

### 3 Biocybernetics and Neural Therapy

*Cybernetics constitutes the science of control and information, irrespective of whether we are dealing with living organisms or machines.*

N. Wiener

In recent years cybernetics has conquered and fertilized almost every field of scientific research as a kind of "bridge between the sciences." It makes use of mathematical methods to study problems of regulation and control, and of information transmission and processing. The principles governing cybernetics apply both to machines and to living organisms. The far-reaching importance of feedback control circuits and of the cybernetic interaction of intermeshed networks of control circuits was recognized in 1948 by N. Wiener and published in his book *Kybernetik oder die Regelung und Nachrichtenertragung in Lebewesen und Maschinen (Cybernetics or the Control and Transmission of Information in Living Organisms and Machines)*. He thus provided a name, a definition and a theory for this new science.

The physiologist R. Wagner, Munich, stated that "the first life existed when the first control circuit existed." The neurologist G. Walter used different words for the same idea: "Life began when in the primeval sea the first molecule was formed with the capacity for feedback." In the course of their development, living organisms have evolved a mass of techniques to ensure survival. These include temperature control, growth, procreation, and heredity. Humankind has studied these mechanisms and has to some extent copied them mechanically. In this (limited) sense, for example, aircraft imitate the flight of birds, the computer imitates the nervous system. The physiological regulating processes have been known for a long time in medicine and biology. But it was not until 1941 that H. Schmidt recognized regulation and control as a common principle both in technology and in the living organism, when he wrote: "In addition to finding regulating processes in technology, we find control mechanisms also in plants, in animals and in Humankind. The fundamental stability of body temperature, blood pressure and pulse rate in the human being, his ability to maintain his upright posture while standing or walking, and a large number of other constants all result from regulating processes."

However, the human being is not a simple energy-consuming machine with rigid mechanisms. Humans could rather be compared with modern computers that transform information rather than energy. The human organism has the advantage that it can work with a dynamic neural material, which is able to regenerate itself and form new connections based on information that benefits the whole. This puts it way ahead of the rigid connections of the most advanced computer system. A number of adaptable functional systems are always active in the human organism. They exchange information and, based on the feedback system, they locate, organize, store, and compare data, and are able to respond to their findings. The impulses have to be as short and clear as possible. The human nervous system has been able to find a way of solving the problem of coding, transmitting, and decoding that modern technology cannot copy completely. According to Vester, cybernetics is "the control and automatic regulation of interlinked and intermeshed processes at a minimum cost in terms of the amount of energy used," without which life would not be possible. Since medicine must concern itself like no other discipline with the biological control circuits in the living organism, it ought not to be unreasonable to expect it to be forced to concern itself more intensively than other disciplines with this higher-order science. Yet, this new line of thought is only beginning to make a little headway in medicine, and painfully slowly at that.

Medicine today prides itself on being based on strictly scientific principles. And yet, diagnosis, which forms its most important basis, seems intent only to look at symptoms and the superficial aspects, instead of concerning itself rather more with the human being as a cybernetically functioning systems complex, systems that respond to and affect his or her internal and external environment. For a symptom is simply the expression of a regulatory change or of a faulty control mechanism. Apparently, in its preoccupation with the study of inert building blocks, medicine seems to have almost forgotten that there is something beyond these that makes up life. To date, medicine has taken the oldest and most important functional basis provided by nature too little into account, namely the fact that organic structures work by means of control circuits that have evolved and proved themselves over millions of years.

Our specialized knowledge has become vast. There is no lack of facts. But there is a lack of synthesis of all this knowledge, a dearth of interconnected thinking that takes the natural laws of cybernetics more effectively into account. We can make progress only if we are able to turn away from analysis and the theorizing of the ivory-towered specialist toward a synthesis, by making the effort to think in more cybernetic terms about the laws on which the facts and events in and about us are based.

Cybernetics regards the human being as the most highly developed of all self-regulating dynamic systems in existence. In the human being, the principle of linear causality (i.e., the straight-line relationship between cause and effect), which is the basis of a purely mechanistic philosophy, no longer applies. Instead, the principle applicable to the human being is that of an intermeshed interactive causality. In any cybernetic system, every subsystem is continually linked to every other subsystem in a network of reciprocal relationships. Seen in this light, disease is a cybernetic problem, since it is the result of a disturbance of the regulating functions within the interacting structure of the self-regulating dynamic system that is the human being, and is due to malfunctions in the transmission and processing of information between individual control circuits within the overall system. Thus, it ought to be the physician's task to act upon these disturbed or faulty control systems in order to restore control and put the disturbed biological functions back into order.

Orthodox medicine insists stubbornly on the so-called "nature"-scientific, linear causality, and its effort to prove itself through randomized double-blind studies. Today, this effort compares with a retreat into old dilapidated bastions. Really, the double is a triple-blind study, where the researchers close their eyes to the reality of network processes in a live system. Biologic systems are not linear but connected in all directions and are subject to a steady state. Hence, there is a balance in which physical quantities do not change after adding energy. The systems are energetically open and able to exchange energy and matter with their environment.

The monocausal reasoning of Galilei, in which cause and effect are directly connected, does not suffice any longer. Thomas declared in 1984 that "it can no longer be considered a scientific effort when one-dimensional causal chains are applied to network systems." Progress cannot be denied. In 1935, Speransky finished his book *A Basis for the Theory of Medicine* with the statement that the time has come for a revolution in pathology where nothing can be lost but chains!

In our daily practice, the majority of patients come to us with a multiplicity of often vague symptoms that fit into no precise diagnostic pigeonhole. We neural therapists know from experience that many of these

disturbances are set off by interference fields and foci. According to Kellner, an interference field is like chronic inflammatory material that cannot be removed or metabolized and that consists of the infiltration of lymphocytes and plasmocytes and of a disaggregation of the base substance. In the case of a focus, bacteria and their metabolic products are additionally involved in the pathological process. Both are sources of irritative stimuli, even if locally they produce only minor symptoms or none at all, and are therefore difficult to recognize for what they are. They continually emit interference signals, albeit only on a subliminal level, which produce stress on the control circuits. These signals are stored particularly by the cells of the ganglia and cause them to be irritated subliminally to such an extent that, when they receive any additional stimuli, they transmit excessive signals. Since the nervous system, whenever the next higher level becomes involved, excites (on the divergence principle) a number of neurons with every new signal, it becomes possible to understand how a minute interference field that, to all external appearances, is totally inactive, can have a negative effect on the whole of the organism and make it unstable. The response of the control circuits to a normal stimulus in such cases is already excessive. The organism works uneconomically and is therefore less efficient and less able to defend itself (Bergsmann, Kalcher). Superficially, the patient seems healthy. But when he or she comes under additional stress, symptoms appear. The stimulus threshold is lowered the longer the regulatory disturbances persist. Additional stress can trigger disorders in pathosensitive regions.

Many of the successes achieved by neural therapy, especially by the lightning reaction, become more readily understandable and can be explained only if they are seen in a cybernetic context. This obliges us to become familiar with the basis, principles, ideas, and definitions of this new branch of science.

### **a) The Organism as Homeostat**

The living organism endeavors to keep certain body functions constant, such as metabolism, temperature, blood pressure, blood pH etc., i.e., the internal environment. Various specific receptors signal any departure from the required values and inform the control center, and this will normally correct such deviations. If the regulating system is overloaded, provision is available for switching over to other intact regulating systems or to bypass them until one is found capable of restoring the function in question to its ideal range. The neurovegetative system and the hormonal system connected to it regulate and control this homeostatic state and ensure that it is maintained. However, the compensating capacity is not unlimited and is lost if the organism is

subjected to an excessive influx of stimuli. It is our task to prevent an irreversible condition by interfering with pathogenic mechanisms that weaken the system through continuous stimuli. The intervention should take place at the primary site of stimulation (for example, the interference field) to restore homeostasis quickly and thoroughly.

### b) The Economic Principle

Homeostasis can be maintained only if the organism is working economically. The task of the regulating and control systems is to adapt all the metabolic processes in accordance with economic principles to the demand at any given time, by the shortest route, in the shortest time, using a minimum of energy. The time taken by a system to change from one state of inertia to another is known in cybernetics as a "settling process." Any stimulus that produces a response in a control circuit thus also sets off a settling process. An intact control circuit reacting normally (in a "muted" manner) and functioning at optimum "control quality" with "negative feedback" is able to cope with this additional demand quickly and economically.

When there is a dysfunction in the control circuits, which may be due to any one of a number of causes, "periodic or aperiodic deviations" will occur in the control quality. These may be of several degrees of severity. In the case of labile (periodic) deviation, any stimulus will produce an excessive response. A short-period stimulus will produce a deviation from the initial energy at a steeper gradient and to a higher value. Similarly, the return to the initial value will also be excessive and require longer to settle down. In such a case any permanent stimulus will also produce an excessive response and the required value will be attained only after a longer settling time. This is known as regulatory lability in the patient.

In the case of a slow, sluggish (aperiodic) deviation any stimulus is delayed and the response to it is slow. Clinically, we then have regulatory sluggishness or paralysis. The initial value is reached slowly or not at all in the case of short-period stimuli, and an adequate value in response to permanent stimuli is not reached at all or only very late. In both these types of deviation of control systems, time and energy are wasted in responding to stimuli, and thus the principle of economy and of homeostasis is upset.

The consequence of all this is that under stress or as a result of the effect of noxious stimuli, ever more energy is required. Only a well-functioning regulating system can cover this additional demand quickly and economically. A disturbed system works more slowly and wastes more energy, and the effort required of it for work or defense is therefore produced less econom-

ically. The available spare capacity is correspondingly reduced.

### c) The Control-Circuit Principle

Of the three basic principles of cybernetics, i.e., information, automation, and control, the last is of particular interest to us. In the living organism, all regulatory processes that serve the maintenance of the biological equilibrium take place automatically. This occurs via control circuits that have the purpose of providing stability for the dynamic system. We are all familiar with the reflex arc. The control circuit takes us one step further: it closes at the periphery, which forms a closed information circuit. "Feedback" is considered the ability to compare continuously the status quo with the (variable) goal. The continuation of a process depends on the evaluation of the status quo. This requires the incessant activity of control systems that compare the effective value with the required value. They adapt to the individual situation through corrections that correspond with the goal. Let us take a closer look at a control circuit in Figure 1.1.

A control circuit (1) is a self-regulating closed circuit. It owes its automatic capability to a feedback system. Its function is to keep the regulating value (2) or range (e.g., hormonal balance, body temperature) within permissible limits and following a disturbance to bring the system back to this range. It is helped in this by a regulator (3), which compares the effective measured value with the required or nominal value and thus acts as control center. A higher-order transmitter for the required control values (4) specifies the values the regulator has to maintain. These values

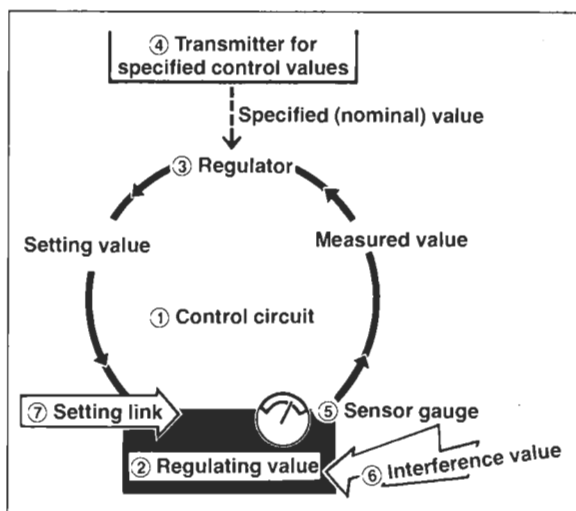


Fig. 1.1 Simple control circuit with the principal standard components.