Symphony of Matter and Mind

Part Eight

Dissonances of the Mind

Psychopathology as Disturbances of the Brain Technology

Chapter synopsis:

1. Split Model of Reality.

The chapter starts with a history of views on the condition that we now call autistic spectrum disorders (ASD). Most of the approaches focus on the apparent set of external symptoms that can be described in one word: dissociation. Hence the name of the condition 'autism,' meaning withdrawal into oneself. But dissociative withdrawal ('freezing,' 'playing dead') is not a pathological condition per se. It is one of the three natural reactions of any living system to danger: fight, flight, freeze. Autistic people use all of them and are prone to aggressive reactions just as well as dissociative. We can interpret autism as a break in normal communication with the world. What is the reason for this break?

The chapter goes back to the definition of the Mind within TTT and looks at the question from this perspective. If it is about encoding environmental signals and creating their representations to form a coherent and adaptive reality model, then any maladaptive state of the Mind is some kind of disturbance in this model's coherence.

The essence of autism is not only and not so much in the behavioral symptom of withdrawal but in the split state of the reality model. The term 'split model' has two aspects. First, the model itself is split into a chaotic state. Second, the disintegration of the model leads to splitting with reality. It is not the world that is dangerous for autistic people; it is the picture of the world that their Mind creates that causes fear. The symptoms are external manifestations of the internal state of the reality model. A living system with an incoherent model exhibits dissociative symptoms (autism), disconnecting from the flow of environmental signals that it cannot make sense of.

It is a simple logical chain that seems self-evident in hindsight, but it has complications that have not been resolved so far. It leads to further questions about the nature of the disturbance that produces the split model.

The chapter offers a solution based on the TTT concept of the physical mechanism that creates the harmonious structure of the reality model and algorithm that the brain employs to produce the coherent flow of the Mind. The chapter starts to formulate hypotheses about pathologies, and the task seems a lot easier now: they are just 'antipodes' of the hypotheses about the normal state of the system.

2. The World of Dissonances.

Some models call autism ‘intense world syndrome.’ It is a phenomenological description that does not offer any explanation. Moreover, it is not to the point because the symptoms speak more of a ‘chaotic world syndrome.’ But anyway, the question is why the world is like that for such people? The environment is, of course, a complex, multifactorial state-space potentially dangerous for anyone. But somehow, living systems make sense of it and, in the usual course of events, consider it quite coherent.

What is just a normal and smooth flow of life for one person, for an autistic person, is an intolerable, incomprehensible and terrifying cacophony. There are too many arrhythmias and dissonances in it. But the reason is not in the world, but in what model of the world the autistic brain creates: it is arrhythmic and inharmonious. The chapter continues to explore the nature of the disturbance of the physical mechanism that usually binds the model into a coherent structure. It also offers a clear hypothesis at what stage there is a break of the Mind’s algorithm and what brain structures are involved.

3. Kaleidoscope of Reality.

In severe cases of autism, a picture of the world does not add up in principle. In moderate and low severity states, the brain can form meanings, but this requires a lot of energy and time. If the environment brings an overload of numerous signals with many parameters and complex dynamics of these parameters, the system cannot cope with integration and goes into dissociation, limiting the flow of incoming signals. We can use a metaphor of a constantly rotating kaleidoscope to describe the autistic condition. To stop the senseless rotation of bits and pieces, an autistic person either shuts off from the world or tries to compensate by focusing on specific details.

The chapter looks at behavioral and physiological markers of autistic condition from the point of view of the proposed hypotheses about the nature of the brain’s internal state. Thus, the bits and pieces that have been rotating in models of autism when theorists were trying to focus on one or another symptom start to fall into place. The proposed new model shows how to get out of the autistic position of science on the issue of autism. We can stop this theoretical kaleidoscope and get a clear picture.

The chapter also offers a new name for the condition, and it reflects the internal problem. We begin to move away from the standard symptomatic diagnostic classification in psychiatry by seeing that many diseases that are now put on different ‘shelves’ in the manuals result from the same internal state of the nervous system. They may have various etiology, differ in some details of the pathogenesis and clinical picture, but the essence of the violation of the normal brain work is the same. ASD becomes a clinical subclass of a new general diagnostic category based on a clear definition of the state of the organ performing a specific function.

4. The Collapse of the Integrative Function.

This chapter focuses on the function violated in states of the split model of reality: the integration of various representations into a coherent picture of the world. When we say ‘picture,’ we mean not only visual modality. But for the sake of illustrative power, this chapter

deals mainly with how people with such a model actually see the world. Taking the examples of visual arts created by people with a formal diagnosis and without it, the chapter shows the inside-out view of what their Mind's 'eye' produces. We begin to understand why the world is scary for them.

5. Reality Model Assembly Line.

The normal and smooth production of reality model involves well-coordinated processes both at the stages of preparation of parts (primary signal conversion), adjusting them to the standards of the entire system (modulation), assembly into system blocks (primary integration), and at the stage of final assembly (higher integration). The whole system is set up to ensure that the product goes out in a working state and can perform its inherent functions efficiently and reliably.

There may be failures at any stage of the process. Failures in modalities of perception and even complete loss of one modality can be compensated. Failure at the stage of higher integration leads to the impossibility of creating the final product — a comprehensive, effective, reliable, coherent and working model of reality.

Systemic failures of integrative function are the main pathologies of the Mind incompatible with life. The disability of such an individual can be partially compensated by society, but this eliminates the immediate life risks and does not correct the maladjustment itself. To fix the breakdown, we need to understand what is physically happening at this stage of the process. Only in this case there is hope for minimizing losses and even for a complete restoration of the reality model 'assembly line.'

The chapter goes back to the hypothesis offered in the sixth volume about the technological chain of the cortico-thalamic system and shows at what stage the collapse of the integrative function happens. It describes what is going on with the physical activity of the higher integrators of the brain responsible for the coherence of our world picture.

6. Technological Jams of the Mind.

By taking examples of pathological states with different etiology, this chapter illustrates how the collapse of the higher integrative function causes various clinically observed behavioral symptoms and physiological markers of the split model of reality.

7. Building Bridges.

When constructing the model of any pathology, we need to build a bridge between the internal physiological phenomena and symptoms. The major problem with many mental disorders is that they are not detected by the methods of conventional neurological diagnostics aimed at gross violations of the spatial structure of the neural network. This problem led to such pathologies being simply attributed to the 'riddles of the soul.'

The chapter points to the fact that any physical process includes the parameters of the participating elements: their relationships (space) and dynamics (time). Thus, a violation of the integrative function means a change in the spatial and temporal organization of the neural network. It is impossible to say which of the aspects plays a leading role since these are conjugate variables that are not only inextricably linked but do not exist without each other.

Assessing the state of the system (diagnostics) requires determining the condition of both aspects. It is necessary to go deep into the network topology details and the details of the fine temporal regulation of oscillatory processes of the brain. Unfortunately, when it comes to mental disorders, the second option is almost never considered in conventional neurology and psychiatry. It is not only due to the deficiency of current diagnostic technologies but is the result of the conceptual gap.

The chapter goes back to hypotheses about the binding mechanism that were worked out in the previous volume and suggests the way out of the dead-end. Once again, the model of how the Mind works normally helps in understanding the malfunction.

8. The Puzzle of Life.

This chapter takes some clinical cases of ASD with various levels of disruption and shows that, despite significant functionality differences, they all have similar markers of the core deficiency. The degree of severity depends on the level of violation of the normal integration processes. In some cases, compensation is possible, but it requires high computational costs, and the speed and efficiency of the process suffer. In other cases, the system cannot complete the 'puzzle' from pieces even at the expense of great effort.

9. Bedlam of Psychiatry.

This chapter looks into the history of mental disorders studies. Despite the sad fact that some major pathologies are still not cured, there is undoubtedly progress in our understanding compared to the old notion of 'devilry.' But there is one subtlety: in cases where the etiology and pathogenesis are not clear, there is a diagnostic failure covered by the assignment of a label of one or another syndrome. By naming the set of symptoms, psychiatry substitutes the real diagnosis (assessing the state of the organ performing the function) by pseudo-diagnosis.

The paradox is that psychiatry, which originated as a branch of medicine that studies somatic diseases of the brain, after 200 years turned out to be at the level of the ancient concept of 'madness,' and all diagnoses related to psychiatry without exception say nothing about brain state. But there is another paradox: as soon as the picture of the etiology, pathogenesis and physiology of a particular condition became more or less clear, the diagnosis moved from the sphere of psychiatry to the sphere of neurology or other medical specialties. Both paradoxes are easily explained: the first one is the reflection of lack of knowledge, and the second one is the evidence of the growth of our understanding of the brain.

But many pathologies stay stubbornly in the domain of psychosis (from ancient Greek ψύχωσις — disturbed soul). Schizophrenia is one of them. It is obviously a mental disorder in the sense that the normal functioning of the Mind is disrupted. But what kind of disorder of the brain is it? So far, there is no understanding of the neural basis of pathology. There is no concept of the physical process violation which manifests itself in those symptoms that have been combined into the name of the syndrome 'schizophrenia.' The chapter explores the issue from the TTT point of view on the normal functioning of the brain and starts to build bridges between the observed external pathological manifestations and their possible internal physiological and technological reasons.

10. Brain Integrators Dysfunction.

This chapter returns to the original description of schizophrenia by Eigen Bleuler, who coined the term in 1911. According to Bleuler, its main feature is the violation of the unity of the psyche. He singled out “four A’s” as diagnostic criteria: ambivalence (contradictory thoughts, feelings and desires), autism (avoiding contact), impaired associations and decreased affect. The word schizophrenia (from Greek ‘split mind’) accurately described the symptomatology. It was an apt name for the syndrome, emphasizing the impairment of coordination between different mental functions (cognitive, emotional, motivational). Bleuler was perhaps the first to emphasize the secondary nature of the symptomatology that attracted the attention of other researchers (hallucinations, delirium, catatonia, behavioral manifestations).

Schizophrenia is, in essence, an integration disorder, just as autism is. The schism between the reality model and the environment’s signals and the dissociative reaction as a defense against an incomprehensible environment is common to both conditions. Associative deficits (the problem of linking meanings into coherent patterns) are also a manifestation of the split model of reality. Violation of smooth regulation of affective sphere with sharp swings or a decrease in the general motivational and emotional level result from the kaleidoscopic reality model in both conditions. Hallucinations and delusions may or may not happen, but they are not the specific symptoms of schizophrenia and manifest in many other states.

The chapter proposes a hypothesis about the nature of the pathology and gives it a name within the proposed new classification. Thus, it becomes a subclass in a general diagnostic category that indicates the internal state of the substrate that leads to the externally observed symptoms.

11. Evaluation Dysfunction.

There is one model of schizophrenia that can be called an attempt to take it out of the ‘pure’ mental disease domain – dopamine theory (DT). It is highly popular and has been the basis of treatment practice for many years. All antipsychotics are one or another form of receptor blockade, reducing dopamine transmission in neuronal synapses. The chapter considers the empirical and the conceptual basis of the DT. The major problem with this model is that it deals with only one side of the symptomatology: the productive symptoms of hallucinations and delusions. It is not about curing the core pathological state of cognitive functions deterioration. Just like bringing down the fever is a necessary intervention in some cases but cannot be considered an illness treatment.

The chapter shows why DT is wrong in assuming that dopamine system imbalance is the core feature of schizophrenia and explains why the treatment practices that have been going on for dozens of years do not heal the fundamental problems inherent in the pathology (Bleulers’ four As). It is the result of the absence of a technological approach to the system. That is why the reaction of the evaluative structures such as the dopamine system to the internal problem is taken for the problem itself. It is analogous to taking a fire alarm for the problem and extinguishing the alarm signal but not the fire.

The chapter offers a hypothesis about the role of the dopamine system and the cause of its 'fire alarm' signal in schizophrenia. In short, the dopamine system reacts to violations in creating a coherent reality model. Chronic violations of this process lead to its dysfunction, manifesting in hallucinatory and delusional states as secondary (productive) symptoms. It is a technological and logical chain of events. But such a simple inference has non-trivial consequences: it means that the whole industry approach to the main systemic pathology of the Mind should change.

12. Delicate Strings of the Soul.

The integration mechanism proposed in TTT is a multiparameter process. There is no reason to associate the disintegration pathology with the dysfunction of only one type of neurotransmitter or receptor. The imbalance of the oscillatory process at the cellular and intercellular level leads to the observed phenomena of imbalances at the level of neuronal populations and general behavioral, cognitive and affective symptoms, which can be called in one word — disintegration. The chapter considers the details of this delicate process of tuning the 'strings of the Soul' and offers an explanation of the pathological state of chronic dissonance.

13. When Strings of the Soul are out of Tune.

The modern methods of treating systemic disorders of the Mind can be compared to trying to tune a violin with a hammer. It is no accident that among professionals, antipsychotics are called 'chemical straitjacket.' But the name 'chemical lobotomy' is more appropriate. The chapter describes some clinical cases as examples and takes meta-analytical longitudinal studies that show the dramatic adverse effects of antipsychotic drugs on brain tissue. The use of antipsychotics is aimed at extinguishing arousal and hallucinatory-delusional states, but negative symptoms increase and patients experience further decay of mental and motor activity. In short, current practice does not heal but cripple. This is the result of a conceptual error and lack of a clear model of the Mind in the branch of medicine called 'healing of the Mind' (psychiatry).

Based on the TTT model proposed in previous volumes, the chapter offers a hypothesis on the nature of the underlying problem that causes the observed symptoms of schizophrenia. This approach gives a connecting thread on which individual aspects of internal and external manifestations of pathology can be strung. It helps to glue the discreteness of data into the continuity of conceptual understanding and build a coherent model of the incoherent state of consciousness. It gives hope for real diagnostics and therapy.

14. A New Approach to the Diagnosis and Classification of Mind Pathologies.

The approach that is offered in the chapter is new only for psychiatry. For the rest of medicine, it is a long-time standard. The authors of a review article titled "Brain Disorders? Precisely" wrote: "Mental disorders represent a public health challenge of staggering proportions. Diagnosis in psychiatry, in contrast to most of medicine, remains restricted to subjective symptoms and observable signs. Shifting from the language of 'mental disorders' to 'brain disorders' or 'neural circuit disorders' may seem premature, but recognizing the need to

incorporate more than subjective reports or observable behavior in our diagnosis of these illnesses is long overdue."

It is evident that the shift from pseudo-diagnosing by calling sets of symptoms by various names in Old Greek to actual diagnoses that speak of the state of the target organ is long overdue. Without such a shift, we will not be able to deal with the public health challenge. But it is not enough to say that it is time to call mental pathologies 'brain circuit disorders.' It's about everything in general and nothing in particular. We need a concept about the mechanisms of operation of these networks in the norm and corresponding hypotheses about violations of this mechanism in a specific pathology. If there is a new conceptual approach to diagnosis, then a new approach to treatment practice will arise.

This chapter summarizes the hypotheses proposed in this volume and places them within the general concept of the Teleological Transduction Theory. It offers a diagnostic class that combines pathologies currently attributed to various neurological or mental disorders. Depending on the etiology, age of onset, and pathology level, they can be defined as clinical subclasses of the integration mechanism impairment.

The proposed diagnostic category is not determined by the known or unknown etiology but depends on the state of the integration process and the determination of changes in the substrate that carries out such a process. As we have already noted, the more we know about the state of the brain in a particular pathology, the fewer cases will remain that will relate to mental disorders. Perhaps the day will come when we will simply forget about such a concept, or it will be of purely historical interest.

The authors of the book "Schizophrenia: A Very Short Introduction" wrote: "We now know that schizophrenia is fundamentally a biological problem that is no different in principle from other such problems, like cancer or heart disease or diabetes. We know that schizophrenia is not caused by possession by evil spirits, or by a weak personality, or a bad mother. Yet in spite of all this knowledge, we remain deeply fearful of all mental illnesses and of schizophrenia in particular."

The more we understand, the less we fear.