists, not only appear to harmonize, even synchronize, in the elucidation of mental mechanistics, but also appear to harmonize very closely with the concepts of the psychological purist. As all the physical sciences have made their advances in the past few hundred years, the great Philosophers of antiquity and the Middle Ages depended on the state of knowledge of their time, and philosophy was entirely based on religious concepts. Descartes, who may be rightly called the father of modern philosophy, was the first to separate philosophy from theology. To Freud, however, goes the credit of producing an anatomy of the mind by devising the system of psycho-analysis.

The fact that different schools of psycho-analysts and psycho-therapists disagree with Freudian analysis because of his emphasis on the dominance of the sexual instinct in the shaping of the personality should not blind us to the wonderful advances in knowledge of the mind which were the result of the researches of Freud, his contemporaries, Adler and Jung, and of his numerous successors in the field. Although his concepts were originally based on empiricism and were mainly subjective, it cannot be denied that in his analytical methods he succeeded in bringing objectivity to the study of the psyche, and raised psychology to the level of a science. The importance which is attached to psychology today in all forms of disease, individual, collective, social, industrial and international mal-adjustments, owes its position to psycho-analytical research. As Galdstone pointed out in a concise but comprehensive digest, the psycho-analysts were the first to expound the theory of psycho-somatic medicine as it is understood today. To Freud goes the credit of pointing out that “emotional tension discharged, in ways that upset normal physiological equilibrium, and initiated somatic changes that produce disease”. It is interesting to compare this concept with that of the modern Selye.

The latter’s concept, based on objective physiological experimentation, while outlining the effects of stress in the production of A.C.T.H., and other hormones, postulates that nervous and emotional stimuli represent the major sources of stress. The urgent pleas by Galdstone, Henderson et al., for a holistic approach to sickness can only be effected by a realization of the inseparability of psychological concepts and mechanistic concepts. The barriers between the two concepts are only figments which do not exist in reality. Each is essential to the other. I am reminded of an attractive simile which was used at a discussion by a speaker at the last quarterly meeting of the Association, when it was suggested that a dichotomy existed between the psycho-analysts and the psycho-therapists and even between different psycho-analytical schools. He compared the efforts of the various different schools of thought to the pioneers who set out to conquer Everest. Different approaches were explored by different groups each profiting by the experience of the others until finally the summit was reached.

The place that Freud occupies in relation to modern psychology may be judged by the prominence given to his work in the writings of Joseph Nuttin, Professor of Psychology in the University of Louvain, and a Catholic priest. In his “Psycho-Analysis and Personality”, he sums up “the Freudian Philosophy ... can be looked upon ... as the exaggeration of a new and fascinating idea. This should not, however, prevent us either from accepting the valuable body of facts which can be extracted from their theoretical background or from going upon this theoretic view of man to a concept embracing the normal human personality in its entirety”. Professor Nuttin has himself propounded that human motivation does not depend exclusively on primitive or instinctive drive but on new needs and drives which appear as man matures and which are specifically
distinct from infantile ones. This concept, which is shared by Allport, does not appear to differ fundamentally from, but rather to be a development of, Freud's original postulates and has indeed been arrived at by the use of analytical methods.

In a very concise Digest of Psycho-Analysis for Catholic readers, C. L. C. Byrnes states "The minute and patient exploration by Freud into the animal side of man's nature has been of immense significance for psychology". In this digest Byrnes quotes from Archbishop Downey "There is a natural alliance between the empiricism of the psycho-analysts and the rational psychology or the anthropology if you prefer, of the scholastics".

Freud's greatest achievement, however, was his structural delineation of mental processes. His exposition of the manner in which personality and character are developed and moulded, his demonstration of the effect of environmental influences on the shaping of personality, his schematic representation of mental mechanisms, are concepts which form the basis of all modern psychology. His division of mental functioning into compartments, notably, the Id, the Ego and the Super-Ego, the Conscious, the pre-Conscious and the Sub-Conscious, was the first attempt to produce a language of psychology. It is inherent in all languages that fallacies appear as it becomes more complicated, as in the language of mathematics. Such fallacies become apparent when parts of the language come into conflict with basic philosophical truths. Psycho-analytical language is not, and does not claim to be, immune to this principle.

The difference between the language of the cyberneticist and the psycho-analyst would by comparison seem to be no more than exists between the spoken tongue of two different countries, for example, of France and England. "Maison" and "house", "fils" and "son", are different symbols for expressing the same meaning. It is a source of wonder that the language invented by Freud when the physiology of the brain was practically unknown, should so closely conform to the mechanisms later uncovered by physiological research. The symbols of Id, Ego, Super-Ego, of Conscious, Pre-Conscious and Unconscious, mind, of censor, repression, dissociation, conversion, projection and repression are all definable in terms of the more objective principles of Physiology and Cybernetics. The following few examples give an indication of the unity of meaning between the language of Psychologists and Cyberneticists—censoring, involving repression, appears to be identical with the process of selection and storage of data; reasoning and judgment are identical with computing and problem solving; the unconscious, with the storage of data and solved and unsolved problems.

The Id, being the seat of Instincts, may be regarded as containing pre-setting influences which guide behaviour. While the Instincts are the main pre-setting influences in lower animals, they should only be regarded in man as subordinate to an overall pre-setting direction of what may be termed the spiritual instinct. This spiritual instinct is contained in the religious concept of the desire for good in the human. While an innate, inborn tendency towards good may not be accepted by the behaviourists as a delineable, scientific entity comparable with the other well-defined instincts, such as the sexual instinct, practically all anthropological studies have shown that in the most unenlightened and primitive of human races there exists an individual and collective belief in a higher, invisible being representing the human concept of seeking for all that is good. While the standards of good may vary in different races it cannot be denied that the overall aspirations of the human mind are towards good. This aspiration towards good is represented by the presence from a very early age of
Conscience and one of the well-recognized early causations of mental illness is a knowledge or sense of guilt practically from the beginning. Conscience may, therefore, be regarded as an essential part of human mental equipment, embryonic at birth, but later to reach its full development in what Freud called the Super-Ego. McDougall describes it as the "desire to realize an ideal of character and conduct; a desire which itself springs from an instinctive disposition whose impulse is turned to higher uses by the subtle influences of organized system embodying a moral tradition". Nuttin sums up contemporary psychology as "coming close to the concrete reality of psychic life through its deep study of the interpretation of the instinctive and the spiritual in human motivation".

Freud defines the Super-Ego as activities of self-observation, conscience and the holding-up of ideals; the representation of all moral restrictions; the advocate of the impulse towards perfection. These concepts from such varying schools of thought would seem to establish that the most important aspect of mental mechanisms, namely the pre-setting, depends on a spiritual instinct.

In this summary of the various approaches to the scientific explanation of mental functioning it seems apparent that a stage has been reached in which different scientific discoveries form a compatible relationship with one another and conform to the requirements of scientific and spiritual concepts. This summary appears to satisfy and include the various controversial theories of materialism, animism, parallelism, epiphenomenalism, etc. Such summary and comparison does not presume in any way to add anything to philosophical or psychological knowledge but is merely intended as an essential basis in the approach to therapy of mental disease. The proof of the integrity of any scientific research is its integration with other sciences. It would be impossible in an address of this kind to devote sufficient time to therapy. Even a summary of modern therapeutic methods could not be fitted in without unduly wearying my listeners. Indeed, my summary of modern scientific advances has many omissions which might well have been included.

It would seem fitting, however, to make some reference to the most widely practised form of therapy in the world today and indeed the most controversial, namely, psycho-analysis. All clinical psychologists cannot but agree that psycho-analysis forms one of the major methods of treatment for the psycho-neuroses. The fact that the techniques of psycho-analysis vary very widely is not peculiar to psycho-analytical therapy. Differences in technique are common to all therapy. There is one principle, however, which emerges and which must never be lost sight of.

Psycho-analytical therapy which would not have as its first objective the restoration of the higher motivation of the Super-Ego cannot be regarded as complying with the concept of the rational composition of the human mind. The balance or homeostasis of the mind cannot be complete unless and until the pre-setting gear of the super-ego has been restored to harmony with the various other mechanisms. All the various techniques of free association, explanation, abreaction, dream interpretation, suggestion, depending as they do on the special relationship between the patient and the physician must have as their ultimate object the restoration of spiritual re-integration.

While, however, this philosophico-psychological consideration forms an essential part of human psycho-therapy it must be realized that the therapist is not dealing with the soul but with mental mechanisms which have for some reason or other ceased to function properly. Ethico-religious departures may and do occasionally set up conflicts which give rise to anxiety states or other
even graver forms of mental illness and in such cases must form the basis of the therapeutic approach. With such rare exceptions, however, the approach to therapy must be based on the general concept that mental disease is the result of a break-down in some part of the organization of the mechanisms of mind, the most important aspects of which have been referred to briefly in this Address.

I have attempted to make a digest of the scientific aspects of psychological medicine and to compress them into a cohesive whole. I fear that my achievement has fallen far short of what I set out to do. I hope, however, that in bringing the physical sciences and psychological and spiritual concepts into a compressed relationship, my address will help to clarify in a very small way the confusion that so many different approaches might well inspire in the student of Psychiatry. I would also express the hope that the broad perspective I have outlined may perhaps help the pioneers in different schools of thought to realize that in each approach is contained values not always conceded.

Finally, I wish to thank my listeners for so patiently and tolerantly listening to this address.
The Contribution of the Physical Sciences to Psychological Medicine: The Presidential Address Delivered at the One Hundred and Fourteenth Annual Meeting Held at Dublin, 13 July, 1955

John Dunne

Access the most recent version at DOI: 10.1192/bjp.102.427.209