Symphony of Matter and Mind

Part seven

Inner Universe
The Mind as Reality Modeling Process

Chapter synopsis:

1. The Game of Life.

Any game can be graphically represented as a tree, where the branches are possible moves, and the nodes from which they grow are possible situations in the game. At each node, the player has a set of possible moves. The optimal solution depends on the completeness of the player's information about the initial conditions, the previous development, and the current situation. To foresee the future, one must know the past and the present. The rules are the same for all but each player has an individual model of the game. The better the model, the more chances of winning.

This sounds a lot like the reality modeling principle for all living systems. But the game of life is not a chessboard with well-known rules and an obvious layout where moves can be calculated. Life is a game with incomplete information. It means that the rules are not apparent, and the players have only partial information about the data of the game and about other players. In such a game players can only make probabilistic assumptions about the moves and their outcomes. Based on the Teleological Transduction Theory (TTT) hypotheses offered in the previous parts, the chapter shows how the brain makes probability calculations to maximize our chances of winning in the game of life.

2. Probability Space of the Mind.

To settle the issue of incomplete information about the potentially infinite and dynamic environment and avoid the overload of 'embracing the immense,' the brain forms the reality model as the probability space. It attributes probabilistic weights to signals and integrates them into the overall adaptive picture of the world. It has to be satisfied with the necessary and sufficient likelihood, estimate the parameters based on the known results, and calculate the current posterior distribution. But it must strive for the maximum range of coverage, spend energy and time collecting data, and not be satisfied with the existing level of the prior distribution (current versions of the reality model). Otherwise, a living system risks facing high uncertainty in the incoming signal, which could be a potentially fatal surprise. The chapter

offers hypotheses about the probabilistic approaches used by the brain to solve the problems of modeling reality.

3. Informational Pendulum.

The mind cannot afford to remain in a fixed, calculated once and for all model. It must explain the world here and now but also be ready for changes. If a living system calms down and decides that everything is estimated and expected, it will sign a death sentence to itself. It has to expect surprises in a constantly changing world. Thus, in trying to reduce uncertainty, it faces the paradoxical task of looking for surprises. The chapter considers the process from the information technology point of view. It shows how the brain solves the problem of balancing between the poles of the extremes of zero and maximum information entropy.

4. Hallucinations and Illusions.

The previous volumes of the series considered the nervous system's normal operation. The fundamental approach is to determine how the mechanism works and then explain what happens when it malfunctions. Based on the TTT hypotheses about the physics and technology of the brain's normal functioning, we begin to look at pathological states. The chapter starts to explore the issue of how the mind may form representations that do not reflect the physical characteristics of the actual signals or are not connected with them at all. It offers a hypothesis about the difference between hallucinatory and illusory representations from the technological point of view by considering at what stage of the mind's algorithm they appear.

5. The Mind's Eye.

This chapter describes the manifestations of how, under certain conditions of the technological chain functioning, the inner Universe breaks away from the outer one, ceases to be a 'map' that helps to navigate, and even turns into a trap that leads to dead-ends. The description of such states helps us understand the complexity of the mechanism and technology in the norm. A healthy state is imperceptible. We do not notice the flow until we see deviations. As a deviation in the flow of consciousness, pathology can serve as a 'litmus test' for the manifestation of the mechanisms of internal processes. By taking specific clinical cases, the chapter offers a detailed account of what may happen when the technology of the mind breaks.

6. Altered Consciousness.

Before we move on to the description of the mind's pathologies, as violations in the process of forming a coherent model of reality, it is necessary to consider the so-called altered states of consciousness. On the one hand, they are normal adaptive states. On the other hand, they are

in the border area, which means they can help us understand certain aspects of pathologies. The chapter considers various levels of such states and shows at which technological stage of the mind's algorithm they appear. Thus, it solves the old mystery of similarity between these states and pathologies of the mind. It also defines the border area between altered and pathological conditions.

7. The Borderline.

The general norm is the ability of a living system to exist and operate effectively in the environment. The mind is the process of creating an adequate model of the world for a living system to orient and survive in it. Thus, the mental norm is an adaptive model which can be individual and, at the same time, adequate to the mutual environment. There is no ideal model as a measure of the norm. But is there a way to assess the norm or deviation from it if there is no absolute measure? To formulate the concept of the system's normal functioning, one must first determine what its function is in principle. The chapter returns to the clear and physically substantiated functional definition of the mind proposed within TTT. It reflects the technological stages of the mind's algorithm. Their violations may be analyzed based on the study of the substrate elements that perform the corresponding functions. Thus, the chapter starts the movement from the currently prevailing symptomatic approach to the pathologies of the mind to the real diagnostics.

8. Escape from the Labyrinth.

Throughout the existence of civilization, there have been many attempts to answer questions about the pathologies of the mind: from ancient versions about the intrigues of the Devil or the curse of God to modern hypotheses within the framework of psychology, psychiatry and neuroscience. However, it seems that the number of questions is only growing, and the answers remain mainly at the level of describing external manifestations and have not fundamentally advanced along the path to a physical and technological approach to internal processes. In other areas of medicine, such an approach is considered standard, and it has created a huge leap forward in the treatment of many pathologies previously regarded as incurable. When it comes to mental illnesses, we are still largely at the level of describing the 'devilry,' but we just use new words. Based on the previous volumes dedicated to how the mind works normally, this book builds the bridge to the next one dealing with pathologies and shows the way out of the labyrinth.