

Is the Functional State of Schizophrenic Patients Located in the Vicinity of a Bifurcation Point?

To the Editor: Schizophrenia is a psychological disorder characterized by delusion, hallucination, confused thought, disorganized behavior, and disturbances in emotion. Abnormalities in neurotransmitter systems, brain structure, and cognition exist in this disease.¹ Genetic studies show the hereditary aspect of the illness. Other studies claim that schizophrenic symptoms are the result of prenatal stress or environmental factors. It seems that a genetic stress-sensitivity in combination with stressful life events may lead to schizophrenia onset or relapse.² The treatment includes pharmacological and psychosocial management. Antipsychotic drugs are the first line of schizophrenia treatment. However, several observations show the importance of psychosocial and rehabilitative methods. As a clue of stress importance in this disease, studies suggest that relapse is more likely after stressful events. Thus, interventions that help the patient to tolerate these situations may reduce relapse rates.¹

In the past decades, studies of nonlinear systems have produced

insights into the behavior of biological systems.³ Nonlinear systems are characterized by the fact that superposition of outputs for each individual input will not generate the final output of the system. Bifurcation theory is a common method for the analysis of nonlinear systems. Bifurcation is an abrupt qualitative change in the behavior of the system. The change may be slight or catastrophic. A parameter value at which a bifurcation occurs is called bifurcation point.⁴ We hypothesize that the functional state of schizophrenic patients, because of their genetic predisposition, is located in the vicinity of a bifurcation point. In this situation, a moderate stress in life-events may induce a qualitative change in the behavior of the system; that is, bifurcation occurs, and the stability of the system may change. This can be equivalent to the onset of disease or its relapse. It seems that the pharmacological medications try to return the system to its stable state, preserve this stability, and prevent aggravation of the symptoms. In this context, it is important to take advantage of proper behavioral therapies to keep the system more stable when exposed to stressful events.

In bifurcation control, having feedback control can be a route for modifying the characteristics of the system and stabilizing it. In the

same manner, it may be claimed that patients must be taught to have feedback control of themselves; that is, to have more conscious knowledge of their own feelings, motives, and desires (more self-awareness) and control them through proper learning, especially when they are in stressful conditions. We suggest that using nonlinear dynamic concepts for hypothesizing the pathophysiology and the management of psychological diseases such as schizophrenia may be a relevant method to improve our clinical knowledge. Surely, these hypotheses should be evaluated in future experimental research.

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