

Chapter Two

Self-functioning Systems

We are aware of meaningful and operational togetherness. A togetherness of things or parts which form a complex or unified whole, we call a system, like a railway system or a forest system. We observe systems all around us in Nature. We observe living systems on land, in the sea and in the air. Just what is the essence of these systems. We speak of economic systems. We invent and study system analysis. It is necessary to have precise and well-defined ideas about what systems are in themselves, in their selves, in the selves who conceive, construe and construct them.

Some people may find parts of this Chapter quite new and somewhat difficult reading. It attempts, through simple linguistic analysis and mathematical logic, to get to the existence and essence of self-functioning feedback systems. Readers should not be deterred, however, if they encounter such parts. They should not waste time trying to understand everything they read, but simply skim over any indigestible parts and pass on to that with which they are more familiar.

A cartoon in *PUNCH* many years ago serves as a humorous, yet profoundly meaningful pictorial accompaniment to one of the main themes of this book. It depicted a large factory floor. No persons, no machines were in sight, only a long, seemingly endless production bench with its line of packages. There was neither caption nor commentary. The only writing was that on the cartons.

DO-IT-YOURSELF KITS.

Living things are *do-it-yourself kits* of a special sort. They are all self-functioning with varying degrees of self-regulation through unique feedback processes. The root temperature of a healthy human's body is never a static 37⁰C. It varies according to need in diverse activities. One would have to be a very astute system's engineer to fathom the thermostatic intricacies of the regulation of body temperature through sweating, shivering, blood flow, food combustion and so on. Likewise, chemical engineering can scarcely conceive the quality control system of the computerized kidneys

which process all the information needed to regulate the amount of salt in the blood. Every second, billions and billions of charged atoms or ions are individually scrutinized and selected for further use or rejected as waste. On the global scale there is yet to be unravelled the systems whereby chemical stability is maintained in both atmosphere and ocean. In the past without man's interference, climatic conditions and the chemical and physical properties of the earth and surrounding atmosphere and oceans have generally always manifested through the whole of their history, the optimum environment for the fruitful development of life, for self-organizing, self-regulating, self-revealing, self-other-life.

This Chapter undertakes a simple, but rigorous non-technical study of the Science and Logic underlying self-functioning systems, particularly as pertaining to Sociology and Economics. All living things, great or small, possess the common property of having been able to have had developed, both in and between them, reflexive-transitive self-other-life systems which they operate and maintain, and which have a specific goal set for them. This set goal, they seek to attain through an extraordinary *questioning* process of feedback in the trial and error of *if...then*. implication. There is something both childlike and also feminine, something cerebrally right lobed about the elliptical non-linear logic employed in such systems. It is quite foreign to the masculine traditional straight line logic of cause and effect, and hence its understanding requires a more evolved and sophisticated attitude of mind.

Not only are all living things self-functioning with varying degrees of complexity but the human self, as artificer, can also project something of its self onto and into special types of artifacts which, like a speed-governor on an engine or a thermostat in a heating system can be made to act as a self-functioning-feedback-system (abbreviated to s-f-f-s), i.e., as a system whose functioning proceeds from and depends on the operating system itself as a single entity or unity itself. In such an iterative operating self-functioning system, the very system itself as a whole, becomes an actual part of the system. A system in which the whole contains itself as a proper and essential part of itself and which acts only by, with, and from its whole functioning self, i.e., *a se*, is appropriately described as being *a-se-istic*. In Set Theory Logic, such a system or set has also been

labelled as extraordinary, in contrast to ordinary systems or sets in which the set or system, as a whole, is not a proper part of itself.

The study of self-functioning-feedback-systems is familiar to many people today under the subjects of Cybernetics and Chaos Theory. It would seem to be more appropriate to call these disciplines by the new more meaningful and comprehensive name of *Aseistics*.

The first recognition that those who study Aseistics must make is that there is something other to such major whole systems over and above the mere listing of the individual minor parts which constitute them. In even the most elementary s-f-f-s, the simple analysis of material subsystems and their minor parts on their own sheds no real light on how a whole aseistic system works. The mere knowledge, in complete isolation, of the working of the many and varied organs of the human body, such as the brain, lungs, heart, liver, and kidneys fails to give any meaningful understanding and comprehension of their relational interdependence in maintaining an optimum steady state efficiency and true healthy coordination to the body as a whole.

Parts are only parts when they are parts of a whole. That is what part means. Unless the whole is known to already exist, the Reductionist Philosophy of Science would be self-deceptive from its initial postulate of analysing the parts to determine the nature of the whole. Without some continual reference to the system as a whole, any analysis of its so-called parts is merely the study of diverse accumulations of bits of stuff.

The aseistic nature of all biological processes is particularly manifest in such activities as the response to stimuli and metabolism. Living things appear to grow and function by themselves, from within themselves. Yet they are not completely independent, for they react to external sense stimulation and take in metabolism's food from outside sources. This latter ingestion initiates the further processes of digestion and subsequent egestion of waste products back to the outside environment. The operative word in any designed s-f-f-s is the *If* of hypothetical *choice* situations, as will be seen later when dealing with positive and negative feedback.

There is something mysterious and also paradoxical about growth. In the self-other revelation of Existential Relativity, Cosmology knows two absolute eternal laws. The first is *All growth and its*

subsequent sustainability in any evolved or still evolving system of the Cosmos is reflexively self-functioning, and at the same time, transitively other-dependent. Both growth and growth rate are self-functioning, yet at the same time they are other-dependent.

A small snowball rolling down a slope of similar material grows slowly. Under the same circumstances a large snowball grows quickly. A small population grows slowly whilst a large population grows rapidly, indeed it explodes. Growth, where the rate of growth is directly proportional to the size of the thing itself growing, is given a special name. It is called exponential growth because the variable x in the growth function e^x is in the index or exponent position. Readers familiar with the Calculus will appreciate that the rate of change of the function e^x with respect to its variable x is the function e^x itself which neither loses nor gains a degree of freedom on being differentiated or integrated. It is a reflexive *self* function, being both self-differentiating and self-integrating. All life processes follow this pattern, as does growth in human knowledge and its materialization in books and in both personal and global computerized information. If today we are experiencing a population explosion, we are also aware of a knowledge explosion. The more we know and seek to communicate through writing, the more we open up ways for further research and literary development.

This knowledge explosion with its attendant proliferation of information has immeasurably extended our cultural horizons, yet the human race, as a whole, still remains in the throes of trying to free itself from slavery to intellectual tyrannies. We have traded our innocence for ignorance and corruption. With the expansion of knowledge there follows its inevitable chaotic fragmentation and specialization. On its own, specialized but fragmented knowledge is necessarily incomplete. It is imperfect and contrary to Nature as Science is making us increasingly aware. No particle, no body with or without life exists in isolation. No thing in itself is ever allowed to ignore its other. All things whether organic and-or inorganic, are interrelated, interconnected and interdependent. They are parts of a cosmic *whole*. They function as a set of all sets, a unique unity of distinctions and unions in union. Nature abhors privatisation.

In evolutionary word-play, *self* becomes increasingly involved both on its own and as a prefix for, and also prefixed by, other

words. On its own as a noun, it names the identity-owner or dictator of a human individualized psyche and becomes the here-and-now *knower* subject of its spaced time *known* object. Knowledge is an act-art togetherness relation of a reflexive self and its transitive other, an *I am* and a *Thou art*.

Prefixed by possessive pronouns as in *myself*, *yourself* and so on, it forms the intensive or emphatic pronouns. In this way it acts as the intriguing feedback reflexive pronouns linked with verbs used reflexively, when the activity flows back to the subject, and the subject and object have the same personal identity or self. From this use as a reflexive pronoun in sentences like, "I control myself", arises the role of *self* as a prefix of other words, e.g. *self-control*, *self-controlling*. In other ways too, there is brought into existence a host of hyphenated *self* associated words, with varying and new meanings, grammatical functions and logic overtones.

The language of Science and Technology today is replete with such expressions as self-starting, self-adjusting, self-adapting, self-organizing, self-feeding, and self-stopping. Designed self-regulating mechanisms are as essential to the industrial and business world today as to the evolving natural world within and around us. As noted, all living things have had developed in them, to a greater or lesser extent, complex systems of self-controlled activity. These may be either completely automatic or partially or wholly conscious. The brain, as the self's cerebral computer is the living human body's crowning achievement and glory.

The new Science of Cybernetics makes a comparative study of the self-regulatory control system formed by the nervous system and brain and mechanical-electrical communication systems such as computing machines. The word itself, *Cybernetics*, comes from the Greek word, *kubernetes*, meaning a steersman or governor. Charon was a character in Greek Mythology. He was the steersman on the boat ferrying the dead across the River Styx. By regulating the rudder from left to right, and vice versa, he could adjust the course of his craft to the caprices and currents of the underworld. The mechanical device known as a speed-governor, working on the basis of negative feedback, exemplifies this kind of self-control. The way that a machine, as a whole, is operating at a given time, is itself a stimulus for any modification of the future course of its working.

In the study of self-regulating systems, a necessary distinction is made between positive and negative feedback. Thermostatic devices are used to maintain a relatively constant range of temperature in some place. In a room, electricity may be allowed to heat a radiator. When the air in the room has reached a desired temperature, a thermostat senses such a situation and acts to turn the power off. When the temperature falls below a certain point, the device again senses this and once more the appropriate signal is given, and the power resumed.

This self-stabilizing system has but one choice, to turn a switch on or off, and is described as having negative feedback. If the system had been incorrectly wired, so that the switch was turned on above a certain temperature and off when below another lower fixed point, then an instability would result. It either now remains turned off and cold prevails or once turned on, it goes on heating until a disaster occurs. Such a system is said to have positive feedback and being progressively unstable, it must eventually break down.

From the designing engineer's point of view in Technology, such intended negative feedback is altruistic and **good**, whilst such positive feedback is selfish and **evil**. Not all positive feedback is necessarily evil. For a system of systems as a whole, a kind of positive feedback which favours orderly growth or sustainability is good. It is the cancerous positive feedback growth of any subsystem which militates against the good of that system of systems as a whole and which thus incurs the indictment of evil. This evil positive feedback of Cybernetics can be associated with the concept of positive entropy in Thermodynamics and figures in the statement of the second absolute law of Cosmology.

*All growth or sustainability through positive feedback in any whole system as a unity is conditioned on the negative feedback of its unit subsystems in union. Such positive feedback in the system as a whole and such altruistic negative feedback in the subsystems in union are technologically **GOOD**. Any selfish positive feedback in the subsystems themselves is technologically **EVIL** and leads to eventual self-destruction.*

It must be borne in mind that all altruistic negative feedback is not necessarily self-repressive. It is simply that self-functioning or self-regulating subsystems are designedly empowered to say "More" or

"Less" to further activity, to *say* "On" or "Off" to either harmonious shared self-survival or eventual tragic privatised self-destruction.

This negative and positive feedback in technology must not be confused with customer feedback in marketplace advertising.

Some of the basic problems in Thermodynamics, particularly those associated with the ubiquitous entropy find echoes, with varying degrees of similarity, in all dynamical situations where there are sets or unities of free distinct units in some sort of union, that is, wherever there is a self-functioning whole made up of discrete self-functioning parts.

Dynamics is that branch of mechanics which deals with the motion of bodies and the action of forces which produce or cause changes to such motion. Thermodynamics is the science which is concerned with the mechanics and relations of heat energy. Heat is energy in transit due to temperature difference. It is the energy of relatively free and uncoordinated individual molecular motion. Temperature is a measure of molecular movement. As objects get hotter, their molecules move around faster and seemingly to an observer, in a more random fashion. As they get cooler they slow up until all motion, in theory, stops at absolute zero.

Ordered energy can be put into a system as a whole, only to become privatised in the latter as the un-ordered heat energy of its discrete molecular parts. The term *un-order* is used rather than disorder, because the latter presumes, with humans' hindsight, the former existence of some prior other order which now seems to be missing or to be displaced and which should still be there.

Un-ordered heat energy is the energy of free and undisciplined particles. As the un-ordered or non-organized kinetic energy of the individual parts of a system, heat suffers the restriction that only a fraction of it can be put back to efficient mechanical use in a system as a whole. As long as we are unable to harness at any one time the motion of each free molecule, we cannot convert seeming random motion back to ordered motion in the selfsame system. It is not that energy is destroyed, but simply that it becomes unavailable in its un-ordered state for further ordered mechanical work in a closed system as a whole. Natural processes involving heat energy proceed irreversibly in the direction of maximum energy-uselessness. The price that any system which is made up of parts must pay, if the

privatised parts are to remain free and to act independently, is an overall energy inefficiency in the same system as a whole, thus leading to its eventual demise. They are subject to and bear witness to the Second Law of Thermodynamics, otherwise known as the Law of Entropy.

We can imagine a system made up of 100 free and independent parts and into this system 100 units of heat energy is introduced from some other source. If the energy were shared more or less equally, then each part would receive about one unit of extra kinetic energy. Each individual part continues on its independent selfish way, not caring altruistically for the system as a whole. If the system as a whole is required to perform some directed work, it receives only a fractional amount of similarly directed interdependent ordered response from the random movement of its un-ordered independent privatised parts. The mere magnitude of the sum of the scalar energies of the un-ordered parts is necessarily always greater than their vectorial sum in any specified direction.

Entropy is a mathematical factor which is a measure of the actual uncoordinated or unavailable energy of a real thermodynamic system. It contrasts the total energy of a system's units, considered only in distinction as isolated and unassociated unit parts within a system, with the ability of the very same system, now in a union as a whole, to do effective work outside the system. Entropy reveals the uneconomical nature of heat energy.

In Nature, every physical and chemical process proceeds in such a way that the total entropy of all the subset bodies taking part in the process is increased. Any integrated system made up of individual free parts, if left just to itself, inevitably disintegrates. This accounts for chemical irreversibility. Fires do not unburn. They may die out but there is no hope of ever getting the wood back from the ashes and the smoke. A statistical interpretation of the Law of Entropy requires that a system left to itself can change only in such a way as to increase the probability of the increasingly disunited state in which the system finds itself as a whole due to the increased lack of coordination of its parts. This disintegrating effect of the sterile individualism and randomness of the parts liberated now from the governing whole, would be classed in Cybernetics as a type of positive feedback, putting the system more out of order as a

functioning whole. That the system should return of its own accord to the pristine order of its original state becomes more and more highly improbable.

Where there are a large number of interlocked feedback systems, as in the human body, there is said to be multiple choice. Self-respecting cybernetists, in contrast with many other species of scientist, prefer to speak of multiple choice, not multiple chance.

Applied to Nature, the physical structure of the wrap or web of living materials covering the earth cannot be separated from or treated independently of the soil, the rocks, the atmosphere or the oceans. Both living and non-living things are fundamentally linked in a dynamic *if...then...* feedback network of interactive relations and self-controlling systems. The sun is the source of their energy and the matrix is composed of an uncountable and also unaccountable number of unique self-stabilizing feedback cycles. When life first appeared on this planet and began to flourish, it did so not only because physical conditions were propitious, but also because it actively modified the non-living surroundings. As life evolved it continued to modify the whole environmental complex so as to effect the optimum conditions for its proliferation. Life has an innate dynamism, not merely just to survive, but to adapt both within and without, so that more and more life may abound.

Feedback trial and error processes are foresighted means to certain determined ends. The very existence of a success or a failure in such trial and error technologies demands that such processes be designed for a purpose. Self's conceived self-survival demands some self who seeks survival either in or through some thing. Trial and error techniques in an evolving s-f-f-s imply actual foresight of the purposeful existence of success or failure. *The degree of symbiotic incorporation into an ecologically favourable environment measures success, whilst rejection by such as unsuitable or detrimental determines failure.* In all eras preceding the advent of human self-consciousness in this planet's evolutionary development, the eventual fate of any new parts, through success or failure, would have been judged by their feedback effect on the whole system, for better or worse, for richer or poorer.

If there were no destructive interference from human beings, the life-system of Nature on earth would be a sun-driven complex matrix

of multiple choices, one whole extraordinary self-other-functioning positive-feedback-system or unity of countless distinct negative feedback subsystems in union. It would be uniquely self-stabilizing and moderately self-progressing as it maintained an ideal balance between order and seeming disorder. There is a mysterious flow of information throughout its whole system which not only binds it all together in wonderful harmony, but which makes judgments and executes sentence on those individuals or species which defy Nature's own rules and dare to militate against her plans with their own cancerous positive feedback. In the world around us, there are these countless interwoven negative feedback systems, each with its special period or time cycle of operation. Some take minutes, some hours, others may take centuries for the completion of just one revolutionary movement. Human beings tend to ignore systems with long periods simply because their full import is not visible in relatively short time spans. This can lead to a presumptuous optimism that toy-making technology can rape the earth and still be immune from Nature's wrath.

There was a past time on this earth when the activities of human beings, particularly in Mother Goddess worship, were integrated into Nature's grand network and were a true functional part of it. This was always meant to be so. Mankind, as the protagonist on stage now in a further, perhaps even final, act of aseistic evolution, is destined to rule the earth in the capacity of Nature's appointed obedient servant and husbandman, not in the usurped evil role of rapacious tyrant. With their various priesthoods' connivance men have prostituted their caretaker-career for a get-rich-quick exploitation of natural resources and have blinded themselves to all possible consequences. For the ecology and economy of our Earth, the Judaeo-Christian religious traditions have proved to be more often curses than blessings. The greatest mistake that humans can make is to imagine that evolution is as blind as they are. Our most childish stupidity is to think that the *brooding hen bird's* spirit in Mother Nature is only a pious myth; to think that the real living world around us in its quasi-infinite complexity, is purely passive and insensitive, neutral and defenceless, meek and virginal, just waiting to be abusively deflowered.

Actually the reverse is true. Immanent in Nature there is a Gaian entity, an aseistic evolutionary force-field continuum-spirit which is not only capable of recognizing and repairing damage done to itself, but which, in its expanding pressure to survive and abound, will stop at nothing to eliminate all opposition.

We do not know what further surprises Nature has in store for those who threaten her delicate vital sense of balance with their man-made evil positive feedback instabilities. Nature does not employ defensive mechanisms. Any offence against her stimulates her to attack and turn the situation now to her own advantage. Not merely do the most adaptable usually survive, but the danger makes them more numerous and far more dangerous. The pesticide industry is occasioning the appearance of harmful super-pests: the fertilizer industry is likewise fertilizing new deadly diseases and super-problems. A new word, *iatrogenic*, is in use to refer to those diseases which result from medical intervention itself. The catastrophic harm done to humanity through the use of addictive antidepressant and antibiotic drugs is only now being finally acknowledged. Bacteria are not only becoming immune to antibiotics, but are passing on such immunity to other bacteria and old diseases like tuberculosis and malaria are now appearing in forms far more virulent than before. Most antibiotics are now obsolete and there is nothing to take their place. Psychological illness in epidemic proportions is conveniently palliated with prescription-only tranquilizers.

Most scientists, in conscience, would quarrel with today's exploitive technology, but their lips are sealed for the most part, because for reasons of remuneration it is fatal to bite the very hand that feeds you. Nature teaches us this too, but for quite different reasons, in almost opposite sets of circumstances.

Something seems to have gone radically wrong with the programming of many human cerebral computers. Whether they have mistakenly allowed some software virus to interfere with their reasoning's flowchart or whether they have got some nerve-wires crossed in their brain's hardware electronic circuit, but we are plagued with self-destructive positive feedback subsystems. The marketplace and big business are obsessed with the positive feedback of *greed's more and more for mine's own one self*, and its *less and less for many or all others or for the system as a whole*.

The atmosphere that we breathe is polluted with poisons from the exhausts and chimney stacks of energy-consuming technological dragons spewing their excremental waste. The oceans and rivers are accumulating our sewerage, detergent and toxic industrial wastes and beaches are becoming unfit for bathing. The second-hand food that we eat is contaminated with the results of the firsthand feeding of animals and birds with antibiotics, female hormones and artificial growth stimulants. Animal and vegetative life is endangered and becomes a source of food-chain poison for humans when pesticides and herbicides accumulate in the soil.

The business world is blindly intoxicated with the power that money can buy and is enslaved to a positive feedback mentality of getting rich quickly in any way today, without giving anything other than a *damn* for anyone else today or tomorrow. There is a tragic irony in the situation that man-made chemicals are unmaking mankind and, as the latest research shows, they are responsible for the alarming gradual emasculation and accompanying feminization of the male of many species, including *homo impotens*. Fish are exhibiting hermaphroditism. In men and the few other animals and fish for which data are becoming available, the male sperm count is decreasing at an alarming rate.

Human prejudice is such that it is always very difficult to get new ideas accepted, no matter how plausible they may be, and no matter how insane the old ones can be shown to be in their inconsistent conclusions. Both the past and the present bear witness to the difficulties that honest unveilers and priestlike revealers of Nature have had in gaining even a minimum of consideration for their discoveries and innovative thinking, whether it be from political, scientific or ecclesiastical authorities. All the latter three are often victims of the seductive virginal unbecomingness of inertia and are generally pledged to uphold their traditions at all costs, whilst the real interests of evolutionary truth are more often than not sacrificed on the altar of expediency. There is nothing that many authorities in academe fear more than a logically valid and empirically verifiable new idea.

Any person convinced of the truth of his or her perception of reality cannot but wax enthusiastic about sharing such knowledge with others. On the other hand, the ruling establishment or the

empowered authority might conceive things or events in a totally different manner, and consider it expedient to silence any opposition rather than whole nations or their own cultural systems should perish. The protection-attitude resulting from, and in opposition to, new ideas can arise from a genuine concern for the welfare of others or from an equally genuine concern for the interests of oneself or from both together. The authoritarian approach of much disciplining in all religious and political groups betrays a mixture, in varying proportions, of trying to protect their adherents from some supposed error and trying to protect themselves from being shown to be wrong.

In cultural evolution, the so-called New Mathematics, as taught in schools at all levels in the latter half of the Twentieth Century, has been a providential cooperator in the development of electronic computer programming. The New Mathematics makes explicit use of the grammatical entities of *and*, *or*, *and-or*, *not* and *if...then*. With just these basic language elements and using the digital techniques of binary arithmetic, the whole edifice of today's computer world has been structured. It is because our human cerebral computer itself is programmed to function this way that we are able to project its self-functioning feedback onto construed and constructed analogues. The purposeful operating of the human brain is perfected as a Do-It-Yourself Set, an extraordinary unity of psychical self-functioning and physical other-dependence.

It is in the realm of psychical development and its perfecting of the self and its consciousness in inner space that evolution is still proceeding. It continues in this, however, only with both the active and passive cooperation of each individual self, freely involved and dedicated to its consummation. All human endeavour should be directed first and foremost to this end. Physical well-being and excellence, sensual satisfaction, knowledge whether philosophical, scientific, factual or fictional are only means to this objective and hence merit but secondary and subordinate consideration. Not mere material growth transitively in outer personal possessions but the possession reflexively of inner personal growth should motivate and direct all true human aspirations. The human I-Me-Mine is only perfected as We-Us-Ours.

In the modern Set Theory of *The New Mathematics*, a set can be conceived as a well-defined *Unity of distinct Units in Intentional*

Union and such union is represented by confining the units in the conventional pair of special bracket-like braces, { }. Sets only exist in the mind of a self who identifies its one reflexive “I am” self with some transitive other or with all others in the one act of knowing. All knowledge and likewise growth in human personal relationships result from such self’s conscious willed unity of both reflexive “I am” self-being and “You are” transitive other-self-becoming. The destiny of human I-self-consciousness is the unity expressed verbally as We, Us, Ours .

To know is to become. Psychically, human personal growth is effected and perfected analogically to the pregnant human placental mammal when the singular “I-me-mine” self knows its self now as plural “We-us-ours”.