

# Foundations for a Biological Model of Schizophrenia with Special Emphasis on the Systems Approach and Biogenetic Concepts

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Within the framework of the systems theory model and as our first consideration, we shall attempt to review some of the genetic aspects of the condition called schizophrenia.

At the same time, the review will consider some of the philosophical and conceptual issues involved in the model of schizophrenia such as may be presented in the sense of the general systems theory. Our ambition is to try and bridge dichotomizing trends in the field of psychiatry, synthesizing the various schools, in line with many developments occurring in the various disciplines.

In an overall conceptualization of mental illness, it is presumptuous to ignore the temporal and structural processes inherent to the knowledge we have of evolution. In itself that knowledge provides us with a unifying cement to the many schools of thought which it is necessary to capitalize on, to arrive at a better integration of the many categories of concepts and systems advanced by their respective protagonists. It has often been brought to bear that evolutionary ideas cannot be applied to phylo-genetic chains exclusively as pertaining to morphology. William James focused many of his remarks on problems pertaining to the emergent mind, to thought and consciousness. The issues raised in the dynamic schools and pertaining to ethology, by their-very

nature, presuppose the basic fact of" evolution; many of the concepts contained in that fact go back to philosophical fundamentals: they have to do with structural, morphological change, chronological development, bringing to mind the concepts of counter-entropy, or again issues such as purposefulness, teleology or the phenomenology of man's existence. At the same time, they refer also to behavior, performance, measurement.

## The Developmental Pre-Condition

One of the ultimate goals of a coherent theory is to avoid creating a greater paradox, so as to limit the antagonisms between observable factors and to eliminate contradiction; if such contradiction or paradoxes already exist, the innovative theory purports to eliminate some of those, if not all. Thus one of the goals that we shall pursue in our construct, will be to absorb and contain the apparent paradoxes encountered along the way. The traditional antagonism between instinctive behavior versus learned behavior needs to be overcome; the antinomy of the innate versus the acquired need not be perpetrated. There will be a multiplicity of such seemingly contradictory statements which, as we shall

contend, are inherent to the language of man, and which actually are a direct result of the nature of man's conceptualization of the world.

It is clear that we must think more *developmentally*, not merely in the ontological sense, but in a way presupposing a full awareness of phylogenetic development, with a total realization that evolution does not stop with contemporary man, but that the forces that brought on "Homo sapiens" are still at work; that nature of which contemporary man is a part, is preparing the ground for further links of the evolutionary chain, and that the social events that we "witness and of which mental illness and management are a part, have to be placed in a different and more proper perspective. John Ranier<sup>1</sup> states in the *American Handbook of Psychiatry*, "In the case of schizophrenia many speculations have been made about its place in an evolutionary scheme." Unfortunately, little has been done to clarify and elaborate upon those speculations, and much can be gained from allowing in-tuitiveness to take its course.

We need to adopt a wider horizon of the evolutionary basis of biology; in particular, in human psychic development. It has been traditional to shy away from some of the implications of those issues and to tacitly accept the fact that man in his present state, is the ultimate link of evolution. Man has always been and, more and more so, has become an important part of the environment. He has gained control over the selection mechanisms through technology and the control of natural forces; still he continues to mirror the totality of the physical environment which reared him. There is need to de-anthropomorphize evolution, to revise our definition of illness (or disease) so as to make it fit more closely the chronological and structure-scales of our reality as well as the other models introduced into our construct. Thus the elabora-

tion of a hierarchy of conceptual systems is a *must* in our attempt to arrive at a truly scientific theory. We need to integrate the genetic as well as the environmental systems, into a global evolutionary approach within a total scale method of representation implicit in the concept hierarchy of the categories considered.

### **Current Status of the Biogenetics of Schizophrenia**

It has been established that the rate of occurrence of schizophrenia in the general population is about 1%. Close relatives of schizophrenics show a noticeable increase in the rate they are afflicted. The parent of a schizophrenic child has a 10-fold chance of presenting the same characteristics, siblings of dizygotic twins show a 15-fold liability. Kallmann's<sup>2</sup> as well as von Verschuer's<sup>3</sup> studies reveal interesting correlations regarding the risk factors. If one includes other mental disorders besides schizophrenia, the rate of incidence is considerably higher.

Twin research has emphasized the fact that although extremely high, the concordance rate for schizophrenia in monozygotic twins never reaches the maximum of 100%; this leads to the concepts of penetrance or as other authors will it, of expressivity of the recessive gene or genes involved.

In manic depressive psychosis, often considered a variant of schizophrenia, the overall incidence of the population is 0.4%, according to Kallmann.<sup>2</sup> Parents of manic depressive individuals show a 25% chance of becoming afflicted with a similar condition. Siblings and dizygotic twins reveal a similar risk level. Slater's<sup>4</sup> study has resulted with very much the same picture, and von Verschuer<sup>3</sup> is basically in agreement with the other two authors. In monozygotic twins, one finds a concordance rate which appears higher than what one sees in the case of schizophrenia; it is likely that we are dealing with a dominant gene or genes

combination. Still the penetration of the factor is again incomplete, and the problem remains open.

Some authors (such as Kind<sup>5</sup>) point out the existence of variations based upon racial characteristics. They point out differences observed between American schizophrenic reaction types, as reflected in the prevalent terminology used in this country; and the Scandinavian "nuclear group" as only true schizophrenia, contrasting them with the so-called schizophreniform psychoses.

### The Stratification Model

It is generally accepted that there is no theory of schizophrenia which does not postulate at least a constitutional predisposition. However, any attempt so far to equate this predisposition with a particular mode of inheritance must be regarded as having failed.<sup>5</sup> The new findings of Tienari<sup>6</sup> on a sample of monozygotic twins defined geographically did not contain a single case of concordance in 16 twin partners of schizophrenic individuals. On the other hand, considerable criticism of the Tienari methodology has been raised and we must wait for further developments regarding the work in question. The organically oriented studies being carried out in Europe at the present time, rely strongly on Kallmann's results, using his findings as an argument in favor of biochemical explanations to the occurrence of so-called endogenous psychosis.

As Weitbrecht<sup>7</sup> points out, Kraepelin already had inferred that the emotional and psychotic manifestations of mental illness need not be considered the expression of a specific morbid phenomenon; they are rather levels and *denuded* areas of the personality, in which those very phenomena are taking place normally, coming to the fore because of the release of deeper functions through loss of higher level activity. This has led Ey<sup>8</sup> to assume a level structure of the *mind*.

In an attempt to counter efforts by American psychiatrists to reduce schizophrenia and other forms of mental illness to psychogenic conditions, he developed a theory which matches psychosis with phylogenetic developmental layers of the brain morphology. Following the trend of stratification models, he considers the structure of the central nervous system as the substrate for the mind's functioning, at the same time reflecting its evolutionary temporality. Thus he has re-introduced the concept of a hierarchy of the central nervous structures, that correlates all psychic norms including psychosis, to genetic factors.

It is also noteworthy that Ey's theory overcomes the dichotomizing trend in the German workers' views where psychosis and neurosis and drawn apart as a result of the antagonism between organic considerations on one hand, and the social-psychological aspects on the other. The construct resulting from Ey's formulations appears to bring a better integration of biological developmental modes, as well as of the continuity theory contained in the psy-chodynamic formulations and the mechanistic systems found in behavioral approaches.

### Heredity and Penetrance

It is true that efforts to prove hereditary causes to schizophrenia and other maladaptive disorders have led to disappointment and by the same token, to neglect of any further effort in that direction. Von Verschuer<sup>3</sup> in his paper emphasizes the fact that Tienari's<sup>6</sup> research has involved nonhospitalized individuals only, thus introducing a clear-cut bias in his results. By contrast Kallmann<sup>2</sup> and other authors dealt with institutionalized individuals exclusively. He mentions the Heston<sup>9</sup> study where 47 children of schizophrenic mothers were separated from them at an early stage and went to an orphanage to live with *normal* children, 50 of which served as controls. Of the first group five developed

schizophrenia; in the other group, none. The point was made that the morbidity of the children of schizophrenic mothers separated from them was the same as in children who were allowed to remain with their natural parents. The latter point strongly emphasizes the existence of a genetic factor in the occurrence of the disorder.

To return briefly to the idea of penetrance; it deals principally with variation of the quantitative manifestations of psychosis, something which had baffled researchers for many years. In addition, the factor of specificity has to be taken into account; for instance, penetrance has been termed greater in women than in men; on occasion the specific genotype will remain totally latent. Zerbin-Rudin<sup>10</sup> emphasizes that the Tienari<sup>6</sup> findings are prone to be misrepresentative; she raises the issue of the diagnostic formulations used, at the same time pointing out that some unnoticed selective process may have been involved in the choice of cases. She further states that in certain population groups, the surroundings which are specific to the area under study may have acted as a hindrance or inhibition to the occurrence or manifestation of a clinically noticeable psychosis. Finally she raises doubt regarding the validity of the dichotomous discordant-concordant approaches.

According to Biermann,<sup>11</sup> the problem of proper diagnosis is the real one, since when individuals are seen by several psychiatrists the ultimate agreement in diagnostic categories is between 30% and 60%. He mentions the studies of Elsasser,<sup>12</sup> Kahn<sup>13</sup> and Schulz,<sup>14</sup> who studied the progeny of 34 schizophrenic parent pairs finding a probability of mental illness in the children of close to 40%. The implication is that if a child's development is influenced by a definite genetic rudiment, he is led to the later occurrence of a manifest psychotic break (in that instance, a schizophrenic episode).

It is the effect of the environment in addition to

an existing constitutional or hereditary potential which will lead to the development of a clinically observable illness. Such milieu influences do indeed include the numerous social and psychological dimensions that are given so much prevalence in the American approach to the problem, including the parent-child relationship, the effect of catastrophic events in early life, family risk, economic status and other social-cultural considerations.

### **The Issue of Psychic Trauma**

It is of interest to this assessment to quote reasons given by a representative analyst, Jackson,<sup>15</sup> for his misgivings about a genetic theory of schizophrenia. He points out that there is no evidence that has ever shown that an individual exposed to the stresses or the psychogenic trauma such as are experienced by the schizophrenic, does not always develop schizophrenia. Naturally he emphasizes the fact that there is no positive quantification of that stress or that trauma. It is also given to understand that, first of all, we have to set up a psychogenic causation for schizophrenia; in other words, nobody knows with any degree of scientific accuracy what psychic trauma is, since it is underlined that "it is nothing so obvious as beatings, rape, poverty" or "the over-generalized notion of rejection." The other argument states that no clear-cut proof has been made that identical twins reared from infancy or childhood in separate and distinct environments have yet both developed schizophrenia. It is evident that the Tienari report<sup>6</sup> would tend to further strengthen Jackson's opinion despite the criticism reported earlier in our review.

### **The Schizoid Personality**

Planansky,<sup>16</sup> in an article titled "Schizoid-ness in Twins," tries to deal with the problem of diagnosis, and emphasizes the need for a better definition of the continuum that

exists between the so-called schizophrenic character (Schafer<sup>17</sup>), introvertedness and other "formes frustes" of schizophrenic heredity. He also refers to the Tienari study<sup>6</sup> which he describes as the only one that was obtained from a full population survey and where no concordance was found but where "normal co-twins were found in 10 pairs out of 16." However, in most of those there was more or less mentioned the manifestation of *introvertedness*, or of features leading to the conclusion that there were present elements of a schizoid personality. Nishiura, et al.<sup>18</sup> carried out a study pertaining to the birth-rank-effect in schizophrenia and neurosis, coming to the conclusion that typical schizophrenia was not affected by birth order and leading to the assumption that endogenous factors were of importance to the establishment of that condition.

Rosenthal,<sup>19</sup> in his paper "The Offspring of Schizophrenic Couples," mentions a morbidity expectancy rate of 35%. His view is basically environmental although he does offer us two genetic alternatives—one is the polygenic theory; the other, the single gene theory with multiple modifiers. It is interesting to note that Rosenthal is influenced by the ideas expressed by Pauling in *The Molecular Basis of Genetics*. Gottesman, et al.<sup>20</sup> present a "Polygenic Theory of Schizophrenia" which is aimed at overcoming the deficiencies in the monogenetic approach. The authors describe schizophrenia as a threshold character *whose appearance is predictable from a diathesis-stress model* (see Rosenthal<sup>19</sup>). They also mention Griineberg's<sup>21</sup> concept of the quasi-continuous variation, similar to Lerner's<sup>22</sup> concept of phenodeviants. They claim that what is inherited is a constitutional predisposition to developing schizophrenia. Thus the polygenic theory *would predict the continual appearance of segregants in the offspring of normal parents, the increased risks of schizophrenia in higher loaded families, a slow response to the negative selection*

*with lowered marriage and fertility rates.* As Dobzhansky<sup>23</sup> stated, "Schizophrenics could be thought of as part of the genetic load, they are the price paid for conserving genetic diversity." Finally the authors also point out the artificiality of the *all or none view of schizophrenia* (see Planansky<sup>16</sup> above). It does seem like the above statements do fall in line with some of the thoughts expressed in von Bertalanffy's<sup>24</sup> theoretical biology. We shall come back to some of those views later on.

### The Problem of Diagnosis

A lot has been evidenced lately in the Scandinavian literature about the need for better diagnostic differentiation of the various types of schizophrenia. As an example, in 1958, Weiner, et al.,<sup>23</sup> talk about the genetics of the psychogenic psychoses. They refer to the dichotomy otherwise known as the reactive versus the process schizophrenias. The authors feel that schizophrenics who get cured belong to that former category, and that they differ genetically from the main mass of the schizophrenias. He feels that the psychogenic psychoses ". . . are the result of a mental vulnerability conditioned by unspecific factors . . ." In that group, the expectancies for neuroses and character deviations are significantly higher. In his review, he points out that most studies on genetics eliminate cases of *cured* schizophrenia. There may be an awareness that *psychoses are rare in the families concerned*.

Book<sup>26</sup> makes the interesting point that ". . . the geneticist cannot afford to ignore psychodynamics nor can the psychoanalyst afford to ignore genetics . . ." He estimates the mutation rate in the genetics of schizophrenia at  $5 \times 10^{-3}$ , thus indicating a very mutable gene. He believes that 6% to 7% of schizophrenics are new mutations. Huxley<sup>27</sup> feels that indications are that schizophrenics are more likely to be able to lead a

normal life in a socially *simple* and physically *harsh* environment, this being in support of the findings of Book<sup>28</sup> in his study of the Northern Swedish population group. Coming back to the Tienari article,<sup>6</sup> I want to mention his findings in eight pairs of twins, in which one has psychotic symptoms whereas the co-twin is clearly neurotic; this leads to the conclusion expressed in his paper: "These findings were considered to support the assumption that, genetically, psychotic and neurotic symptoms are not specifically distinguishable."

It is interesting also to mention the survey conducted by Pasamanick<sup>29</sup> which demonstrated the many cases of unrecognized and untreated psychoses in the communities.

### Schizotaxia and Schizotypy

Meehl<sup>30</sup> states, "A genetic theory of schizophrenia would be shown to ... be the strongest and largest contributor to variance." He points out that *clinical schizophrenia* cannot be inherited as such because it has *behavioral and phenomenal contents which are learned*. He adds, "It seems inappropriate to apply the geneticist's concept of penetrance to the crude statistics of formal diagnosis . . ." It is gratifying to see the author make a clear-cut distinction between the *schizotaxic rudiment*, the schizotype and finally *schizophrenia* in either its social or its clinical framework (see Foulkes<sup>31</sup>). His views throw considerable light onto the need for an integration of the many models currently in existence. He expresses it in the following terms: "the theoretical puzzle is exaggerated when we fail to conceptualize schizophrenia at different levels of molarity."

His genetic substratum, as said, is *schizotaxia*, which, when seen in the prospective of the individuals' social reinforcement regimes, leads to the *schizotype*. He postulates that those regimes lead the schizotaxic individuals to

learning several core behavior traits such as originally presented by Bleuler.<sup>32</sup> He further adds that a schizophrenogenic mother is required to push the schizotype toward schizophrenic decompensation, and the problem thus, to him, lies mainly in the areas of (1) the genetic-aspects of schizotaxia, (2) the learning processes leading to schizotypy and (3) the phenotypic heterogeneity of the schizotaxic tetrad (cognitive slippage, anhedonia, ambivalence and interpersonal aversiveness). Finally one would also wonder about the mechanisms involved in the schizophrenogenic mother's technique in bringing about an unfavorable adjustment of her child.

Meehl<sup>30</sup> points out the desirability of developing a systems' approach to those problems. I feel that his views, however, do not push far enough and that we therefore continue to run true to the traditional concepts of pathology. He mentions *central nervous systems centers* dealing with specific positive reinforcement or aversion; he talks about the *disruptive effects of aver-sive control* and *inadequate development of interpersonal communications sets*. Here we fall back into the old trap of logical antagonisms opposing the constructive to the disruptive and the proper to the inadequate. Thus the author does not seem to want to consider models in general and systems in particular as being primarily representational.

Gottesman, et al.,<sup>33</sup> conducted a rather comprehensive survey on all the major studies on the genetic aspects of schizophrenia, especially in the area of twin research. However, the article shows a paucity of commentaries which makes it fall quite short of the expected attempt at integration. The authors make one statement which seems to have some importance in terms of our own review; namely: "It is not crucial that schizophrenia may not be due to a recessive gene; it is crucial that researchers not abandon genetic-oriented research designs . . ."

### The Morphism Issue

Another approach that seems to hold interest within the framework of synthesis efforts, is presented in Huxley's<sup>27</sup> article about *schizophrenia as a genetic morphism*. He opposes the schizophrenics' alleged *low viability and fertility* to some ill-defined selective advantages, extending the concept in question to the so-called *crypto-schizo-phrenic Sc. carriers*. He suggests a more direct biological approach which must combine many fields aimed particularly at research on those selective advantages and disadvantages of overt schizophrenics, non-manifest Sc. carriers, as well as normals.

This article by Huxley is heartily criticized by Kapland<sup>34</sup> and others, who disagree with the morphism issue and the nature of the various selective advantages quoted. Zerbin-Rudin<sup>35</sup> also finds little support for Huxley's assertion of any selective advantages. At the same time she states that the "schizophrenic genotype in itself does not handicap fertility." The author mentions the fact that there is a theory according to which *each person has the ability to become schizophrenic*, leaning heavily on the concepts expressed by Bellack<sup>36</sup> who protagonizes a *multifactorial psychosomatic theory of schizophrenia*, where heredity may possibly introduce certain somatic or constitutional predispositions.

The report of the World Health Organization<sup>37</sup> in Geneva in 1966 emphasizes the problem of the homogeneity of schizophrenia itself and its connection with the so-called schizoid personality. Schizophrenia can be "regarded as the more or less accidental exacerbations of some much more constant manifestation of the gene, not yet possible to recognize." The report goes on to show that schizophrenia "had not been shown to be associated with a well defined biochemical abnormality. This does not imply that there are no schizophrenic variations that may some day be demonstrated at the molecular level." How-

ever, to equate variation with abnormality is something else again. The issues which exist in the field of research in the genetics of schizophrenia are multiple. One has to deal with the problem of validity of all psychiatric *diagnoses*, both from a phenom-enological viewpoint and from an independent consideration of their etiology. The need is brought out for a *model capable of throwing light on the nature and mode of interaction* of the genetic and environmental factors operating in the causation of *schizophrenic illness*.

### Systems and Biogenetics

A system is a structure in which all processes are connected functionally in a more or less complicated way (see Mainx' "Foundations of Biology"<sup>38</sup>). Mainx states . . . "the roles which assert something about single processes occurring in a system . . . hold only conditionally . . . since in such cases the mutual relations of the processes considered to all other processes, are neglected or deliberately simplified." And also "The more general and comprehensive such (an exhaustive total) statement is (made about the mutual relations prevailing in a complex system), the more indefinite are the concepts used in it and the less testable are they in experience." Living organisms have to be looked upon as open systems, which makes it even more difficult to draw boundaries between them and the environment. The individuality of the patient is strictly a psychological experience on the part of the observer, that is the therapist. As is apparent, Mainx is far from being a staunch supporter of any biological systems' theory.

As will be noted, we shall use the *model concept* rather extensively, or, from a slightly different viewpoint, the idea of the *representational system*. Those are not to be equated with hypothetical constructs, but rather with the thought of bringing in allegorical analogies between already existing,

and philosophically or scientifically validated concepts, on one hand, and a complex sequence of propositional statements on the other.

As a further preamble, let us remark, still with Mainx,<sup>38</sup> that "(there is) danger to the future development of modern biology in its impoverishment of speculative inquiries," where we may substitute the word *psychiatry* for *biology*, since, with Lewis,<sup>39</sup> it may boldly be said that "there is no psychiatry except biological psychiatry."

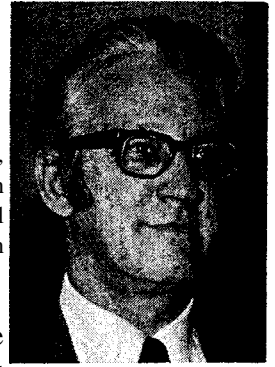
### The Instinctive and The Acquired

Ranier<sup>1</sup> has emphasized the fact that in psychiatry, like in any other branch of intellectual endeavor, dichotomizing trends are the rule and in fact, represent a basic characteristic of man's thought. It would seem that before any far reaching synthesis can be arrived at, a deeper introspective realization of the paradoxes inherent to man's view of reality is unavoidable. At a later time we may review the many aspects of the controversy involved.

Thus as we consider the interactional processes implied by a biological framework of the psyche, we introduce by necessity ideas that are on one hand contradictory and antagonistic; on the other they compliment each other and tend to call for each other as parts of a conceptual polarity. Innate behavior as expressed in ethology needs complementation by learning processes as signified for example by adaptation, conditioning and language; in the end we formulate those ideas by opposing the acquired to the instinctive. In this context, illness as a biological concept is dichotomized along the lines of being both a genetically determined phenomenon and a disorder of learning, that is a maladaptive function. It is generally accepted that the concept of evolution is essential for a more unified theory of biology; however, we must recognize that evolution alone has no meaning

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unless it is conceived of as the complement to the world's immediacy. Those remarks indeed have considerable relevance in a proper conceptualization of schizophrenia which thus becomes both a product of the evolutionary process and of the ontogenetic clash with environmental factors. That formulation parallels Freud's idea of opposing instinctual pleasure to the realm of the world's reality.

Werner's biology (Von Bertalanffy<sup>24</sup>) expresses his belief in a *cosmic law of progressive development* as well as in a law of *orthogenesis* where new species emerge along the scale of time. He defines development as the overall result of sequential change in a system which yields novel ingredients both in structure as well as in mode of operation. Thus evolution is a sequence of levels of organization, but at the same time a sequence of systems of transactions and of modes of adaptation. Those may or may not be a function of the time factor.

At all times, however, they are a function of the immediate structure they take place in. Thus a developmental approach to a construct along schizophrenia has to aim at a sequence of articulating systems making those systems fit in terms of their specific principles of organization and ordering them according to the degree to which they reveal differentiated and hierarchically integrated functioning. Such concepts may help us understand the fact that schizophrenic individuals show *decompartmentalization*



in some of their biological systems, along with *dedifferentiation and even disintegration*; one wonders whether there are systems within the overall framework of schizophrenia where some degree of higher organization can be demonstrated.

In this respect, I want to allude to what has been called the *scientific technological prejudice*, where higher organized fields of activity such as poetry, philosophy, religion and art in general, are rejected as being burdensome and a handicap to progress. Benn<sup>40</sup> in his article "The Problems of the Genius" is of the opinion that genius appears when a family begins to *degenerate*. In this context he lists Goethe, Byron, Beethoven and others. He feels that degeneration is a "combination of somatic negative variants and a psychic event which threatens the survival of the individual." He indicates that psychopaths are closer to genius than psychotics who in a vast majority of cases represent failures or drop-outs, as expressed in their inability or refusal to produce or to perform. At the same time we need to quote Socrates who said that "crazyness is not bad as such, since through it great good has come over Hellas."

### The Issue of Alienation

Many authors have been concerned with the establishment of the monolithic concept of reality, where literacy has been equated with normalcy, where one logic system has been declared *official*, and other systems of reality perception such as faith or belief or conviction are subordinated to the *proven facts*. Lundstedt<sup>41</sup> points out the need for an "adequate theory of mental health, coming to grips with the problems of time, change and evolution." He mentions man as a "unity consisting of independent systems"; he talks about the "antinomy of mechanistic views and teleological ideas." At the same time, however, he confronts "reducible appearance with

irreducible reality" and states that "the suffering schizophrenic may only seem disabled because we view him in terms of our fixed standards of adjustment, performance and reality. In the final analysis if we assume that traditionally accepted logic and rationalization are the highest level of intelligence of humanity, the person who follows his own system of thought must adapt or perish. The social system must reject those who do not obey a reasonable number of its ground rules, since a lot is at stake—even, it is said, the survival of the species."

In 1966 Foulkes<sup>31</sup> using the current terminology, points out that "the social element is responsible for the form that the illness assumes." He is rather representative of the trend in the field of psychiatry, where social deviance or maladjustment is deemed to be at the root of the *illness* rather than the illness-qualifying background. He refers to the "network;" i.e., the *natural* group in which the patient lives, as being involved in the pathologic process witnessed in the patient. Cummings<sup>42</sup> in 1965 clearly pointed out the present day dilemma in arriving at a proper definition of mental illness and, for that matter, of mental health. The final report of the Joint Commission on Mental Health<sup>43</sup> recognizes that "there is no general agreement in a universally acceptable definition of mental illness or of mental health; this is evidenced in the proliferation of both conceptual and operational definitions"; the author classifies those into three major categories. He states that "mental illness can be defined in terms of (1) exposure to psychiatric treatment; (2) the presence of symptoms; or (3) social deviance or maladjustment." He quotes a study which showed that ". . . pathology ratings cannot effectively distinguish hospitalized from non-hospitalized patients, nor the employed from the chronically unemployed." Scott<sup>44</sup> in 1958 strongly defended this idea of maladjustment, or deviation from social norms, as the most appropriate of all formulations among all

attempts at defining mental illness. Cummings, however, makes an interesting and two-edged point when he remarks, "Ego failure . . . cannot be understood independently of the setting of the failure . . ." In conclusion the author brings out the need to recognize the relationships between the three types of definitions for mental illness mentioned earlier. It is certainly impossible to disagree with the thoughts expressed by the quoted authors, which contribute greatly to the idea of avoidance of an overemphasis of one system over another such as we have set out to prove in our attempt at conceptualizing the multiple facets of schizophrenia.

### Schizophrenia and The Theory of General Systems

I believe we should at this time move on to a short examination of the concepts involved in the theory of biological systems as would appear applicable to our subject. We have so far focused on the biogenetic aspects of the condition under study, with special emphasis on the evolutionary dimension of man's existence in time. Our purpose now is to underline the need to re-establish a better state of balance between the dichotomized extremes, in the spectrum of constructs and endeavors, pertaining to the class of biological variance we call schizophrenia.

At the root of the systems approach to life sciences, von Bertalanffy<sup>24</sup> stands alone. His is a unique attempt to bring about a panorama, an all-encompassing view of biology. In his classic *Modern Theories of Development*, he systemically sets out to redo the theoretical basis of biological sciences. Key issues are raised, eminently involved in the future of schizophrenia research; he examines the impact of Gestalt theory on the field of medicine, where configurations and organizational patterns achieve recognition over structural *adding*. He states "If the organism is a hierarchical system . . . then it is

clear that it requires investigation at all levels . . ."

Personality development theories have taken into account only a few of the hierarchy levels of the organismic model, such as concerns systems theory. Those theories present to the scientific community an amputated version of the evolutionary model of the organism considered. The current learning theories are still at the stage of the "organismic description of vital processes," which obviously cannot constitute an *explanation* of what is observed, nor abide by the necessity for a historical perspective of the event, often even denying or simply ignoring the background to the processes.

If we want to truly apply the concept of temporality, we must recognize that the genetics of schizophrenia also imply the "potencies" and "possibilities" existing in the germ along with its own *gradual rise in the levels of organization*; again we run into the problems of the morphological structure of the organism as well as their functions as defined within the dimensional extensions of space, of time and of reality, at least to the measure that we can conceive of them. We believe that there is need to seek the type of formulation of mutational change, such as may be a part of the emergence of schizophrenia, which will satisfy the several categories of insight gained by a careful study of its biological systems.

### The Morphogenetic Viewpoint

For instance, the morphogenetic issue has application in the area of schizophrenia research, because it leads to the issue of process development, of learning and acquisition of function. When we speak of vectorial potentials, we do not merely speak of the production of form from embryo-logical rudiments, but of the ultimate end-product, that is, of the adult entity. Thus personality and psychic configurations involve the organization of processes which themselves result from the interaction of

the potentials of the embryo with a space-time-reality structure it is to grow into.<sup>45</sup> Le Chatelier's principle has as much application in psychic development as it has in biological growth: ". . . what happens at a given place (or at a given time or for that matter in a given function), is determined according to its relation within the whole." One speaks of the *inner dynamical condition* of the system and of the assumption of a direction to all natural processes. Actually we find it difficult to conceive of any one process that in the final analysis is not *natural*.

The consideration of schizophrenia as being one of the levels of the *reality parts* of the total organismic structure, leads us directly to a systems' approach. *Parts* exists in many *categories* which we clearly have to define or at least seek to define, before venturing into more special characterization of the various levels in question. Thus we speak of bone, cartilage, brain tissue; the components of those parts are molecules, cell-organelles, cells, colonies, tissues and on up. Thus we run across morphological or structural hierarchical levels, which obviously bring into any study on the system, varying degrees of relevance. We cannot, however, simply remain in the area of structure alone. We have to include a hierarchy of functions, and a hierarchy of awareness, of excitability, of responsiveness, etc., all in line with existing biological considerations applicable to the morphological levels considered.

In any study of the central nervous system the researcher cannot hope immediately to come up with any sort of integrative understanding of what goes on, both in the purely structural as well as in the dynamical spheres, in the functional areas up to the emergence of consciousness, creativity and awareness of existence. Finally we want to briefly mention the important issue of the *theory of the biological uncertainty principle* which becomes the more valid, as one deals with increasingly

complicated levels of organization.

Kantian philosophy leads us to accept the idea that we observe or perceive the result of both an unknown world-as-such ("Ding an Sich"), by definition a constant and a variable factor; namely, the mind of the observer. In the schizophrenic as in the *normal*, the world exists in itself,<sup>46</sup> independently of the mind of the observer, but appears in such a way that is determined by the nature of the observer. Thus change and perception in the world is related to change in the *nature of the schizophrenics mind*. Francis Bacon wrote, "The present systems of logics . . . assist in confirming and rendering inveterate the errors founded in vulgar notations, rather than in searching for truth . . ." As Bertalanffy himself has pointed out, "Measurability does not in itself increase the reality of the measured." Only some aspects of the world, that is, the ones closest to our level of structure, are accessible to measurement, and thus are operationally conceptualized.

### Researching Evolution

In Tax's<sup>47</sup> *Issues in Evolution*, one of the panels dealt with matters relating to "Evolution of Mind." One of the principal topics pertained to problems of methodology; it pointed out that *the evolution of mind and behavior can (must?) be studied in the same manner as that of any other organic function*. Thus our purpose adds up to deciding whether such methodology can possibly be developed in the area of schizophrenic research; whether schizophrenia, or whatever it is the term stands for, should be considered a part of that self same evolution and behavior, within the total framework of biological evolution.

The trend such as it is reflected in the discussions reported in the just mentioned work, has been to consider cultural evolution as supplementary to genetic change.

That should indeed assist in dispelling the duality or dichotomy raised by a strict separation of heredity and environment. I would feel that the implied amalgamation needs to be pushed further and that the two antagonistic poles, namely mutation and environmental adaptation, are complementary aspects of a higher category concept reflective of a higher category reality.

Gerard, one of the key participants in the panel<sup>47</sup> in question, introduces his ideas that *all systems have three major attributes*: a certain *being* or architecture, which we in our construct have been calling structure, a certain *behaving* or function; and a certain *becoming*, or history, that involves evolution, development and learning at the different stages. The three dimensions of each system, however arbitrary they may appear to be, need to be considered in our study of schizophrenia. It obviously does not seem to be inappropriate to talk of the structure of the personality of the schizophrenic individual, be it that we consider his ego or the biochemistry of his central nervous system; as part of our effort, we are admittedly looking at the purpose of schizophrenia; i.e., its place in the evolutionary scale; at the same time we are particularly concerned with the behavior of each individual schizophrenic person.

Finally, we are concerned with the future of the deviancy that is represented by the occurrence of schizophrenia and the schizophreniform conditions. It should be obvious that the systems we are looking at, extend in many different directions. In the structure area, they involve the molecule upward to the level of the cell, the cell colonies, the organ, the individual entity and all the small and large groups of individuals, as well as society as a whole. Brosin, in the same discussion<sup>47</sup> agrees: "One might define or regard mental disorder as biological deviance, or as failure in the working of an organism . . . Our methods of study must vary with the data we examine."

### Autism as a Positive Alternative

It is interesting also to quote Ey,<sup>8</sup> who in his *Manual of Psychiatry* expresses the conviction that, "Schizophrenia cannot be reduced to a negative structure; it implies also the positivity of an autistic existence and world . . ."

The total concept of schizophrenia has repeatedly been proven not to be amenable to being led back to merely one of its organic or psychosocial factors; this is in line with the now generally accepted idea of the multidimensional aspects of the *etiology of all mental conditions in general*.

The *effect of the observer upon the systems on which he is impinging*, including *transference* and *counter-transference*, is discussed by Brosin.<sup>47</sup> He also raises the issue of the *barriers to studying such component systems* which include the various feedback phenomena. Of great interest to us is his remark about the effect of Niels Bohr's complementarity principle. Again coming back to Gerard,<sup>47</sup> the panel agrees that man has now the potential of improving his brain by genetic processes, *the trouble (being) that we don't know what we want to breed for, and our social institutions not being very encouraging . . . of that sort of an action*.

Our concern in this consideration of schizophrenia must include the realization that the micro- as well as the macro-dynamic aspects of evolutionary change, are taking place in the genetic as well as in the social-cultural spheres. Organic evolution has traditionally been described as a continuous process, but *it is punctuated by . . . brief periods of crucial change . . . in which previously non-dominant forms of life achieve an evolutionary break-through*.

Thus the occurrence of individual or social groups of deviants should not trigger moves on the part of organized society, which are merely aimed at counter-acting the deviancy; it should rather result in

a better understanding of the fact that change itself is inherent to human and social structure, historicity and existence.

### The Synthesizing Theories of Schizophrenia

Allport<sup>48</sup> defines criteria for the kind of systems that apply to human beings although he tends to look at the nervous system itself as being *closed*. He defines the personality as being an *open system* and lists the criteria as being (1) the intake and output capability for both matter and energy; (2) homeostasis; (3) increase of order over time (counter-entropy); (4) the ability for transactional commerce with the environment.

He mentions the general systems theory of Miller,<sup>49</sup> who seeks to establish formal identities between physical systems, the cell, the organ, the personality, small groups, the species and society. Allport mentions the fact that Miller's critics complain especially about such models resulting in the *vaguest generalities*; he personally sees the danger in an *inevitable approach from below* which means *taking the path of the physical and biological sciences*.

Along the lines of various synthesizing efforts on issues of schizophrenia, which find their highest level in the general systems theory, there are many partial theories which touch on very diverse aspects of the problem.

Hofmann<sup>50</sup> attempts to bring out an experimental integration of data aimed at a concept of *the multifactorial genesis of schizophrenia*; he includes in his review the *general adaptation syndrome* as one of the dimensions involved. Some of the works cited go through the usual expose of questions pertaining to nosological unification. It seems here that there is a clear-cut need to establish a *spectrum* or scale of etiopathogenetic factors. Laing<sup>51</sup> in his book *Sanity, Madness and the Family*, as he tackles the question of the social intelligibility of the experience and behavior of schizophrenics by an

approach that is mainly phenomenological; aims primarily at presenting *schizophrenia* along the lines of the family system. It is interesting that he as such demolishes much of what has been the traditional set of symptoms the psychiatrists have seen in a schizophrenic individual, denying by the same token the need for any strong genetic, biochemical, behavioral or otherwise theory. It seems, however, that the weakness of his approach is that it limits itself by not going into the issue of a given individual's *proneness* to developing *schizophrenic ways* in response to the interpersonal communication pattern particular to the family constellation.

### Von Bertalanffy's Categories

At this point we are ready to come back to von Bertalanffy's<sup>24</sup> concepts pertaining to the categories one needs to consider to arrive at a proper understanding of schizophrenia. In a recent article he takes issue with the methodological impotence of contemporary psychiatry. He sees a relationship between that helplessness and our ways of thinking, our basic concepts and categories . . .; his trend is to interpret those *basic concepts and categories* in terms of evolution. He states, "Other sorts of awareness exist and cannot be dismissed simply as illusory . . ." He states that contrary to Kant's view, the categories of space, time, number, causality, ego, etc., are not *given, once and for all a priori concepts, valid for every rational being; they are the product of a long and tortuous development . . . preconditioned by biological organization*. His approach to issues pertaining to interpersonal relationships is clearly Jungian; he supports the concept of a collective repository of the *mass-unconscious*, out of which, as he says, "individualized egos grew." From such concept, he derives his understanding of empathy, morals, religion and artistic endeavors, adding, "The world of

science is only one perspective of reality, highly useful . . . but not the exclusive one . . ." Thus he describes physics, and psychology as conceptual constructs representing certain aspects of reality.

### Summary

We see indeed the profound level of this helplessness reflected in the impasse which exists nowadays in our dealings with schizophrenic people. That helplessness is clearly related to a bottleneck in our basic concepts, in our ways of thinking. Without a fundamental reshuffling of our ideas, of the

issues of awareness, reality, logical systems and the meaning of the sort of gregarious living that we call society, our efforts at overcoming that current impasse are bound to fail. As to our methodology of research in the spheres of what mental illness is, particularly the so-called schizophrenic psychosis, to mention only one of the many areas of controversy which face us, a drastic explanation of the scope of our inquiry is needed. At the same time a fundamental volte-face is imperative in our use of the various conceptual constructs which we carry under the heading of science.

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