HANS HASS

ENERGON THEORY

The hidden common feature in the evolution of life.

All forms are similar, and none is the same as the other;
and so the Chorus points at a secret law,
at a holy enigma.

Johann Wolfgang von Goethe

We have to hurry.
If we continue sleeping, Europe will,
like so many great nations before it, sink-,
and nobody will have understood why and wherefore.

Jean-Jacques Servan-Schreiber

Translated from the German by Elisabeth Zinschitz

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INTRODUCTION

Nowadays everybody takes it for granted that the working structures and enterprises created by mankind are fundamentally different from animal and plant bodies. To compare a shoemaker's workshop with a rosebush, or a millipede with an insurance company, seems to be totally absurd.

In this book I want to show that reason is misleading us here. What seems to be absurd, is, in fact, reality. We are stuck in old conventional thinking patterns. What our senses and our brain want to make us believe is in many respects illusory.

In biology, but also in economy, we have overlooked the very obvious connection of both areas until the present. All animals, all plants, all human working structures and all acquisitive enterprises have the same main orientation, the same vital backbone, so to speak. However different they may look, they are all geared to enhancing their energy potential. Their existence stands or falls with this specific activity. Only if they succeed in achieving an energy outcome which on average is favourable, are they able to last. They have to win more exploitable energy than they spend while working. If they have a balance of deficit, they may be able to maintain themselves through their reserves or by consuming their own structure, but if the deficit persists they will disintegrate themselves. This goes for every worm as well as every locomotive factory, for every bacterium as well as for a bank robber.

Without energy there is no movement, no progress, not even for a thousandth of a second. Without energy there is no development or maintenance of any structure, no growth and no procreation.

In the end no physicist has yet been able to say what energy is. We do not have the smallest clue about the nature of energy. According to the view of the world of modern nuclear physics everything leads ultimately to energy... Energy is the root of all phenomena.

Energy is extremely transformable. It manifests itself as heat, as kinetic energy, as electricity and as chemical energy. Further manifestations are magnetism, gravitation, nuclear energy and energy of stationary mass. Every single one of these forms of energy can be transformed into any other, and we are now able to measure all of them. Units of energy measurement are among others ergs, calories, horse-power hours, electron volts, watt-seconds. Each one of these measures can be converted into the others. But what this extremely flexible phenomenon which is being measured here actually is, we do not know[1].

It is not only that animals and plants as well as economy structures created by mankind have to win on average more energy than they spend while winning it, but they also have to be *competitive*. In the realm of organisms as well as in business life monopolies are hard to achieve and maintain. Almost always there are several candidates claiming a specific source of income. The consequence is that competition between these claimants decides who survives and who doesn't.

Now, which distinctive features are the basis for this characteristic which we call "competitiveness"? And are these features different for plants and animals than for human economy structures, or are they the same? Is it possible to measure them?

In animals and plants we find "individuals" and "species". Specific individuals may perish through competition or environmental impact, but that does not mean that their species become extinct as well. Small fir-trees die continuously, and gazelles perish, but their species last: as very specific structures in space and time not only capable of a acquisitive activity, but also of competitiveness. It is only when the environment changes in such a way that the type of structure cannot achieve a favourable energy balance, that the species is not able to survive: it "perishes". In evolution this has happened over and over again.

Also in this respect the same happens in human economy structures. Here too it is possible to distinguish between the type of gaining activity on the one hand and the working individual on the other. Here too a working person may lose his employment or a company may go to the wall, but the specific type of enterprise or profession will not disappear because of that. Here also we have structures in space and time which are competitive and capable of acquisitive activity within a certain environment. If these environmental factors change – specifically the productivity of the source of income - then these structures are doomed. It has happened in the course of human history that specific types of professions and enterprises have disappeared as well.

As there is no common name for energy gaining systems, I call each one of them an "energon". These energons are consequently not defined by a specific appearance, but rather by a specific effect.

In this book I avoid the word "system" because it is used in a different sense and therefore liable to be misunderstood. In natural science it is quite customary to denote living creatures as systems - as "living systems". In economy, however, we denote the higher political-economical construction as a system, and not the individual economy structure. There we speak about planned economy or market economy "systems", but no one would think of calling a goldsmith with his professional tools and other accessories or even an opera singer a "system". Recently cybernetics have also started having their impact in business management, but they have not got as far as smaller, simpler economy structures. The new notion "energon" bridges this gap.

Every energon is a "structure" which is based on the division of labour. It consists of functional units which achieve a favourable energy balance because they work together. In higher plants and animals these subordinate units are tissues and organs. Where a working person is concerned, apart from the natural organs in his body, artificially created units (tools, equipment and similar things) are added. In companies consisting of numerous professional structures, these subordinate units are employees, machines, equipment, departments etc. The essential point is that in any case it is not actually the appearance of these units that matters or the way they function – but rather the achieved *effect*.

A man from the business world is more familiar with this way of looking at things than a biologist. In companies it happens quite often that certain tasks can be carried out by a human being as well as by a machine. And frequently very different procedures can lead to the same desired result. So, the structure of a subordinate unit and type of activity are merely of secondary importance. Only the effect and the expenditure are of primary importance. These two factors are the only ones which have an impact on the balance. Seen in this light, human acquisitive entities in the end do not only consist of material units, but also of effects. They are *effect-structures*.

In animals and plants the different parts are not freely interchangeable. Therefore we are used to looking at these bodies in a different way than we do with companies. But also here the appearance of the subordinate units or how they function is not really essential – it is their effect and the energy expenditure which comes with the effect. As was previously pointed out, the same result is achieved in very different ways. The echinoderms alone (starfish, sea-urchins) have produced no less than five different types of respiratory organs. Some breathe through dimples in the abdominal wall into the abdominal cavity, others through gills close to their oral aperture, yet others through lung-like formations in their anus. What is only essential here is that the organisms receive the required amount of gas – how this happens in detail is of lesser importance. Consequently, very different procedures can lead to the same result. In arid regions for example, it is of vital importance to store water. The toad which lives in the Australian prairies by the name of Chiroleptes platycephalus stores water in its bladder, in its lymph cavities under its skin and in the abdominal cavity – it swells like a sphere, digs itself 30 centimetres into the earth, and thus it can survive a dry season. The camel, on the other hand, carries a supply of fat in its humps and wins it through chemical breakdown. 30 Kilos of fat produce about 32 litres of water. Here we see again how by means of different procedures the same results are achieved. In the end, the only thing that is essential is the effect.

Consequently, animals and plants also are effect-structures.

When we consider human acquisitive structures to be so entirely different from plant and animal bodies, this is mainly due to three aspects: their components consist to a large extent in non-organic material (for example machines); they are not grown together; and they are of a completely different origin.

I will try to show that these differences are not fundamental. The term energon is more than a mere concept. It shows connections over which the term "living creature" – which was transferred from generation to the next without thinking – has drawn a veil.

I will show that the structure of all energons – necessarily – is set up according to the same laws and that the competitiveness, which is so decisive, for all of them is based on the same principles. These are not metaphysical, mystical ideas, but concretely measurable connections[2].

Also governmental institutions, as I will show, are energons – or parts of it. Their structure, however, is more difficult to understand. Therefore we will only look at them towards the end of this book.

However, I do not only assert that plants, animals, human acquisitive entities and governmental institutions have a common structure which until now has remained hidden to us, but I will prove that all these energons are related through tribal affinity. Until now we have been convinced that, for the time being, humankind is the peak of the evolution of organisms, i.e. that we are a kind of end, if not goal, of organismic development, "the culmination of creation". Evolution has developed beyond humankind a long time ago. It continues in the professional entities, business organisations and governmental institutions – in which humankind is only a kind of controlling germ cell.

That is the starting point of the ideas that are to be presented here. The energon theory is at its centre.

In the first part of the book I will specify my definition of the term energon and give an overall view of all books which deal with similar topics. Then follow the principle arguments of my theories as well as an overall view of the acquisitive forms of the energons and their evolution.

At the centre of the second and third part there stands the question whether competitiveness can be measured. At first the factors having an effect from outside, and then the problems arising within each energon. The fourth part is about the development as a whole. There I try to describe the state of the art of our present economic and political situation.

It is certainly problematic to connect the presentation of a theory immediately with its practical application for problems in the present. A theory may be right, but its application may be wrong, then the theory suffers from this application. On the other hand, critics, even when they give a very short summary of this book, may try to apply it. Therefore I think that I can just as well do it myself.

Konrad Lorenz once said that the elements of a whole can only be understood all at once, or not at all: in my work I was confronted with this problem. The concept of the energon induces a radically different way of looking at the habitual, and therefore it is difficult to start with the presentation at some other end. I have tried to put the material into order; this, however, means that I cannot respond immediately to every objection. Apart from this, the scope of the discussed field rather large and therefore some of what is squeezed into one chapter actually should be discussed more extensively or should actually be presented in a book of its own. Above all it seems important to me, however, to give an overall view of my theories and their most relevant consequences.

My research was accomplished in a period of more than ten years. Therefore I cannot list the names of all helpers. Here I would like to express my gratitude to all of them again.

In the area of business management and national economy, fields which are largely alien to a biologist, specifically the presentation by Sombart, Nichlisch and Gutenberg was most useful to me. In political science I mainly followed the works of Gierke, Kelsen, Jellinek and Krüger. For valuable information and corrections I am obliged to H. Lexa of the Institute for Industrial Business Management, and R. Reim of the Institute of Political Economy, both at the University of International Economy in Vienna. In the area of physics I was helped by H.

Thirring and by G. Ecker, in the area of physical chemistry by E. Broda. In my own field, zoology, I specifically thank W. Kühnelt, W. Marinelli and F. Schaller of the Uiversity of Vienna and G. Steiner from Heidelberg for his critics and information. Continuous inspiration, especially in the area of behaviour research, was given to me by my friend of many years I. Eibl-Eibelsfeldt. In botany I owe thanks to A. Biebl, B. Gessner, F. Knoll and H. Mohr as well as L. Burian.

Research, especially in the historical field, was actively done for me by Mrs. M. Windisch-Graetz. I have to thank my friend Fritz Molden for agreeing to give me considerable means in order to obtain information and for having so much patience, even though he received the script many years later than originally planned. The drawings were made by Kurt Röschl.

Comments:

[1] See appendix V.
[2] I want to point out that the affinities which is shown here do not fit into the alternative homologous – analogous. This evaluation scheme, which dominates in biology at present, is losing importance; much less obvious connections are at stake.

I

8

THE HIDDEN COMMON FEATURE

How many things become one
until now has not been defined
by the sciences.
Johann Plenge (1919)[0]

A flood of facts growing each year has
already drowned part of the scientist.
E. von Holst (1942)

1

Who earns how much and how?

We may look at this question, which comes up so frequently in daily life, on a much larger scale: How can a material structure pursue a gainful activity? What factors are essential for its success?

Nowadays two questions are to the fore: will Europe be able to compete with the American economic system? Will a global economic system become necessary? It seems erroneous to compare such matters with the question of how bacteria and grasshoppers succeed in increasing their power. But if you consider energy production as primary and essential, then we are definitely dealing with the same phenomenon only at different levels of integration.

Following practical considerations, which I will come back to later, I distinguish four groups of energons: plants, animals, human professional entities and business organisations. For the first two groups I shall use the classification which is common in biology. The terms "professional entities" and "business organisations" require further explanation.

"Professional entity" does not refer a human being per se. We do not intend to compare the genetic human body to animal and plant bodies - as has been customary in biology up to now. A human professional entity is rather the overall structure which is necessary for following a type of gainful activity (Illustration 1a.)

The professional entity of a shoemaker not only consists of a human body, but also of clothes and tools, and of premises where the work is done, of a work bench, of chairs, tables, shelves, possibly of assistants, of a bank account and of several other things. This overall structure did not grow together like the organism of an animal or a plant, it is an artificial extension of the human body. It comes about by means of additional units – "artificial organs" as I call them – that a human being enhances his capacities and becomes able to produce excellent results.

There is another characteristic that belongs to this entity, and this does not stem from its genetic formula: it is the ability to use all these units in an effective way. From a biological point of view it may be said that a human being, by learning and practising during his apprenticeship, builds up specific norms of action and reaction in his brain. What these "behaviour patterns" individually look like we do not yet know. There is no doubt, however, – and electrical cerebral stimulation has definitely given evidence of this – that these are concrete *material* structures. They can be imagined as some kind of electrical circuit, as a multitude of connections between sensory and motor ganglion cells. On the motor level there are primarily nervous impulses which are linked and which correspondingly lead to coordinated movements of the muscles. The production of a shoe – see our example – requires very specific movements of hand and body, and the shoemaker does not have the innate capacity to direct these movements. He has to learn and to "refine" them. Apart from other things he has to acquire the "knowledge" which is necessary for buying the raw material and for selling the product. So he needs further co-ordination formulas as well as information which is stored as "experiences" which are used to modify and improve individual actions. All these tiny units are stored in the brain of the shoemaker, but they are added in the same way as the tools and the chairs are. They too have to be regarded as something that enhances the genetic structure at a functional level. They are also essential elements of the professional entity[1].

Some professions require a large amount of equipment – just think of a dentist. In other professions – e.g. a coconut picker in Polynesia – the genetic body coincides almost entirely with the professional entity, as is the case with a courier, a singer or a pickpocket.

In the economic sector professional activities which are not permitted in society are usually excluded. In the context of the energon theory, however, they have to be taken into account like the authorised professions. The thief, the safe-cracker, the blackmailer, all are also energons, all are also professional entities[2]. Moral judgements and legal regulations only make a difference in so far as they change the risk which is involved in the activity.

How little the professional entity and the genetic body have in common follows from the fact that one and the same person in the course of his life is able to follow two or more professions. He then develops several professional entities - one after the other. It is also possible that a person follows several professions at the same time. In that case this person is the centre of two or more professional entities, which he directs alternately (see Illustration 1b.).

The multifarious professional entities which were created by human beings in the course of history are surely not less diverse than the bodies of animals and plants. Through our senses we perceive them in an entirely different way - particularly because their parts have not strongly grown together - but if we consider energy production to be a central function, then it is *they* whoare the evolutionary development of "living things". It is not the naked human body which continues the evolution of energy producing "plants" and "animals", but the professional structures created by human beings in which we ultimately just function as entities who build up these structures and who direct them.

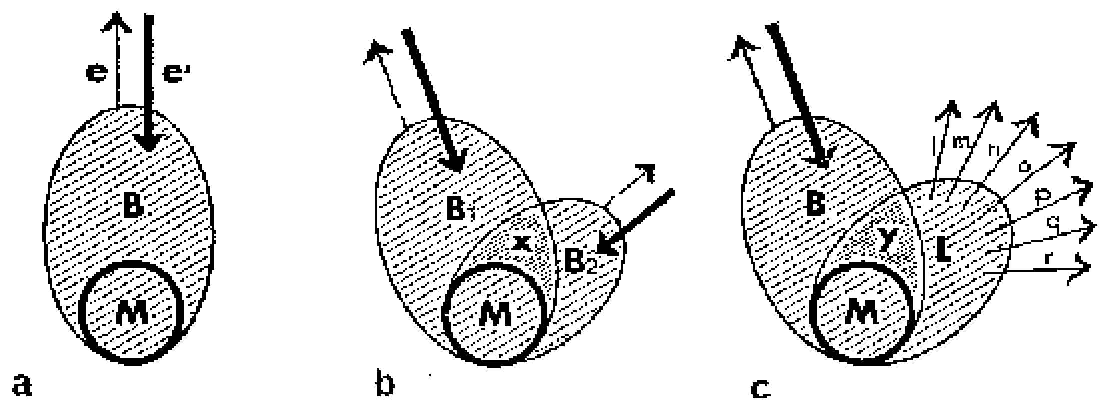

Figure 1: The extension of the human body by means of artificial organs

a) a professional entity. B = the totality of all entities which are necessary for specific work. H = the human being as a control centre. E = the energy output for this work. e′ = the gained energy.

b) a person as the centre of two professional entities (B1 and B2). x = the artificial organs serving the two professional activities.

c) A person who apart from a professional entity has also built up a luxury entity. y = artificial organs which serve both the professional activity and the attainment of conveniences. l-r = energy output for the purpose of attaining conveniences(pleasure?). (The interaction: the enhancement of professional efficiency through recoveryrecuperation, thus convenience(pleasure?), is not taken into account here.)

What the particular energons do with the surplus which results from their gainful activity will be discussed only marginally in this book. Animals and plants – I will come back to this later in more detail - hardly have any option other than to convert the result of their gaining activity into growth and reproduction. This changed when the professional entities arose. In their case the return can also flow into growth or into reproduction - it can however also be used for entirely different purposes by the control system called "human being" who may surround himself with further units which merely serve for his convenience or pleasure, e.g. a painting by Rembrandt, a game of chess or a sailing boat. In addition to the professional entity a human being also creates – if he wants to and if he can afford it – a "luxury entity" (see illustration 1c).

The term luxury evokes negative associations and is also misleading, but I cannot think of a better term. Contemporary usage may refer to a "cultural entity", but since we also speak of agri-"culture", a purely a gainful activity, this term is not accurate. By "luxury entity" I understand therefore all additional entities which do not directly serve gainful effort. Everything a human being produces in order to enhance his pleasures and the quality of his life is included in this term[3].

True, it is not always possible to draw a clear boundary between a professional entity and luxury entity. A businessman’s Mercedes is partly a professional tool, partly a means of pleasure, and apart from that serves to show that he is credit-worthy. Apart from that there is some repercussion of the luxury activity on the gainful activity: a convenience facilitates recuperation and relaxation, and can increase professional efficiency. Nevertheless the distinction can be balanced up and is also not foreign to any economist. In the legal system, especially in considering taxation, this distinction is common, and there it not insignificant at all. In daily life we realise the difference when a working person encounters hard times. Then we can see how bit by bit he gets rid of his luxury entity - and what finally remains, apart from the obligations he has for example towards his wife and his family, is the professional entity, limited to the essentials.

This way – if we consider gainful activity to be a central function - we come to a rather different way of looking at human beings and their such activity. Even the working man’s wife - if she is not working herself – is then seen in a different light. Her source of income is her husband, who supports her. Eventually, her orientation towards this man, his particular nature and his wishes, is her professional entity[4].

And finally there are people – at least in the non-communist countries - who live without performing any gainful activity, who live for instance on an inheritance or on social welfare. In this case we see this germ cell called human being without any professional entity. It lives on foreign return, on the capital of an acquired surplus. This means that there exists no professional entity whose centre is not a human being, but there certainly are human beings with a very small professional entity or even without one[5].

2

Besides plants, animals and professional entities there is a fourth large group of energons and I call this one "working organisations". Another possible denomination might be the term "working communities".

Working organisations are no more than extensions of the individual human being. In their structure, which has a level of integration higher by one or more stages, professional entities develop to become functional replaceable units.

The large American industrial companies, whose structure Galbraith has described so vividly, show this very clearly[6]. Unlike the classical private company founded by an entrepreneur where there is still an individual at the top, these giants are already utterly supra-individual entities with their own laws. They are not really controlled any more by the stockholders, who used profits to provide the required capital. The "technological structure" – i.e. managers, technologists and foremen – renews itself by its own authority. Just as happens in multicell organisms where a single cell merely plays a functional role, also in the typical working organisations (in the "mature" company, as Galbraith calls it) the single professional entity – and therefore the individual – is not more than a replaceable originator of the required work. If he dies, someone else will take his place. Even when someone in the upper echelon of the working system dies, the activity of these large companies is not essentially affected[7].

In the case of a private company owned by an entrepreneur it is debatable whether it can still be defined as an extreme extension of a professional entity or if it already belongs to the group of the working organisations. Experience shows that a larger company does not go to the wall when the entrepreneur dies. If the shoemaker continues to expand his workshop and finally turns it into an industrial company for shoe manufacture, then, at a certain point of time, this blurred dividing-line will be crossed. The bigger the company becomes, the more the owner himself becomes a replaceable element in this system and the more the surrounding working structure imposes its will on him. The difference from the professional entity is its super-individuality. Even if it is not possible to draw a clear line I consider it appropriate and justified to make this conceptual distinction.

When several companies merge to form a combine or a cartel, the development of working organisations with an even higher level of integration is possible. The state again has precedence over the professional entities, companies, combines and cartels.

The entire development of the energons typically happens in a hierarchical way. The first main structure which they achieved was the cell, on the next level it was the multicell organism. In these two areas we can speak of plants or animals, depending on the type of activity. The human being – emerging from the animal kingdom – then extended his genetic body and developed professional entities by means of additional units. They already represent the next level of integration. Working organisations are composed of professional entities. The highest stage of development in these working structure levels culminates in the "modern state" or in a "confederation of states"[8].

3

At all times there were thinkers who recognised the state as a real organism. Plato defined the state as "a large human being", Aristoteles named it "a living creature that has a soul". The English philosopher Thomas Hobbes considered fear to be the starting point for the building of the human state and called the state "an omnivorous monster". Fichte called it "the organic manifestation of God". Schelling explained that the state was not a means to certain ends but the "construction of the absolute organism".

Further advocates of the "organic" approach within political science were the philosophers G. Fechner and W. Wundt, as well as its most brilliant advocate, the jurist Otto von Gierke. The Swedish historian and theorist Rudolf Kjellen added an additional form of life to those of plants, animals and human beings: the state[9]. He called the state a "real personality with a life of its own", an organism in the biological sense. Such ideas lead to several rather superficial, anthropo-morphistic comparisons – in particular by J. Bluntschli, who even considered the state to be male (unlike the church, which he thinks is "female"). Richard Thoma spoke of an "organological ghost doctrine".

Another biologist, no less a figure than Oskar Hertwig, dared to enter the tricky ground of general political science[10]. He took up Ernst Kopp, who in his book "Grundlinien einer Philosophie der Technik" called the state an "organism reproducing the human body". According to him, the state is a " form of organism higher than human beings". The analogies which Hertwig shows were better backed up than those of the mostly mystically oriented organologists. But he did not receive very much attention.

From the point of view of the energon theory the state is – this will later be explained in more detail – a rather complicated hermaphrodite, on the one hand a human organ, on the other hand an independent energon. Following the classification outlined above, there are states which can be considered as extremely expanded professional entities of individual persons, and also others which can be classified as supra-individual objects and therefore belong to the group of working organisations.

But not only in the political field were there scientists who advocated the idea that organisations created by human beings were comparable with animal and plant bodies. Philosophers as well as naturalists repeatedly came up with the idea that organised phenomena very likely share a certain principle.

Immanuel Kant was the first to express the idea of an "archetype" of all animals and plants. He wrote that a "natural history" still to be written would teach us about the "varieties" of the creatures of the "archetype"[11]. Kant considered it possible that "all species descend from one single genus".

Albrecht Dürer believed in a secret law of construction which he tried to "wring out" from nature. He considered the diversity of forms to be based on an adaptation (a "reversal") of a basic form, of a "canon" the existence of which expresses itself in the similarity of all creatures.

The same idea became the theme of Goethe's efforts in the area of natural science. He searched for the "primordial plant" and for the "primordial animal"; he did not assume a common ancestor, however, but rather a common basic structure as the origin of the diversity of plants and the higher order of animals. He tried to describe these archetypes: "wo nicht den Sinnen, doch dem Geiste nach" (not according to the senses, but according to the spirit).

On the basis of this point of view, looking at the hidden common features, Goethe succeeded in discovering two important things. In the area of botany he discovered the metamorphosis of the leaf: formations like thorns and tendrils, but also stamen and pistils are transformed plant leaves[12]. In zoology he discovered the human intermaxillary bone, which until then had only been detected in monkeys and other higher vertebrates, and it was considered strange that man did not have this bone. Goethe searched more precisely - and eventually found the bone[13].

A famous academic dispute in Paris (in 1830) was about the question as to whether there really are "hidden common features". Geoffrey St.-Hilaire claimed that there was a unified plan which dominated the entire animal kingdom ("unité de composition organique"). Cuvier, who came out of this dispute as the winner, rejected this.

Almost 10 years later the German naturalists Schleiden and Schwann established the cell theory, and another 20 years later Charles Darwin got the theory of evolution generally accepted. In 1809 – the year in which Darwin was born - Jean Baptiste Lamarck had already presented it in his book[14], which did not receive a lot of attention. However, Darwin, who had gathered an impressive amount of evidence, aroused a great deal of attention and approval.

With these two theories the hidden common features which had been searched for by Kant, Goethe, Geoffrey St.-Hilaire and others seemed to have been discovered. The cell theory alone meant a huge degree of standardisation. Nowadays the cell theory is taught in every school, but not many are fully aware of its consequences: All plants and animals are built up from the same basic unit, i.e. the "cell". In water these cells live as independent organisms - the unicellular organisms. They reproduce by cell division. The "multicellular organisms" who are bigger by far – all larger plants and animals including human beings – also come from a single cell, from the "germ cell". The germ cell is also subject to cell division, but the resulting secondary cells are not. Instead, more and more large cell clumps are formed - and in these work organisation takes place. In some of the resulting larger "organisms" the cells develop leaf tissue, in others they develop muscles, bone tissue, etc. This way, animal and plant organs are always built up by the same fundamental unit. Therefore, however different as higher animals and plants may be in their outer appearance – a bee, a fir-tree, a porcupine , they are all built up from one and the same fundamental unit, the "cell".

The theory of evolution of Lamarck and Darwin explained this astounding common feature by assuming a natural affinity. The origin of all plants and animals - including the human being – can be found in unicellular organisms. They are all branches of the same enormous phylogenetic tree of life. Nowadays it is thought that the beginning of this process was two and a half or three billion years ago.

Subsequent generations of researchers were able to substantiate both theories by using improved tools and methods. No counter-evidence was produced. Today we have no reason for serious doubt that this process called "evolution" really took place.

A third hidden common feature was discovered. In all plants and animals the hereditary recipe ("genome") hidden in the cells is built up on one and the same principle. The electron microscope has even made it accessible for the human eye. They are extraordinarily long, thread-like nucleic acid molecules, on which the individual development orders are lined up like letters. Our current knowledge about the order and the structure of human hereditary factors does not come from our research on human germ cells. We owe it to research done first by Gregor Mendel on peas, then by T.H Morgan with dew-flies and later by other researchers done mainly on bacteria and viruses. We have to realise what this means: Even between a human being and minute bacteria there is still such a close affinity that we can infer the inner structure of human germ cells from the one of the bacteria!

Therefore it is perfectly clear that nowadays in the field of biology – and in the field of natural sciences in general – the question of the "hidden common feature" is considered as outdated and answered long ago. In this sense Werner Heisenberg, a Nobel prizewinner, commented that one could, in the spirit of Goethe, consider nucleic acid as a "primal living creature" – " because it is a basic structure for the whole biological field." Heisenberg compares the elementary particles the atoms consist of with the "regular bodies" from Plato's "Timaios", and he continues: "They are the prototypes, the ideas of matter. Nucleic acid is the idea of the living creature. These prototypes define entire further development of events ..."[15]

The biologist W. Zündorf expressed this point of view even stronger in his writings on the evolution research. "Die von Goethe intuitiv erschaute und dichterisch gestaltete Einheit in allem Wechsel und in aller Mannigfaltigkeit der Formen enthüllt sich dem modernen Forscher als das dem Lebendigen zugrundeligende Erbgut. Jede lebende Gestalt dankt ihm ihr Dasein, ihre Formfülle liegt in seiner Wandlungsfähigkeit begründet."[16]

I will try to show that these opinions are only half right and that a further, maybe even the most important common feature has remained undiscovered until today. The genotype – the "hereditary recipe", as I call it – certainly was an important prerequisite for development towards a higher level. But the effectiveness of the hereditary recipes cannot explain the spatial and temporal structures which organisms have attained in the course of evolution. Rather, it was the necessity to have an active energy balance that almost stipulated how these spatial and temporal structures had to be. The energon theory takes up where Goethe's way of thinking, and that of several of his contemporaries, came to an end. This way of thinking claimed that the process of life inevitably develops according to a common basic concept. It also claimed that *all* living creatures – in order to be able to exist and continue to develop – have to follow, as it were, the same rules, and that the very same rules are also authoritative for the spatial-temporal structure of professional entities which are formed by human beings[17].

This hidden fundamental framework is – as the reader will see – unsightly and imposes a view which is utterly different from our usual categories of thinking. As Goethe said, this hidden common feature can only be *described "not according to the senses, but according to the spirit"*. But the energon theory goes a lot beyond this as it includes not only animals and plants in its comparative way of looking at things, but also working structures created by human beings. To use Goethe's terminology - not only for the "primal organism", but also for the "primal professional entity".

5

The question about the hidden common feature also came up in economics and in sociology.

In 1912 and in 1923 the Russian national economist A. Bogdanov published two volumes on 16
"general organisation theory", and in 1919 three lectures by the sociologist J. Plerge appeared in Germany on the same subject. Further writings onsimilar questions came from the national economists R. Erdmann and W. Brand, the philosopher O. Feyerabend, the constructor K. Wieser, the ontologist F.Schmidt, the writers F. Eulenberg and H. Domizlaff, the economy expert K.Stefanic-Allmayer and others[18].

All these authors looked – from very different starting points – for the actual "nature of organisation". I briefly want to point out a serious mistake which most of the authors made.

In their reflections about the nature of organisations they also included atoms, molecules, crystals and planetary systems. It is true that these structures without doubt are "organised". But there is an essential difference in comparison to organisms and to the working structures created by human beings: here it is a matter of balance, not of energy-producing systems. The energon concept draws a clear line here. No atom, no molecule, no crystal and no planetary system is such that it can enhance its free energy resources. This is the big gap which separates inorganic structures from organic ones[19].

To my knowledge there were only two authors who also took the energy balance as a starting point for of their reflections: The French sociologist Ernest Solvay tried – but only on a theoretical level – to devise fundamental mathematical formulas for the structures of the human way of building up a community. The second was the founder of physical chemistry, the Nobel prizewinner Wilhelm Ostwald, who in 1909 wrote a book on "The Energetic

Principles of Cultural Sciences". In this book he addressed himself to sociologists, but he did not get any attention whatsoever. A researcher whom I know mentioned the book. I owe this knowledge to the circumstance that Prof. Dr. Broda of the Institute of Physical Chemistry in Vienna was so kind to take a critical look at the draught of this book, and he drew my attention to Ostwald. Ostwald gave me some ideas in particular about energy. His thoughts were not revolutionary, but on many points we came up with the same conclusions[20].

If our brain considers the professional entities and organisations created by human beings as utterly different from plants and animals, it is because of the "elements" these structures consist of – and because of the way in which the human brain has classified these elements until now in its index of concepts. In order to see the common feature, we first have drastically to change the organisation in this index.

Comments:

[0] All quotations are no original translations but were translated by the translator of this text.
[1] The American sociologist and philosopher Marshall McLuhan also speaks of "extensions" of the human body, particularly in the context of the senses and the locomotive organs ("Die magischen Kanäle", Düsseldorf 1968; "Das Medium ist Massage", Frankfurt 1969). Since his trains of thought – which have been rejected as much as acclaimed – cannot be explained in a few words, they will be discussed in detail in Appendix III.
[2] W. Sombart presents a similar definition: "According to my definition work can also be the activity performed by the thief to commit a burglary even though this is (socially) harmful." ("Der moderne Kapitalismus", Munich 1921, p. 7).

[3] An inclination to luxury - in the sense of an expenditure which does not promote gainful activity – exists in the world of animals as well, in their body structure as much well as in their behaviour. In the individual balance however these expenses always remain within a moderate range. Only in human beings does the inclination to luxury become a distinctive feature. Later it will be explained that the thus increased expenditure for luxury is a debit item only from the working individual's point of view, whereas for his whole life it is a decisive promoting factor.
[4] "Professional" is misleading here because it could be associated with prostitution. What is really meant however - without any value judgement – is energy production.
[5] Also, pensioners and retired people seem to have no professional entity. This, however, is not the case. In the course of their lives they have worked and so they have achieved a legal right – eventually this becomes the structure which maintains them: it becomes their gainful means. As long as they gain a return from this source they have a professional entity.
[6] John K. Galbraith, "Die moderne Industriegesellschaft", München 1968.
[7] In business management the terms "business" and "enterprise" are not always used synonymously. According to Niklisch, a business is the actual production entity and can also consist of an individual person; an enterprise, however, is a superordinate legal structure. Gutenberg uses the two terms almost synonymously. As this corresponds to current usage, I do so also.
[8] The terms "professional entity" and "working organisation" are implicit in the term "legal person". Otto von Gierke wondered what "reality" gives rise to this legal phenomenon; to these legally acknowledged "characteristics to which it ascribes personality". With regard to human "associations", he says: "In order to understand and appreciate that part of law which presents itself as ordering the life of associations, one has to try to find out what it actually is that becomes part of this law and and receives its order from it." ("Das Wesen der menschlichen Verbände", Rektoratsrede, Leipzig 1902).

[9] Rudolf Kjellén, “Der Staat als Lebensform”, Berlin 1924, p. 117 and 228.
[10] Oskar Hertwig, “Die Lehre vom Organismus und ihre Beziehung zur Sozialwissenschaft”, Berlin 1899, und “Der Staat als Organismus”, Jena 1922.
[11] “Von den verschiedenen Racen der Menschen”, in L. Voss: “Immanuel Kants Schriften zur physischen Geographie”, Leipzig 1839, p. 321f)
[12] “Die Metamorphosen der Pflanzen”, Jena 1790.
[13] “Über den Zwischenkiefer des Menschen und der Tiere”, Stuttgart 1820.
[14] “Philosophie Zoologique”, Paris 1809.
[15] “Der Teil und das Ganze, München 1969, p. 325f.
[16] “Idealistische Morphologie und Phylogenetik”, in G.Heberer: “Die Evolution der Organismen”, Jena 1943.
[17] In biology the capacity of a living creature to survive in the struggle for life is called its value for selection. Here we try to achieve a more accurate view of this value, which corresponds with the competitive capacity in economics.
[18] see references. - The books of Schnutenhaus and Kosial, experts on business management, do not really belong to the “general organisation theory”, because they almost exclusively deal with business management.
[19] In spite of this different research topic K. Stefanic-Allmayer achieved some results which correspond with the ones presented in this book. Bogdanov’s extensive efforts however failed because he generalised too much. “Völlige Unorganisiertheit”, he wrote, “ist ein sinnloser Begriff, im Grunde genommen, dasselbe wie völliges Nichtsein.” Therefore he tried to find common categories for almost everything ... a procedure which was liable to lead to the discovery of extremely superficial parallels.
[20] In one of his last writings Konrad Lorenz defines living creatures as energy and information producing systems which are characterised by a double control circuit one leads to the production of energy, the other to the production of information. (“Innate Bases of Learning”, in: K.H. Pibram, “On the Biology of Learning”, New York 1969.) This point of view is close to the one taken in this book. But he considers, as is also usual in the cybernetic field, that information production is primordial. The energon theory takes the point of view that this is only a necessary tool, and therefore secondary.

II

VEHICLES OF EFFECT

I am willing to defend the revolutionary hypothesis that too many experiments and observations are made and published and that they are not sufficiently reflected.
August Krogh (1929)

Our view on life has been darkened, made impossible by the absolute cut which we draw again and again between what is natural and what is artificial.
Pierre Teilhard de Chardin (1925)

1

Anyone who is rather sceptical about the energon theory – and this of course initially applies to everybody – will have to take a closer look at the next two chapters. In these chapters I shall try to demonstrate the main error we make in our traditional way of thinking.

Let us just take the following example to illustrate the great difference between an organism and an economic structure developed by humans. Let us compare, for example, the body of a lizard with a major business enterprise such as an engineering works. In our eyes almost everything seems to be fundamentally different.

The body of a lizard is composed of tissue and organs which consist of living cells or are at least built up by them (like bones). In a factory we have walls made of stone and concrete, machines made of iron, furniture made of dead wood. The body of a lizard is an organically connate entity; in the factory the machines may be screwed down tightly, and everything may have more or less its proper place – a business enterprise is also a kind of entity – but the single parts are not organically connected. The people working in this factory move around freely. Where they differ in fundamentally, however, is in the origin of their individual "elements". In the case of the lizard, everything derived from a common germ cell – following the instructions of the hereditary material contained in the chromosomes, the body of the lizard developed slowly as a result of cell division and cell differentiation. The engineering works has a totally different origin. A businessman developed a plan in his mind which he later put into effect. He decided to erect a factory of a certain size in order to produce certain machines for which there is a demand on the market. This basic idea was further developed by experts, capital was made available, the buildings were constructed, machines and tools were ordered, appropriate workers were employed. Almost every element in this enterprise is of different origin. Some – like for instance the generators – had already been completed before the businessman even thought of starting up this enterprise. Others were produced at various places: a large number were imported from abroad. All these elements were gathered together in one place and combined following a certain plan. The history of the origins of these "elements" is thus totally different from that of the lizard.

Yet there is *one* feature that the different elements of the lizard and the engineering works have in common. In both cases each element has a given function, it thus has to fulfil a task. Elements without any function are of no use, they may even be a burden. So we have already found one common feature. Whether it is the lizard or a business enterprise: elements without a specific function are disadvantageous – if they hinder certain processes or cost money, that is if they have a negative impact on competitiveness, which is inevitably expressed in the balance. If two energons – whatever they may look like – are competing with each other and peers in all respects except that one is inhibited by units without any specific function, then the other energon has an advantage.

This common criterion of competitiveness needs to be looked at more closely. What do the individual "elements" perform in detail ?

In both cases there are units which have only one function and others which have several functions. The eyes of a lizard serve no other purpose than to see, whereas the liver has more than five different functions. The same holds for the engineering works. The generators have no other function than generating electricity, while a business manager – who ultimately is also a unit fulfilling a task in this enterprise – has a whole number of functions. Another common feature is that in both cases the units are part of even bigger units. In their relation to each other these units may be superior or subordinate. In the case of the lizard, the iris is a part of the eye and the eye in turn is a part of the head. In the case of the business enterprise, the cogs of a gear wheel are functional units of this wheel, which itself is a functional unit of the respective machine. But this does not necessarily mean that the bigger unit is more important than its components. The eye of the lizard does not work without the iris nor does the machine function without a gear wheel. What in the end makes each of these numerous units so important is their effect. Independent of their outer appearance they are "vehicles of effect" or "functional units"[0]. At their respective spatio-temporal location they have effects which are required within the framework of the entire structure. This is what makes them efficient – and indispensable.

This fact not only holds true for the lizard and the engineering works but in general for all animal and plant organisms and for all acquisition structures developed by humans They all consist of vehicles of effect. The cheaper, that is, the more energy-saving the way a certain effect is achieved, the better for the energon. This has a positive effect on the balance sheet and thus again on competitiveness. Some may protest now and say this is a truism, that everybody knows that anyway. This is not correct in so far as we have found a common feature which justifies a common term for "parts" which from the outside look very different. Each energon consists exclusively of vehicles of effect. Vehicles without any effect or function are a hindrance to every energon. In order to be competitive the energon has to get rid of any such vehicles if possible.

In the fields of sociology and political science in German expressions with the term "vehicles" are widely used, like "vehicles of state power", "vehicles of public opinion", or vehicles of culture, power, etc.[1] Othmar Spann ,who started from totally different assumptions but came to similar conclusions, called the means of production "vehicles of performance". Gutenberg used the term "functional vehicles" which had turned up in biology for describing units in business enterprises[2]. In my opinion the term "vehicle of effect" is more neutral and thus more appropriate. Furthermore a function is something potential whereas an effect is something actual. A function may as well have little effect and it is the effects that in the end make up every energon. The material units producing these effects are thus the vehicles of these effects.

Vehicles of effect are tissues as well as organs or single cells, they are "organelles" within the cells as well as the "organs" (like the reproductive organs) which are made up of numerous organs and the "organ systems" (like the nervous system).

In business enterprises the premises and machinery as well as the employees, departments and the staff serve as vehicles of effect. In a state each ministry as well as each public authority, each policeman and each department have the function of a vehicle of effect.

After talking about the similarities let us now consider the differences. The units animals and plants consist of are built up of living matter, they have grown together and they developed out of a single germ cell. These are the three main features in which they differ from artificial units on which professional entities and employment organisations are based. I maintain that none of these features is really of prime importance for differentiation. This is just a different principle of growth and formation which is already present in minor organisms but has blossomed only in humans and made possible our exceptional rise.

We now turn to various phenomena which so far have been regarded as being of minor significance but which are of great importance for a better understanding of evolution.

2

The first object we deal with is the thorns of the rose bush. These sharp vehicles of effect have the purpose of deterring bigger, herbivorous animals from eating their leaves and thus serve as protection. They are composed of cells which later on wither by constantly lignifying. The thorns become even harder in so doing and their protective effect increases. This roves that in order to fulfil a function the substance in question does not necessarily and inevitably need to be alive. In the case of the thorns the function is even better fulfilled when the living "material" turns into dead material[3].

The situation is quite similar with trees. When the stem withers as a result of the cells having lignified, it fulfils its function even better. An oak stem consisting of living cells could hardly take the enormous weight of the tree-top.

In other cases the functional units are made up of dead material from the start, like the skeletons of radiolaria, the armour of crabs and insects and the shells of snails and mussels. The living cells only fulfil the function of production in these cases. The functional unit itself is made of anorganic matter that is dead from the onset.

The functional unit need not necessarily be produced by the cells themselves. Amoebae, for example, build a protective covering. In the case of the genus *Euglypha* the amoeba itself excretes small internal calcareous shells, in the case of the genus *Difflugia* the amoeba forms a housing that looks quite similar by sticking together grains of sand (Fig. 2).

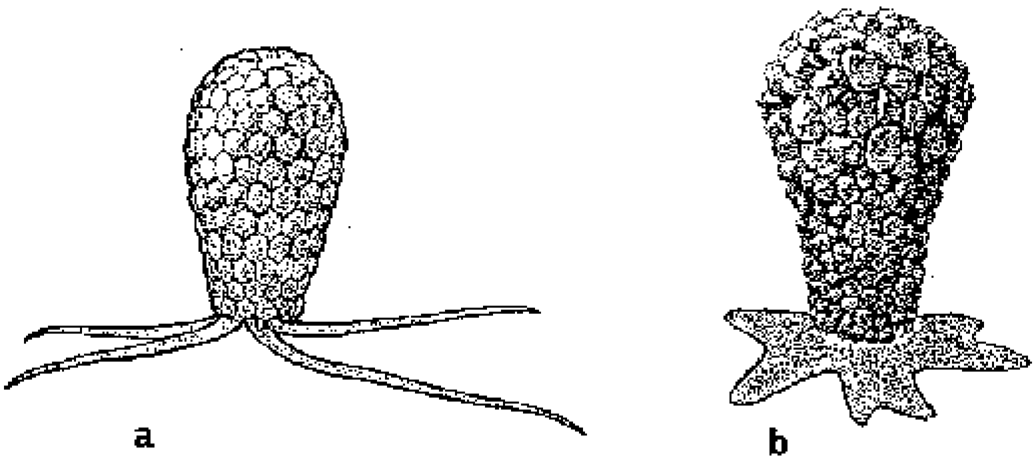

Figure 2: Organogenesis of amoebae

a) *Amoeba euglypha* builds a protective covering out of the internal (calcareous) shells it secreted.

b) *Amoeba difflugia* forms a similar housing out of grains of sand. It thus uses units already existing in nature and turns them into essential parts of its working structure.

As far as the energy balance is concerned this means that the amoebae of the one genus have to take up and shape the raw material. This seems to cost more than using grains of sand when these abound in nature. It has to be kept in mind that both activities require a specific action program which must have developed in the course of generations and is now deeply rooted somewhere in the body. Even in protozoa we can find different "processes" which result in the formation of functional units with approximately the same results. In one case the body itself produces the functional unit, in the other case the body makes use of already existing units. As for the balance sheet, there is no fundamental difference. What really matters is the protective effect and the production costs of the armour.

Such examples exist in great numbers. Bees build their honeycombs out of a substance occurring naturally in their body, namely the wax secreted from glands. Wasps build similar honeycombs out of vegetable parts which they break up and glue together with secretions from their oral glands. As far as the balance is concerned what really matters in both cases is how much energy is used in each of these processes and how effectively the required function is fulfilled by the honeycombs. Whether they are made of a substance that was secreted by the body or obtained elsewhere does not matter.

Another example: Especially land-dwelling animals need organs which communicate to the body where is 'up' and where is 'down'. In most cases these functional units have the form of a vesicle which is lined with sensitive cells and contains spherical and disk-shaped bodies (statoliths). According to the position of the animal they exert pressure on the one or other side, this information is communicated to the central nervous system, where it is assimilated.

The statoliths of most animals are secreted from cells. However, the vesicle of the decapod crab ends in an opening in which the crab (after each exuviation) stuffs grains of sand or small stones which it then uses as statoliths. There is no question that they are important, even essential functional units for the crab. Are they nevertheless part of the body even if they have not been secreted by the cells?

3

Another question: Do only units which have grown together constitute parts of an animal or plant? Let us take a look at the capturing methods of some aquatic animals and spiders (Fig. 3).

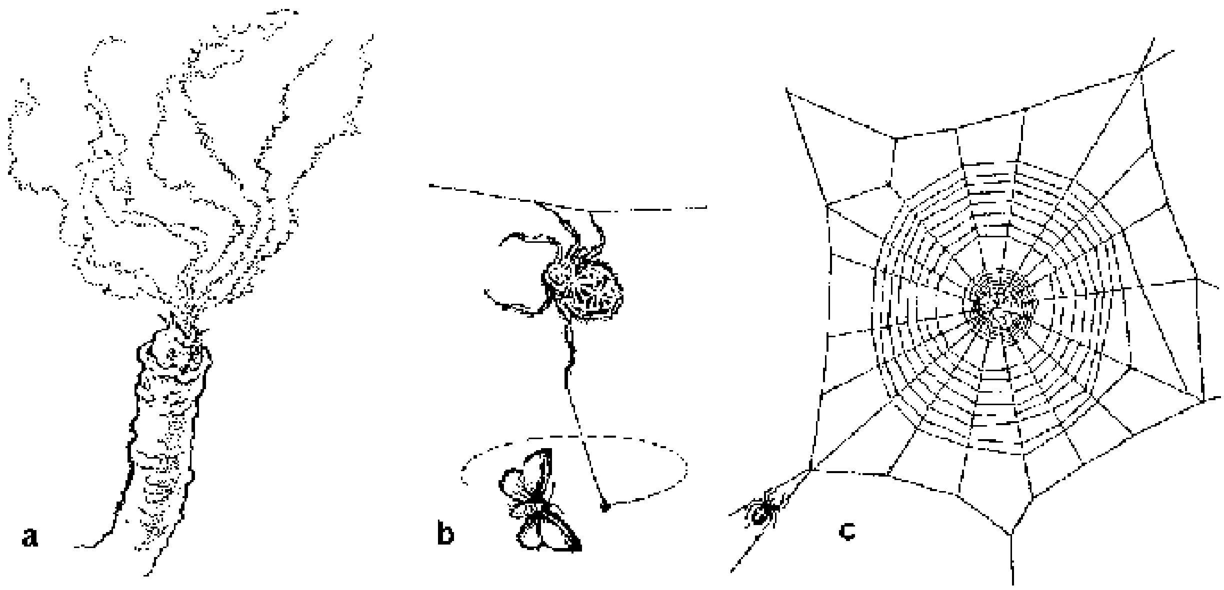

Figure 3: connate and separate organs

a) Floating microorganisms stick to the adhesive fern threads of the *Vermetus,* a predator using the lime-twig strategy.

b) The lasso spider (*Dicrostichus*) flings a thread with an adhesive droplet at the end towards insects and thus catches them.

c) The capturing organ of the web spider. The web is no longer connate with the body of the spider.

Among marine worms there are species which catch microorganisms by means of adhesive tentacles. These are thread-like organs that are situated around the mouth and are stretched out like a limed twig. Microorganisms floating around stick to these tentacles, which are then retracted and the capture eaten. There are also other animals that use such methods of capture, they are all known as predators using the lime-twig strategy. There is no doubt that these limed twigs were produced by the body and are connate with it.

The Australian spider *Dicrostichus* uses a similar capturing method. It secrets a thread from a spinning silk gland at the end of which there is an adhesive droplet. With its front leg the spider holds the thread like a lasso and flings it towards insects passing by. Should an insect stick to the thread, it will be drawn nearer and be eaten. The catching equipment in this case is produced by the body though it is no longer connate with it.

Finally there are the web spiders we all know so well. The web the spider builds is completely separated from its body. Is it part of the body of the spider or not?

In our traditional way of thinking it is not part of the body-simply because it is not connate with it. But when we compare the lime-twig predator, the lasso spider and the web spider, it becomes clear that we have no reason for making such a distinction. As for the balance-sheet which in the end decides on whether an organism survives or not – it is irrelevant whether the capturing organ is connate with the body or not. In the case of the web spider this would even be a disadvantage.

It is thus not important if functional units consist of material produced naturally in the body or if they are connate with the body[4].

4

Now we have come to the third and most important question: Are only those units which were produced by a germ cell part of an animal or plant?

The armour of the amoeba *Difflugia* , the honeycombs of the wasps and the statoliths of the decapod crabs have proved that this is not true. There are still more impressive examples (Fig.4).

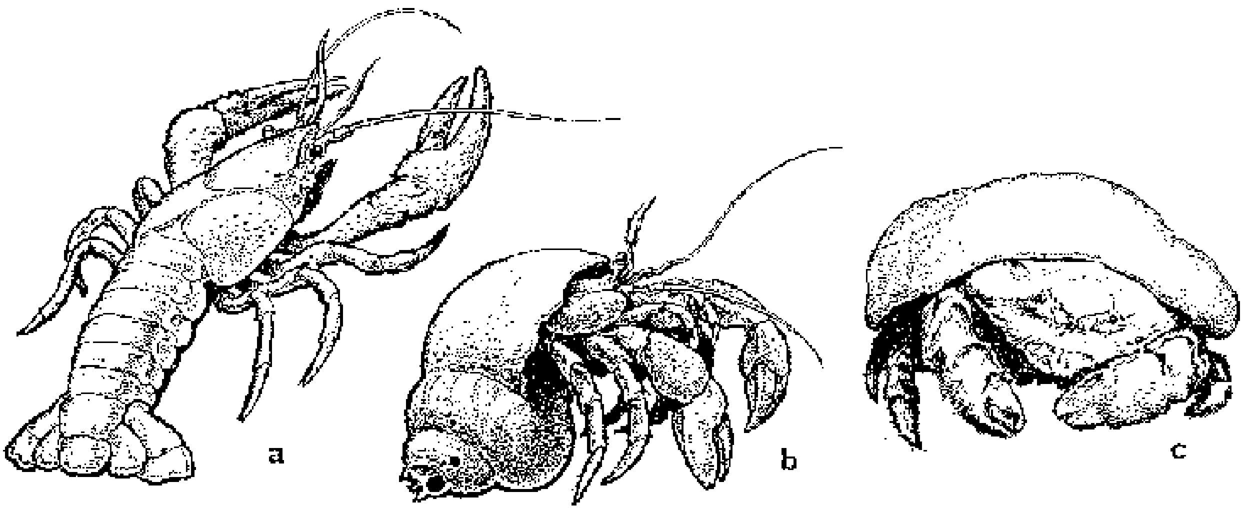

Figure 4: Acquisition of organs by animals

a) Usually the tail of crabs as well as the rest of the body is armoured (crayfish).

b) The hermit crab uses empty snail shells as protective armour; it does not need to armour its tail.

c) The woolly crab *(Dromia vulgaris)* increases the protective effect of its natural armour by disguising itself . With its scissors it cuts a sponge to such a shape that the sponge exactly covers the dorsal field. With its last pair of walking feet it holds the sponge. A foreign organism is artificially changed in this way and turned into a protective organ.

Everybody surely knows the hermit crab. While its related species have an armoured body, including tail, the hermit crab looks different. It hides its unprotected abdomen in an empty shells which thus takes over the protective effect which in the case of other crabs is performed by their armour. The fact that these shells turn into very important functional units for the hermit crab can easily be proven in experiments. When the shell is taken away, the crab soon becomes the victim of other animals. The shell neither consists of living substance nor is it connate with the body nor was it produced from the germ cell of the crab.

The woolly crab *(Dromia vulgaris)* disguises itself by holding a sponge covering its dorsal shield with its last pair of walking feet. This also has a protective effect – though the achievement of the woolly crab is even greater than that of the hermit crab. In the latter case behavioural patterns developed which enable the crab to recognise empty shells and attach them to its body – from among different shells it may even choose one of the appropriate size. But the hermit crab does not change it in whatever way. The woolly crab, however, cuts the sponge with its scissors until it has the necessary size and shape to cover the dorsal shield. For this process much more complex – even if again instinctive – action and reaction programmes are required.

In this case the strange unit (sponge) attached to the body is even a different organism. Numerous animals develop such methods of utilising other energons even much further.

In the outer membrane skin of coral polyps and mussels we can find a large number of single-celled algae. They have been assimilated by the body tissue to such an extent that they can only be recognised by their colour. Both parts profit from this relationship, which is a symbiosis. The algae need carbon dioxide which is emitted as a metabolic product in animal cells. Thus the algae can absorb it immediately. The animal tissue in turn needs oxygen, which is emitted by the algae. In the case of the worm *Convoluta* whose body also hosts such algae this dependency has reached a stage at which the worm – unlike its related species – no longer forms a kidney system. The algae dispose of the metabolic waste products of the worm. If one prevented young worms of that species from taking up such algae, they would soon die. Without a suitable unit responsible for the internal detoxification this organism is no longer viable. Are these algae organs of the *Convoluta* or not? They do not originate from the germ cell of the worm.

This issue is so important and totally contrary to the traditional basic notion[5] prevailing in biology as well as in general thinking that I would like to give further examples.

Cellulose, a component of wood, is very hard to break down. For digesting (splitting) the cellulose a specific enzyme is necessary which only few animals produce. The termites which exclusively live on wood are able to break down cellulose even without producing such an enzyme – namely with the help of protozoa living in one part of their intestines. These organisms thus replace the required glands. If one kills these "digestion assistants" – which is possible by means of sterilisation – the termite will continue eating but will starve to death. In this case too the question arises: are these protozoa part of the termite's body or not? Without them the energon "termite" is not able to survive-though the protozoa do not originate from the germ cell.

There are more examples: Other insects have special, often very complex reservoirs for accommodating similar "digestion assistants" which help them break down blood and vegetable juices. These reservoirs are organs which developed according to the genetic code and are called "mycetomes" (Fig. 5).

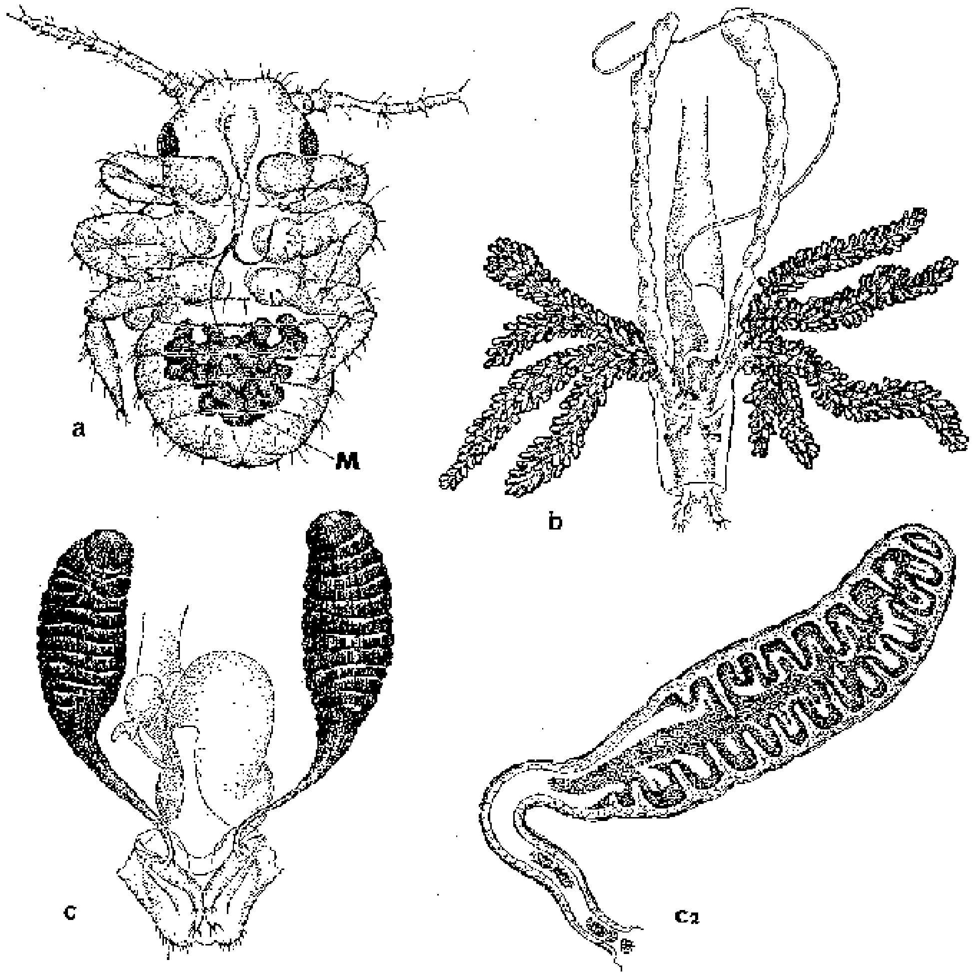

Figure 5: Organs occurring naturally in the body for accommodating and transferring "digestion assistants"

a) Jumping plant louse (*Psylla buxi)* with branched mycetomes ("accommodation for symbionts") in the abdomen (M).

b) "Smearing device" of *Cerogria heros*. The bacteria are accommodated in sac-like bulges which are directly connected with the ovipositor When being deposited the eggs are thus infected with the bacteria.

c) "Bacteria syringe" of *Cleonus piger* (a weevil). The sac-like bulges have a longitudinal musculature and the opening is surrounded by a sphincter. C2: cross-section of such a "syringe". The interior of the club-like organ is divided into chambers. By contracting the sacs the bacteria are squirted on the deposited eggs.

Up to now all these complex hereditary organs have been regarded as belonging to the "body" of the respective animals whereas the digestion assistants within the organs which fulfil vital functions (and to which this expenditure comes in useful) have been regarded as separate units. Further details in the text.

Some species develop separate canals and squirting devices which only have the function of passing on the digestion assistants to the eggs, that is to guarantee the transmission to the brood. The female biscuit beetle smears excrement on the deposited eggs and the young, after hatching, instinctively eat up part of the egg shell so as to obtain the essential digestion assistants. Should we regard all these devices (organs, behavioural patterns) which support the body as parts of the body because they were developed by the genetic blueprint and treat those units fulfilling the actual function as if they were separate entities? Our present views have been shallow, to put it mildly[6].

It is neither necessary for units to consist of a living substance nor do they need to be connate with the body nor do they need to originate from a germ cell in order to be seen as part of an organism.

This is also clearly demonstrated by the topical issue of organ transplantation: the heart which Doctor Barnard transplanted to his patient Blaiberg did not originate from the germ cell of the patient. It had been part of a different body which had led its own life for 24 years. That did not matter for Blaiberg. What was of importance to him was the fact that his own vehicle of effect, his heart, no longer fulfilled the necessary tasks and that he would not be able to survive without such a vehicle. A different vehicle was successfully used to fulfil the task – where it came from was of minor importance.

For quite some time now cardiac pacemakers have been transplanted to people suffering from disorders of cardiac activity. These pacemakers have the function of giving the heart the required orders for carrying out its activity. In this case a technological unit replaces the nerve structure. If it stops working, the individual will be doomed to die.

In order to be able to judge the problems in hand as far as the evolution is concerned, we need to take a closer look at the functions of genetic blueprints.

5

Genetic blueprints (the "genetic code") are not just some vague concept. As already mentioned, one can see them under the electron microscope (Fig. 25). We owe our profound knowledge of the molecular set-up to the progress that has been made in biochemistry in the recent decades. More than ten scientists received the Nobel Prize for their research in this field[7].

These functional units have been a necessary prerequisite for the higher development of organisms in the course of evolution. In the reproduction process they pass all hereditary properties on to the next generation. Thus only alterations of the functional unit itself, that is the genetic blueprint, may cause hereditary changes in the body structure.

Only few biologists use the term "blueprint"[8]. I use it to emphasise its functional difference to control. Blueprint and control may also coincide – this is probably largely the case with genetic blueprints. As for their purpose, these two functions differ widely – the energons developed by humans are better examples of this than the processes taking place in animals and plants. As every businessman will know, it is much easier to find people who give orders according to certain programmes than to find people who are able develop new effective programmes involving action and reaction. In general the following holds true: the actual essence of effective processes is not the control itself but the co-ordinating commands on which the control is based. What took so long to develop in the evolution of animals and plants was not the units which carry out orders (and supervise/observe their execution) but the blueprints required for these orders[9].

In theory it is *the first and most simple evolutionary stage* when the respective genetic blueprint fulfils no other task than developing all the necessary organs for an organism. In this case the activities of the individual organs are not co-ordinated: central control of activities is missing. We can see this principle realised in most plants. There may as well exist correlations between the single parts but a central organ for regulating actions has not been developed. Each functional unit – leaves, branches, ducts, roots – fulfils certain functions and the interaction of all these units results in an energy balance which is on average positive.

The *second stage* is reached when the genetic blueprint develops a special functional unit in addition to all the other units which is in charge of controlling behaviour. This principle is realised in all animals that build up a central nervous system (brain). It is of importance that this organ has a blueprint for each vehicle controlling behaviour. At the second evolutionary stage all these control blueprints are developed by the genetic blueprint. In this case the genetic blueprint not only builds up the entire body and the central control structure but furthermore also produces patterns of behavioural blueprints according to which the control mechanism directs the body.

This implies that behaviour is innate. One example is the insects which are largely regulated by such blueprints. Correspondingly their actions and reactions are similar to mechanical processes – their ability to alter and expand them is limited. We say that their actions and reactions are "instinctive". How these instincts function in detail, what triggers them off and how the instincts are connected with each other has largely been determined[10].

The *third evolutionary stage* – with all its transitions and overlaps – is characterised by the ability of the brain to develop new behavioural blueprints on its own. Especially mammals have this ability, that is why they are called "animals with a higher learning capacity". Their behavioural blueprints are to a great extent not determined by hereditary factors, because mammals learn everything they need for life by means of "playing" and "practising" during their juvenile phase. Since these animals are not born as fully developed beings, appropriate protection and care of the offspring are required for their development.

The genetic blueprint thus builds up the regulating organ at the third stage – *but provides only part of the blueprint for behaviour*. The brain has become more capable and is now able of creating such blueprints as a result of its analysis of the environment. These animals have the advantage that they can adapt their behaviour much better to environmental conditions. Their reactions have only few similarities with mechanical processes, they are no longer the product of the genetic blueprint. A different functional unit is now in charge of their development

The advantages of such a *shift of functions* – from the genetic blueprint to the central nervous system – are quite obvious. The genetic blueprint altered only very slowly in the course of generations – for example through mutations. This implies that changes in *innate* behaviour thus occurred gradually in the course or evolution. And if such behaviour no longer proved effective – that is, in the case of environmental changes –, it consequently regressed very slowly. The central nervous system on the other hand was able to develop new behavioural blueprints within the short time of one life-span and if these behavioural blueprints were no good, it got rid of them by simply "forgetting" them. This implied the possibility of an unpredictable increase in efficiency. The energons consequently were able to achieve effective action and reaction programs a thousand or hundred thousand times quicker than before[11]. Even mankind has not reached this stage totally. Some of our behavioural patterns are innate, that is, they are still determined by the genetic blueprint. Our rather unclear instinctive actions, for example, as well as our actual processes of movement are strongly influenced by the genetic blueprint This applies, for example, to the orientation movements of an infant searching for its mother’s breast and to the process of sucking. Even our facial expressions seem to be innate to a large extent[12].

The successive order of evolutionary stages:

First stage: The genetic blueprint builds up all the organs, each of which then has its own 30
function to fulfil.

Second stage: The genetic blueprint additionally develops a special organ for co-ordinating the interaction between the organs and furthermore provides the necessary blueprints for doing so.

Third stage: The central nervous system takes over the function of creating blueprints. The blueprints are thus no longer innate but acquired.

The evolutionary development has – to my knowledge – never before been described in this way but is in principle familiar to every biologist. What has so far been totally ignored is that at the same time a second developmental process took place. Thus I come to the main issue.

6

Just as the development of behavioural blueprints was gradually taken over by the central nervous system, the same applied to the structural blueprints.

At the first (lowest) stage the genetic blueprint designs all structures of the body, all functional units are thus "innate".

An example for the second stage is the hermit crab. It is no longer the genetic blueprint that builds up the protective unit for the tail – but the behavioural blueprints. The crab instinctively searches for empty shells in which to hide its tail. This means: the acquisition of organs is still dictated by the genetic blueprint – but only indirectly. The genetic blueprint no longer builds this unit (armour) out of cells but designs a blueprint from which the body itself acquires this protective unit. The acquisition of organs is consequently passed over to the central nervous system – though the instruction on how to do so is still provided by the genetic blueprint[13].

The third stage in this parallel development corresponds exactly to that of the development of the control of behaviour: The central nervous system is finally able to produce blueprints for the acquisition or building up of organs on its own. *This is the brink which mankind crossed*. The mental abilities of our ancestors reached a stage at which they were able to develop not only individual behavioural blueprints – but also blueprints for the formation of additional functional units.

Every child that tests how to use a stick or how to join parts to a functional unit is an example showing these initial stages of development. For the energons the opportunities of increasing power resulting from this progress were extraordinary The energon primeval man was suddenly able to enlarge his genetically developed body by adding as many additional units as he liked.

31

7

A fourth evolutionary stage-on *both* levels of development – followed closely. Due to the ability of copying (which only few animals possess), due to intentional demonstration (instruction) and above all due to the development of the information carrier "language" and "writing" people were able to transfer individually formed blueprints – for behaviour as well as for the acquisition or development of organs – *to other people*.

What makes language especially important is the fact that experience can be passed on ("handed down") irrespective of an object. There was no longer any need to showing the person who developed new blueprints the objects in reality – which was necessary in the case of demonstrating and copying – since these objects could be "described" in words. With the invention of writing information transfer no longer depended on people. This medium made it possible to pass information on to the following generations. Radio and television even increased these possibilities. Today information can be transferred to people all over the world within seconds[14].

One has to become aware of the consequences this progress had for the evolution.

Personally gained experience was no longer passed on by means of the genetic blueprint, which would have never been able to cope with such a vast number of blueprints. The central nervous system, on the other hand – an organ consisting of millions, even billions of cells – can deal with a much larger number of new blueprints[15]. Within its short period of life the individual itself may develop only a very limited number of such blueprints but it can adopt – according to its personal capacity to learn – many more.

Thus one generation was in the position to take over the experience of the previous one.. Mankind came to possess not only *acquired behaviour* but also a constantly growing number of *acquired organs*. It developed "artificial organs"-additional functional units.

These evolutionary relations have so far not been recognised and my aim in this book is to demonstrate them[16].

The fact that this important course of development has up to now not been properly recognised is due to our deeply-rooted way of judging, which for thousands of years has been dictated by what seems obvious to our senses. To our brain the artificial units created by men present themselves as clearly separate units: therefore we take it for granted that they are part of the environment and do not belong to the body.

As for the development of life there are no reasons for separating a human being from its "technology" (in the widest sense) because of a functional shift.

We have to remember that in the course of the evolution of plants and animals such functional shifts occurred very often. – We will later discuss this issue in detail. An example: the respirator of the cuttlefish (belonging to the molluscs) additionally took over the function of movement: they swim jerkily by expelling water through a siphon. Nobody would thus think of excluding cuttlefish from the development of life just because of this functional shift. What took place at the evolutionary stage "man" was nothing other than a functional shift: the central nervous system took over the function of building new functional units. The consequences in this case – indisputably – were much more far-reaching. This extension of functions was the basis for the formation of an entire kingdom of new and bigger organisms – similar to some protozoa which had formed the basis of the development of the kingdom of multicellular organisms. A new "sphere" of life emerged as Teilhard de Chardin called it (he called it "Noosphere")[17]. The consequences were thus unique – but they still do not justify the distinction of principle made between the first part of evolution and the second.

The already mentioned amoeba *Difflugia* demonstrates that this development started at a very early stage of evolution. Even this protozoon develops – *thus acquires* – an additional organ: out of grains of sand it builds an armour. In the case of coral polyps, the worm *Convoluta* and the termites, a foreign energon is attached to the working structure. As long as the blueprints for this behaviour were still developed by the genome, not much progress was made at this evolutionary stage. But when the central nervous system took over this function and in particular when the developed blueprints were passed on directly to other individuals via language and writing, the energons, so to speak, threw off the chains that up to then had slowed down their evolution and in so doing made way for an almost unlimited increase in power.

Let us see what the consequences were in detail.

Comments:

[0] In the following both terms will be used alternately.
[1] W. Eucken even wrote about "demand vehicles" ("Grundsätze der Wirtschaftspolitik, Hamburg 1959, p.62).
[2] C. C. Schneider, "Lehrbuch der vergleichenden Histologie der Tiere, Jena 1902, p 123.
[3] Another function of thorns is to provide some support for the branches when they climb up A lignified thorn can fulfil this function much better.
[4] Hans Domizlaff also held this view: "visibility on all sides" was not an essential feature of a living being. The connection could also be an invisible one. An anthill was not regarded as a living entity – Domizlaff speaks of "major organisms "– only because it not grown externally as a single entity. ("Brevier für Könige", Hamburg 1952, p. 98)
[5] This basic notion means frankly that the cat ends at the end of its whiskers, the fir tree at the tip of its roots.
[6] Today even the chloroplasts of all nucleobiontic plants (that is plants with cells containing a nucleus) are regarded to be degenerate protozoa (cyanophycea), that is, symbionts. This would also explain their ability to reproduce.
[7] J. Lederberg (1958). A. Kornberg (1959), S. Ochos (1959), M.F. Perutz (1962). F. H. Crick (1962), J. D. Watson (1962), M.H. Wilkins (1962), F. Jacob (1965), J. Monod (1965). N. W. Niernberg (1968), H. G. Khorana (1968), R. H. Holley (1968), M. Dellbrück (1969).
[8] For example the virologist W.Weidel. ("Virus, die Geschichte vom geborgten Leben", Berlin 1957)
[9] In biology, in particular in ethnology, the terms "programs" and "being programmed" are widely used today in association with heredity. These terms have the disadvantage that they are strongly associated with the idea of a conscious agent (Latin: agere, to act, to do) which dictates the programme. The term 'recipe' (recipio = I receive) or 'blueprint' seems more neutral to me. A recipe or blueprint can be employed no matter how it came into being.
[10] I. Eibl-Eibesfeldt provides an excellent summary in "Grundriß der vergleichenden Verhaltensforschung", Munich 1967. We will deal with this issue in detail in Part 4, Chapter II.
[11] Konrad Lorenz pointed out another advantage: the genome becomes better adapted to conditions vital for life only "only through success", whilst an organism capable of learning also from its mistakes. ("Innate Bases of Learning, p. 46)
[12] This had already been surmised by Darwin ("The expression of Emotions in Man and Animals" London 1872.) Films taken of various tribes without their knowledge have confirmed this. (H. Hass, "Wir Menschen", Vienna 1968 p 169 ff.)
[13] Frequently cited examples for the "use of tools" in the animal kingdom prove this. (The woodpecker finch uses the spines of cacti to get insects out of burrows, the tree ant uses its larvae as sort of "shuttle" to join leaves together). These abilities are mainly innate ones. Acquired use of tools, the next evolutionary stage, is far rarer. The term "tool" is avoided in this book because many of those artificial vehicles of effect developed by men have different natures: like clothes, shoes, chairs, houses, bridges, roads. K.Stefanic-Allmayer uses the term "technical organs". However, this term has the disadvantage that it cannot equally be applied to the preliminary stages in animals.
[14] M. McLuhan holds the view that mankind will, as it were, return to the previous state of a village community. Like in the past ,when everybody in the village knew when something unusual was going on humans are gradually beginning to take part in unique events simultaneously. (For example: the TV broadcast of the first moon landing). See appendix III

[15] The memory capacity of the human brain is estimated to be 10 6 to 10 8 bit. (M. H. Mirow, “Cybernetics”, Wiesbaden 1969) Bit is the unit for measuring the information content developed by Claude Shannon: a quantity that forms the basis of modern information theory-within cybernetics.
[16] A graph illustrating the entire process can be found in appendix IV.
[17] Teilhard de Chardin seems to be the only person who so far has vehemently held the view that the creations of men – all "vitalised material" produced by mankind – should also be regarded as part of the development of life. (Particularly recommendable is "Die Hominisation, Ineditum 1925, in "Auswahl aus dem Werk", Frankfurt 1967.) I consider the basic theses of Father Teilhard in more detail in Appendix 2.

III

THE CONSEQUENCES

Bildsam ändere der Mensch selbst
die bestimmte Gestalt.
Johann Wolfgang von Goethe (1798)

Every medium has the power
to impose demands on the naive.
Marshall McLuhan (1964)[1]

1

The starting point for the following meteoric development was human intelligence. What do we know about the structure which leads to this achievement? What is this exceptional human skill and quality based on?

There are actually only functional differences: morphologically, ganglion cells and glia cells in the human brain do not essentially differ from those of apes. The cerebral cortex, where the association centres of our conscious thinking are located, is considerably bigger; the internal structure, however, has not revealed any fundamental differences to date. Even if this may not be very flattering for us, it seems to be purely a matter of quantity. Just as computers acquire entirely new skills when the number of their units is enlarged by a hundred- or thousandfold, our higher level of intelligence also seems to be connected with the possession of a larger number of brain cells[2]. Of course it is possible that completely different discoveries will be made in the future.

On the other hand, experiments with chimpanzees show quite clearly where there are functional differences[3]. If you fasten a banana to the ceiling of their cage and you give them blocks that can be joined together and also a few boxes they will pile them up, join the blocks together, climb the box tower and fish for the banana. They only succeed after numerous attempts and often do not succeed at all, yet, the possibility exists. However, if the blocks and the boxes are not in their visual field at the same time (but spread out in other, neighbouring cages), they will not be able to fulfil the task. This account is strongly simplified but it shows – in my opinion – what it is that obviously matters. The brain of an ape (and of other intelligent animals) is able to grasp causes and effects in the imagination – *but only if the elements involved are spatially and temporally close together*. If the animal perceives them in different places or at different times, its brain is not capable of the appropriate and necessary combinatory work.

Human beings, on the other hand, are able to connect impressions and experiences which they perceive at completely different points in time and space within the realm of their "fantasy", which means somewhere in the brain itself. That represents major progress. With our imagination we can actually relate every item of which we are conscious to any other. We are able to draft new patterns of behaviour without having to lift a finger – "plans" for sequences of action or for the formation of structures that are useful for us. We are even able to scrutinise these plans – which still happens "in our fantasy" – for their feasibility. We can reject them, supplement them, alter them. We can "theoretically" find out what the functional unit has to look like for this or that purpose. We then start to look it or construct it artificially according to our imagination[4].

Perhaps it will turn out one day that we only owe this invaluable skill to a gradual or even quantitative further development of the thinking apparatus of animals. The resulting consequences were enormous in any case. The whole network of effects of the development of human power can be deduced from that *one premise* of functional innovation.

2

First consequence: Artificial organs are not chained to the body. They do not have to be carried around all the time. Human beings put on clothes; if they get too hot, they can take them off again. They take a knife – if they do not need it any longer, they put it down again. They get into a car – then leave it again when it has taken them to the desired destination.

Every animal has to carry all its organs around with it continuously – if one leaves out of account the few artificial organs which have already been created by animals themselves (nest, catching devices, etc.) . This means in the first place that animals have hardly been able to produce organs which they did need constantly. The task was simply too laborious – and above all every organ has to have its place in relation to other organs, has to be nourished, well looked after, renewed, etc. Whenever such formations were achieved, the advantages did not outweigh the disadvantages. Individuals with such formations were not able to assert themselves – therefore no further development took place, they disappeared again. We are used to considering animals as miracles or perfect structures – but if we compare them to human beings with their removable organs it becomes apparent how immensely limited animal evolution had been up to that stage of development.

Animals – with a few exceptions – were usually only able to specialise in one particular way of life. With the organs created for that purpose they were tied to it for better or for worse. Only in rare cases do we see development of the ability to get rid of superfluous functional units. For instance, male termites discard their wings after their wedding flights.[5] However, such units are then lost for good and cannot be added to the functional body again.

Human beings take off their artificial organs – clothes, a pick, a spear ... a car. If they are in need of them again they use them again.

Some of the artificial organs we attach to a location: then they do not burden us at all. For instance: a machine, a library, a mill, an electron microscope. If we need their services we go to them, operate them, use them. The single professional entity or business organisation can thus also include big immovable units towards which the movable and directing structure – "man" – according to his needs moves in order to activate them.

Second consequence: From the very beginning the new advantages were also associated with new disadvantages, new problems. Every unit that does not grow into the body can get lost – but, more importantly, can also be stolen.

Somebody who has mislaid his glasses or somebody whose bicycle has been stolen is not able to use these units anymore. All artificial organs can only serve human beings as long as they remain available to them, as long as they stay in their domains.[6] We do not have to carry these functional units around with us constantly – however, if they are separated from us additional facilities have to ensure that they remain available to us.

One functional aid in order to diminish the dangers of "forgetting", "mislaying" and "losing" is what we call "keeping something tidy". By assigning certain definite "resting places" (drawers, files, cupboards, buildings) to all movable artificial organs we make it easier for our brain to keep control. With units that are fixed to a location – for instance, a fountain or a fence – the problem is less pressing. As their locations stay the same once and for all there is smaller risk that we will forget them.

Much more serious with all kinds of functional units – no matter whether they are fixed or movable ones – is the second problem, namely how it is possible to avoid them being stolen so that the right to use them is thus usurped by other people. This is very critical because almost all artificial organs can serve other people too.

Here we have reached an important point. Also every animal and every plant is constantly exposed to the risk that parts of their bodies will be snatched away from them. These, however, always serve as nourishment for the thief – but their actual functions can hardly ever be used by it. If a lizard bites off the wings of a dragonfly cannot fly with those wings.

The functions of organs that are not ingrown, on the other hand, can also be used by other individuals. Instances are homes, nests and traps made by animals. With the elaborate gadgets and facilities that have been created by mankind in the course of time, that problem has increasingly come into the foreground. All additional units have to be protected effectively.

To guard, to defend, to hide, to lock up, are countermeasures against that second danger. However, they are – for the energy balance – a considerable strain. The only really effective and efficient protection for the individual consists in the formation of a community of interests with a division of labour. Some energons specialise in the function of protectors – police, soldiers, judges – and are maintained by the others. The latter then are able to practise their individual gainful activity undisturbed. Their artificial organs, although they are separate from them, remain tied to them, within their right of disposal. By that a special kind of tie is created: the right of ownership that is protected by a community.

Much thought has been given as to how and why the formation of human associations and states came about. Seen from the point of view of evolution that necessarily had to happen – just as with bigger animals the formation of special organs of breathing or circulation took had to occur. The further unfolding of energons since the beginning of mankind was based on the formation of artificial organs: they were a burden in that they have to be protected against robbery. However, such a protection can only be supplied – effectively and efficiently – with the aid of a "community with division of labour".

A tendency to form *small* groups is innate in human beings ever since our ancestors used to create herds. The formation of larger communities, however, arose from the inevitable connection of causes and effects. *Artificial organs were the necessary consequence*. Human beings who achieved the formation of organised communities had an advantage eo ipso. Therefore that tendency was successful. Here Darwin's guiding principle of "natural selection" slimmed things down. If we are confronted with huge communities of human beings everywhere today, the reason is not because they were invented by one person or another – because other things had been invented, too, which were not successful – but on the grounds that such facilities had eminent advantages and made superior those energons which had them at their disposal.

The cultural, artistic, "psychological" development of human beings, which we tend to rate most highly, is in terms of evolution only concomitant – though for ourselves personally very important. What has to remain in focus is the hard fact that there cannot be any kind of activity and as a result any culture without surplus energy. I know of no counter-argument to that. Surplus energy is always the prerequisite for everything else. What is important here is that for energons in the second stage of evolution this are only attainable with the aid of artificial organs. The latter – as one of a number of consequences – have been responsible for the formation of communities.

3

Third consequence: Artificial organs are interchangeable . This means that humans can alternately specialise in one or the other activity. If I take a shovel I specialise in digging. If I take a pencil I specialise in writing. If I sit in a rowing boat I specialise in moving on water. Lorenz called humans "specialists in being non-specialised". This is only true to a certain degree, as our brain is highly specialised. In my opinion it would be more correct to say: "humans are specialists for versatile specialisation". With that we can do better justice to the peculiarity of the germ cell "human being". Never before has something so chameleon-like been developed. By employing sometimes one and then the other functional unit that is separate from the body, we transform ourselves sometimes into one and then into another highly specialised being.

Our hands were the prerequisite for that. Whether we like it or not: we owe to our ancestors' climbing way of life the fact that we have them. Other animals have not been able to attain a comparable development. For instance, the brain of dolphins is particularly capable – nevertheless, even in a million years dolphins could not become comparable to human beings. This is simply for the reason that they do not have an organ that is suitable for the production of artificial functional units and for connection to their bodies. They would never be able to produce a hand-axe, to take up a pick or to play the piano. It is possible for us – and not only because of our brain's capability.

As a further consequence the interchangeability of artificial organs made it possible for more people to use the same organ alternately. What's more, *they can be passed on from one energon to another*.

Just imagine what that means for the evolutionary process. Up to the developmental stage "human being", with every dying plant and every dying animal also all the parts of the bodies of which those energons consisted died (apart from reproductive processes). If a rosebush dies, all its leaves die as well. If a giraffe dies, hen also its four legs die, so do its heart and its eyes. The descendants do not benefit from it in any way – except (and this really happens sometimes) if they eat their parents.[7] This changes with human professional entities. If a shoemaker dies, his son – or some other appropriately qualified person – can "take over the company". Artificial functional units maintain their operability after the owner's death. Another person, another directing centre, slips into the structure of all those artificially created units and reactivates them. Or "the company is liquidated": tools and equipment are "disposed of". In that case, too, the single parts live on in other bodies of professions or luxury. Some early stages are even found in the case of animals. A snail-shell serves the hermit crab analogously after the snail's death. The hermit crab dies – and another one moves into that shell. It is similar with the homes of animals.

Fourth consequence: Artificial organs are not considerably burdened by their past history. With the bodies of animals and plants new functional units were only able to develop in small steps and mostly only out of already existing units. Every organ is – as Hesse and Doflein put it – "doubly conditional": not only through its manner of "performance" but also "through its history". It is true that the tools and machines of human beings often show similar burdens. One tool is often developed from another one and can only overcome the traces of the original purpose of its use gradually. In principle, however, every artificial organ is a new entity – or at least can be one. With animals and plants this hardly ever is the case. If we take a closer look at their organs we will most of the time be able to tell from their structures and the way they function what their historical development has been. From the point of view of construction the organisms are only rarely perfect.

Fifth consequence: Artificial organs can practically be built out of every material. For those consisting of cells this is not possible. Plants and animals, for instance, have not been able to use metals. The reason for this is the high temperatures that are needed to mould them but which the living cell cannot tolerate. Outside the body, on the other hand, functional units can be created (e. g. furnaces) which can withstand such temperatures.

Sixth consequence: Artificial organs do not necessarily have to be operated with energy from their bodies themselves: it is in principle possible that outside-energy operates them *directly*.[8]

If somebody's sailing-boat is driven by the wind, he does not take in the wind's energy into his body like food, spend it there and then transfer it onto the boat (as is the case with rowing) but the wind drives the artificial organ, the boat, directly. If a farmer harnesses an ox to his plough, then he does not take in the ox's strength but the ox pulls the artificial organ plough *directly*. If we melt metal in a furnace or fry meat on the stove, then the fire's energy does not enter our bodies but serves us directly. If our car is driven by the energy that is contained in petrol, then we do not have to drink the petrol but the energy drives the artificial organ car directly. For those processes there are also many preliminary stages within the plant and animal kingdoms but only humans were able – with the aid of artificial organs – to make outside-energies serve acquisition structures on a large scale.

The concept of the energon, with the human race as its centre, is thus increasingly distancing itself from the common notion of it. Those living bodies of a higher order – which are the actual reality – consist of parts that have not only not grown into each other but which are in many cases operated using differing sources of energy completely independently.

4

Seventh consequence: Artificial organs do not necessarily have to be produced by the one whom they are to serve. Within a community single persons can specialise in the production of one or the other functional unit. This was the basis for manual work, trade and industry and furthermore for the institution of the "market", for the universal agent "money" and for "trade". Again, they are not random creations deriving from human inventiveness but necessary results of the development that was triggered off by artificial organs.

Through specialisation the artificial organs also get better and cheaper. So they can be produced at a price and with a quality otherwise unattainable for the user. These advantages were increased considerably through industrialisation and mass production.

Another precondition for that process of development was the existence of organised communities. Only with them did the single person have the opportunity to concentrate on one task. Thus a community where that process of specialisation took place could acquire better artificial organs. The balance of single persons – and also of communities – was improved by that and therefore also their superiority over less organised groups of people. By virtue of their intelligence, humans recognised this and promoted such development. In that respect too, artificial organs functionally resulted in the formation and inner organisation of larger communities.

Eighth consequence: Artificial organs do not necessarily have to be financed by one energon only. A number of energons can pool their surpluses of energy and then use the created organ together (e. g. a bridge) or in turns (e. g. a tractor). This is another factor which encouraged the formation of communities. Within a state *common organs* can be created with a relatively small expenditure by all citizens and which then increase the power potential of every individual.

The most important common organs were first of all the ones that secured life and property, that is, organs for the maintenance of internal and external security within the nation. On the one hand we call these large functional units national defence, on the other hand we call them legislature and executive. Other important common organs are the sewage system, plumbing, roads, energy supply, railways, the mail, the telephone system, institutions of education, the fire brigade and more besides.

Those organised structures are so colossal in parts that one finds it difficult – with conventional thinking – to attribute them concretely to every individual person. However, if one follows the developmental history of the energons and the vehicles of effect, both built by humans, then this is indeed the case. Within a state the whole structure of the national defence, just as the mail, the national library or any road, are vehicles of effect for every acquisition structure – from the pedlar to the production business, from the housewife to the insurance company. Here we can use a way of thinking that has been common practice within the legal system for a long time. It is every body of acquisition's duty to partake in the maintenance of those common organs by paying taxes – and everybody has a right to the benefits of their effects.

The functional structure of the acquisition entities that build the germ cell "human being" becomes more and more branched: it becomes increasingly difficult to grasp it. However, if one keeps in mind the artificial organs and their consequences for the structure of the energon, then one has the key to the comprehension of those interconnections.

Ninth consequence: Artificial organs can also be "rented". Humans do not have to acquire them in their entirety but they can – at lower cost– take possession of them only when they need to use them. This means a further saving of energy. That process got its special significance as a device for the acquisition of human achievements. For instance, if I rent the services of a messenger, then he becomes my functional unit, my artificial organ for the period of time in question. It is the same when I hire the services of an attorney, a hairdresser or a steamship company. If I insure myself, then the insurance company in question becomes my functional unit for the period of validity of the insurance policy. If we go to the theatre we share in renting –as a "luxury"– the services of the theatre and of the ensemble.

Today large communities are organised in such a way as to put almost countless numbers of potential functional units at the disposal of humans. If people have enough surplus energy to rent their services, these units will – for a certain amount of time – become organs to serve them.

That means that there are a variety of interactions and connections that can hardly be kept track of. At the centre all this there is still an organic core: the germ cell "human being". Around this a growing number of organised units are situated that are affiliated short-term and which then produce effects for the respective structure of acquisition. In fact, such services can already be performed before the central human being has even thinks of enlisting them. The same goes for all commodities that are not produced to order but are held in stock. If I buy a gramophone, when I pay for it I am purchasing a share of the work of the company in question. However, that work has already been done when I pay the rent for the work – the price of the gramophone.

5

Tenth consequence: Also the upkeep, the repair and the renewal of artificial organs can be transferred to others who are specialised therein. Here the advantage has to face a disadvantage, however. Plants and animals are very autarchic. They care for and repair the different functional units in their "own company" and can even reproduce some of them in cases of injury or loss. With the artificial organs of humans ,on the other hand, it can be more difficult to get a repair carried out. This is only of minor consequence compared to the advantage that in principle every functional unit can be *attended to separately* and becomes almost without exception *replaceable*.

Eleventh consequence: If an artificial organ is not needed anymore, it can be "liquidated" without giving it a second thought. It is thrown away – or it can even be "sold". With animals and plants it is a different matter. Often changes of the environmental conditions occurred or an energon changed to another form of acquisition: in those cases organs became superfluous or amounted to burdens. Only changes in the genetic make-up could eliminate them, however, that must have taken hundreds or thousands of generations. Until then every newly developing energon of the species in question repeatedly reproduced units which had become superfluous and above all, they also had to nourish them continuously. The possibility of throwing off such functionless parts in the twinkling of an eye – or even of converting them into energy (when they were sold) – also represented major progress.

Twelfth consequence: It was of really enormous significance that thanks to artificial organs energons suddenly did not have to bring forth descendants of the same species all the time. Every fir can always produce firs only, a lion always only more lions. From the proceeds of professional bodies and businesses built by humans, however, it is by no means always necessary to build energons of the same species only. The return from a shoemaker’s workshop might equally well finance a tobacco shop or a night club.

With mankind, evolution surmounted the immense handicap of propagation limited to the same species or (with mutations) to a similar species. If the living conditions of a maybug are bad but if they are favourable for violets, nevertheless the maybug will only be able to bring forth young maybugs and no violets. The mere thought of such an eventuality seems grotesque to us – but only because we are used to taking for granted propagation that is tied to the species. Seen from the energon-aspect this was a rigid one-way street that was practically not circumventable – but still a burden.

Energons built by humans are liberated from those bonds to the species, they are not "tied down" to their species as regards their propagation. For instance, if the economic situation is unfavourable for cinemas, the owner is by no means forced to open up further picture places. The capital – or better: its variable part – is then shifted to other lines of business where there are better earning possibilities. On the basis of separate functional units – *and only because of them* – energons thus reached the point where individuals of one species can also produce individuals of a completely different one.[9]

This was also the reason for a much greater individuality in the shaping of energons. Whilst one stag-beetle is almost exactly like another one or a fir almost exactly like another one, professional bodies belonging to the same "species" already show structural differences to a much larger extent. The notion of the species – which biologists define by the process of production – loses its clarity. The same form of acquisition still compels basically similar structures to a large degree but adaptability to the respective environmental conditions grew tremendously. In the Middle Ages there were still plenty of professional structures which remained constant over many generations. On the basis of technological progress and progress in the means of communication, however, energons increasingly become single phenomena which – as will be shown – may well be constructed according to the same principle but which are almost as variable in the details of their structures as the environments where they operate.

Thirteenth consequence: Eventually artificial organs opened up the portals for culture, art and convenience – for our actual "existence as human beings". To put it bluntly: an animal could hardly bring forth a garden swing serving its convenience or silver cutlery for the ingestion of food. On the basis of competition animals could hardly acquire organs which merely served their "convenience" and their "happiness" but not the effort of acquisition or reproduction. If such organs emerged, then they were burdens in the competition for acquisition. They set back their energons correspondingly, eliminated them.

With energons consisting of separate functional units that suddenly changed. The successful businessman may very well use surpluses for his comforts also and the functional units (e. g. summer residence, motorboat, evening dress) serving that purpose by no means hinder his professional body.

The striving for convenience and especially happiness – in the broadest sense – became the greatest motivation for humans regarding their efforts of acquisition. If a soap manufacturer is forced always to put his income into the manufacturing of soap only, his motivation to work will certainly be weaker than if he is also able to spend his earnings on a trip to Mallorca or on the purchase of a red cabriolet.

Artificial organs not only open up eminent possibilities to create successful structures of acquisition for the germ cell "human being", but they also activate very decisive stimuli in it. That the world became the way it is very much due to that one important functional step forward.[10]

6

Within physics an important change has taken place in the last fifty years. The world which for Newton was still perfectly concrete has increasingly retreated beyond human imagination and comprehension. Our brain cannot reproduce the processes inside atoms as pictures anymore. We can only understand them *mentally* (through formulas and figures), however, we cannot understand them *with our senses*.

The conclusions of the energon theory lead to a similar transition in biology and in some of the humanities – which will hardly be welcomed by them. Some things that used to be rather simple and comprehensible in our previous system of thought are now blurred to a virtually incomprehensible abundance of interconnections. On the other hand, this new way of looking at things leads to a considerable simplification of thinking. It becomes possible to categorise all structures which carry on the development of life *with one and the same conceptual system*. It becomes possible to attain a standardised way of communication within the manifold branches of biology, of economics and political science. In fact, it should become possible to consult knowledge of one area in order to explain phenomena of other hitherto completely distinct areas.

For all energons the central activity – by which their existence stands or falls – is the acquisition of energy. This we will now examine in more detail.

Comments:

[1] The term “medium” as McLuhan uses it and which is maintained by his translators also corresponds terminologically to the expression “artificial organ”. With media McLuhan describes all artificial “expansions" of human beings, the totality of all aids created by us.
[2] See B. Rensch, “Die Abhängigkeit der Struktur und der Leistungen historischer Gehirne von ihrer Größe”, in “Die Naturwissenschaften”, Vol. 45, 1958, p. 145ff.
[3] Cf. W. Köhler, “Intelligenzprüfungen an Menschenaffen”, Berlin 1921.
[4] Plato called man “an animal that draws up utopias”. Spinoza said the spirit “was not a power handling imaginings” but itself consists “ in the course of the imagination and the interconnections of imaginations”. It is interesting to ask as to what extent areas of the brain which are not accessible to

consciousness have similar projection screens at their disposal. Many achievements of so-called "intuition" might be explained through the "unconscious" activity of those cerebral areas. (Cf. Konrad Lorenz: "Innate Bases of Learning".)

[5] The parasitical crab Sacculina even throws off a large part of its body including the legs and the eyes once it has found its "host", a prawn, and can then send its roots into it like a plant.

[6] In business management similar basic ideas play a part. Thus W. Bouffier defines capital as "the right of disposal of properties of wealth expressed in terms of cash value" ("Einführung in die Betriebswirtschaftlehre", Vienna 1946, p. 23).

[7] This for instance is the case with the larvae of the mosquito Miastor. R. Hesse describes the process as follows: "They eat out the mother , therefore live on the parts of her body until only the hose of the body cuticle is left which is ultimately torn and thus releases the young ones." This is one of the manifold ways of taking "care of the brood", of the "feeding of the germ". ("Tierbau – Tierleben", Jena 1943, Vol. 2, p. 411)

[8] In particular, Wilhelm Ostwald pointed this out ("Die energetischen Grundlagen der Kulturwissenschaft", p. 81 ff). In part 2 /chap. IV and V I will come back to that problem in more detail.

[9] A. Naef wrote: "Natura non facit saltus! Every formal element is tied to previous ones and determines following ones unless it is on the blind end of a twig from the tree of life. Morphologically there are absolutely no new appearances!" ("Handwörterbuch der Naturwissenschaften", Jena 1932, Vol. 7, p. 4.) This especially changed at the developmental stage when human beings arose. From there every "saltus" (jump) became possible. On the basis of the functional unit called the central nervous system and its achievement of "human intelligence" absolutely everything that is new could emerge.

[10] The comparison between human being and germ cell as it is often used in this context has only functional validity. The germ cells create the multi-celled body by continuous divisions: thus they are ultimately identical with it. With human expansions, however, the "germ cell" is maintained individually – that is, it does not enter the structure that it has created. It remains an individual – even if its individuality is limited within the framework of the bodies built in that way. Yet, the comparison is justifiable with regard to the function: both the germ cell and humans form life structures with a higher level of integration.

IV

LOCK AND KEY

Alle Zwecke, Ziele, Sinne sind Ausdrucksweisen
und Metamorphosen des einen Willens, der allem
Geschehen inhäriert, des Willens zur Macht.
Friedrich Nietzsche (1895)

In the organism activities which increase the supply
of structured energy only possible through others
which in its environment create more chaos.
W. Troll (1948)

1

Many readers interested in the current economic boom and the development of the world economy will probably regard examining plants or animals as a pointless, rather roundabout way to come to serious conclusions in their field of interest. So far economists have totally ignored the first half of the developmental stage of the problems they have been dealing with. 45

We do not know – and probably will never – what development in detail led to the formation of the cells. From the fossils of multicellular organisms we can obtain some information about their complex development; protozoa on the other hand left only very few traces. In the foreseeable future we will probably be able to reconstruct the beginning of the entire development of life in detail and to demonstrate this in experiments: biochemists have already succeeded in artificially reproducing autoreproductive molecular structures[1]. But the evolutionary process which led from these initial stages to the highly complex organised structure of the "cell" is likely to remain unknown.

Using the energon theory we are nevertheless able to draw some conclusions about each intermediate stage in this development. Each energon had to be so constituted that it achieved an active energy balance, otherwise the evolutionary cycle would have inevitably come to an end at this stage. As I would like to show, we can deduce a lot of information about the structure required for achieving such a balance – and thus about the structure of each of these links.

2

The relationship between each energon and its energy source is like that between a key and a lock. Just as the nature of the key has to be such that it can open a certain lock, the nature of each energon has to such that it can tap a certain energy source. That is the precondition for the following processes.

What does not exactly fit into this comparison is the fact that each key is a tool that needs to be operated. Keys do not open locks on their own initiative. The energons in comparison are all bodies that are active without the help of an agent. They are thus – to illustrate this example – keys which open locks on their own.

Let us nevertheless continue with this comparison. The shape of the key "bit" – the most important of all its units – is not determined by the manufacturer. he may produce the key but the shape which the bit needs is determined by the lock. According to the mechanism of the lock, the bit has to have a certain shape in order to open it. This is a significant causal connection which plays an important role in the energon theory. The lock does not produce the key – but it determines its shape. Though the manufacturer does the work necessary for its production he does not determine what the result of his work will be like. Only if he succeeds in copying the shape determined by the mechanism of the lock will the key fit. On the other hand, it may happen that a key opens a lock which it has not been produced for.

The same is true for the energons. Those which are responsible for tapping energy sources have to meet given requirements as to shape and arrangement. The energy source does not produce them but dictates their nature. How they are produced is only of minor importance; what matters is that they have the required properties. Thus if we are looking for the "origin" of these properties, we should not regard it as being the manufacturer. The necessary properties originate *in the nature of the energy source*. 46

3

The mysterious phenomenon "energy" which all energons seek takes the form of *actual* (kinetic) or *potential* (static) energy[2]. It is only the actual energy the energons are interested in, only this form can do work. For so doing a "gradient" is required – just as in the case of a waterfall. The higher the point is located from which the water plunges down, the more energy these particles absorb – the more work can they do. Ostwald called this power "intensity".

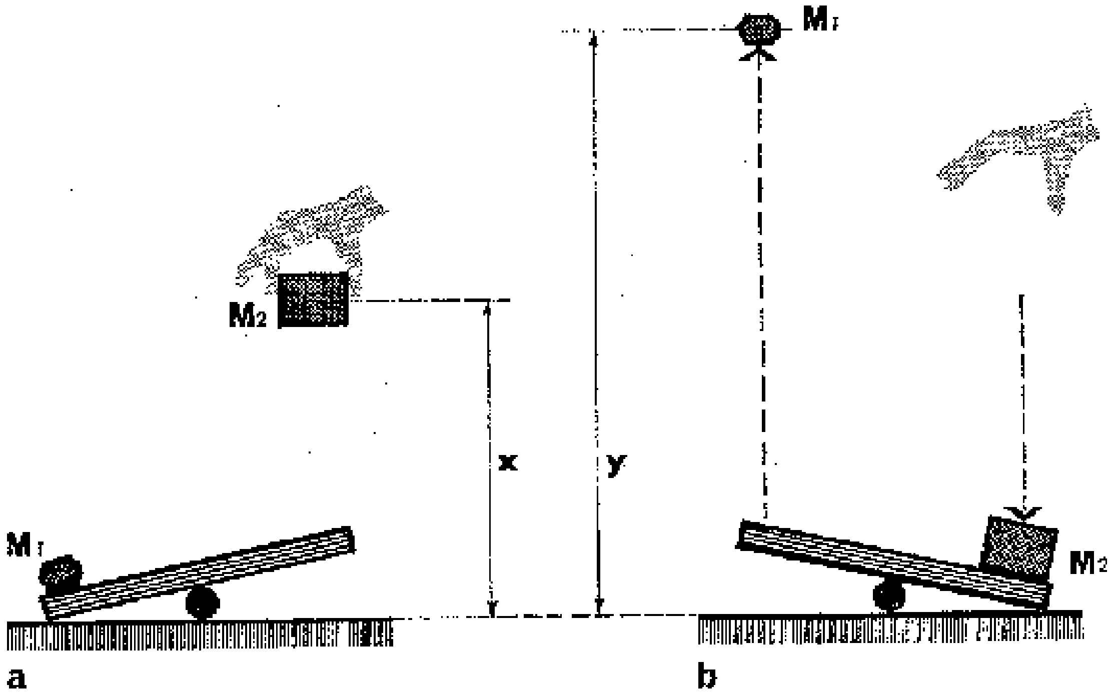

Figure 6: Illustration of the energy transformation underlying the life process

a) The body M1 weighing 10 gram lies on a balance beam. Its potential energy within the gravitational field of the earth results from its weight and its distance from the earth's centre (centre of gravity). Body M2 has a distance x from the earth's centre: thus its potential energy is greater not only because of its greater weight but also because of its longer distance from the centre of gravity.

b) Body M2 (released) "falls": its potential energy is transformed into kinetic energy. Due to the impact the balance beam is pressed down and M1 is flung into the air. The distance from the centre of gravity (y) increases and is longer than that of M2 before the fall (x). Thus M1 is "raised to a higher energy level". Such an energy transformation forms the basis of the life process. All organisms are capable of "lifting" smaller amounts of energy to a higher energy level by using absorbed energy. This process does *not* counteract entropy. On the whole actual energy is lost – "destroyed" (due to the evolution of heat). The organism nevertheless increases its personal energy potential – which is later used for enlarging the structure causing this transformation process.

The sea, for example, has enough thermal energy to operate all the machines in the world. But this form of energy cannot be used because it is potential energy. If we could transfer the sea close to icy space, a gradient would emerge, an "intensity" evolve, and we could start making use of this energy source.

But not every form of actual energy is of use to every energon. If a flash of lightning strikes a rabbit, then the animal may be supplied with an enormous amount of energy but it will nevertheless die. Oswald called those forms of energy which a system absorbing energy makes use of the "raw energy" of the system. The amount absorbed net was called "utilised energy" and the proportion of raw and utilised energy the "quality balance". This is of great importance in competition since the " quality balance" has a decisive influence on the degree of effectiveness of the respective energon.

When energy is transformed from one form to another, a certain percentage of heat is produced , which the energon loses – unless it needs energy. This energy evaporates in the environment, the gradient is levelled out. All organisms (plants as well as animals) are such that by using greater amounts of raw energy they raise small quantities of utilised energy to a higher level – that is, they increase their intensity (Figure 6). This gives the impression that the organisms counteract the general levelling of the slope in nature. This is not true. On the whole actual energy is always lost in these processes, *"entropy" increases*[3].

Where on our planet were those suitable energy sources for energons situated?

4

Some groups of "bacteria" demonstrate how energy can be produced out of inorganic compounds. Sulphur bacteria oxidise hydrogen sulphide, nitrous bacteria oxidise ammonia, iron bacteria break down ferrous and ferric compounds. Just like we produce heat – that is energy – by igniting coal, these bacteria initiate a chemical reaction when they come into contact with an appropriate substance. In so doing energy is released – which is used for running their tiny "enterprises". If business goes well – the sulphur bacterium gains approximately 75 calories per mol of decomposed hydrogen sulphide – they increase by acquiring and incorporating the corresponding substances. 48

Since such energy sources are on the whole rather rare, these energons did not blossom. Though these particularly small energons have been blooming up to now as special entities, a higher evolutionary development did not take place[4].

An almost infinite source of kinetic energy though are the light rays (photons) which constantly stream from the sun to the earth. All those energons which are familiar to us under the name "plants" (more precisely "autotrophic plants") are directed towards exploiting this source[5]. The actual key bit which opens the lock of sunlight is the same or at least similar for all plants. It is the pigment molecules which are spread in the entire cell body of lower plants or are band-like, plate-like or spherical bodies – "plastids" – in higher plants.

These functional units react so strongly to the sun light that single electrons within their structure are shifted to a higher orbit – like the body M1 in Figure 6 which was raised to a higher energy level. In this way they absorb more energy – which is then later transformed into chemical energy in a sequence of reactions (known as "redox reaction"). The energy is, so to speak, locked up in small cages.

Such a "cage" is first and foremost the adenosine diphosphate molecule, in short ADP. It may be compared with a charged battery. By adding a phosphoric acid molecule it is transformed into adenosine triphosphate (ATP), with the bonding energy being the higher "charge". If the plant cell needs energy for running its business, the battery quickly gives off its charge of kinetic energy without losing too much heat. Such a charging and discharging – that is a retransformation into ADP – may occur hundreds or thousands of times in the course of one day.

In the interior of the plastids two other processes take place: with the help of light energy another molecule type (NADP)[6] is charged with hydrogen, and afterwards – in the "dark reaction" – carbohydrates are produced: first sugar, then starch, cellulose and other necessary substances.

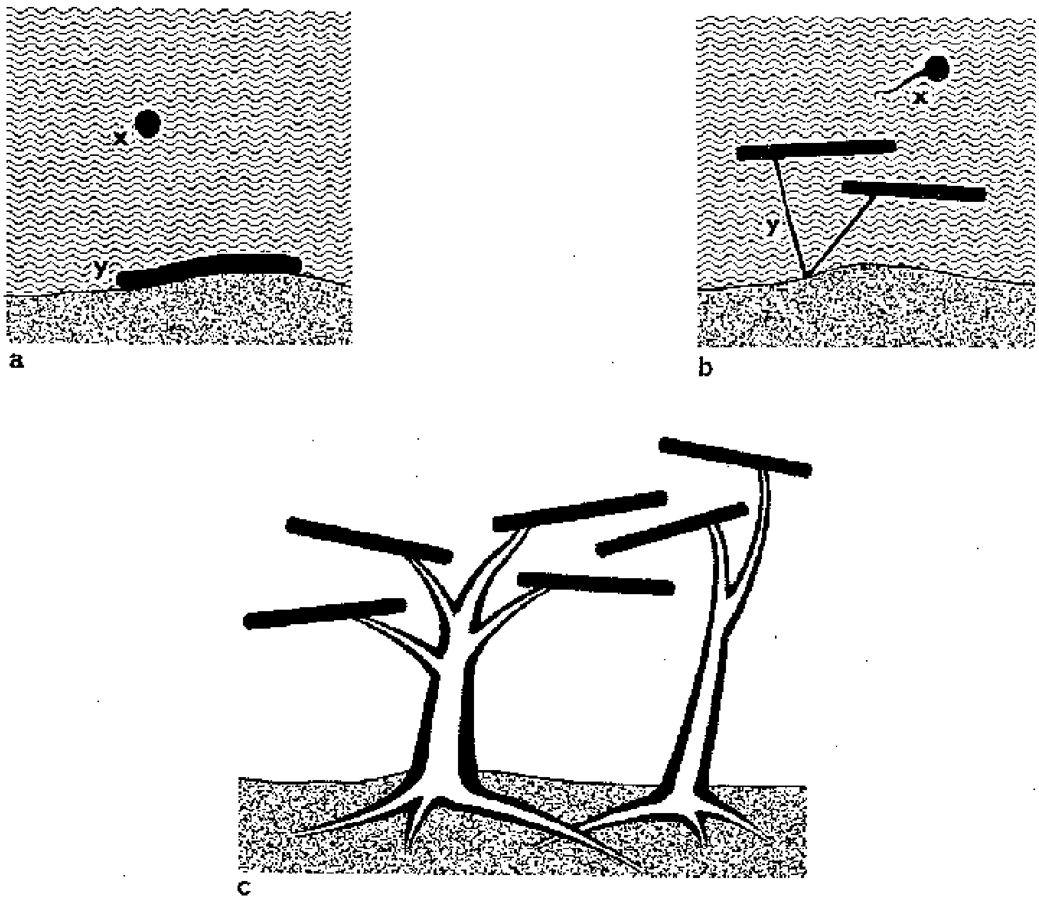

Figure 7: Main stages in plant evolution

a) The units capable of photosynthesis (energons) float in water (x) or cover the ground (y). In both cases additional functional units are required: one is needed for keeping x drifting within bright zones, another one is needed for securing y in the ground.

b) A locomotor organ (like a cilium) enables the floating type x actively to move to more favourable areas for acquisition. Type y develops stalks for lifting the units capable of photosynthesis above the ground: thus it is less likely that they will be covered with sand and sludge.

c) On land the plants are not surrounded by water and thus they have to extract it from the ground: additional functional units in the form of sucking roots are necessary. When competing for light the plants raise the units capable of photosynthesis as high as possible: the weight-bearing trunks have to be thicker and harder.

At stage b simple devices (such as ducts) are sufficient for feeding the stalks, at stage c ,however, a double tube system is necessary: one for carrying water (together with salts) to the units of acquisition (leaves) and another for carrying energy and materials (the "assimilates") to the branches, trunks and roots.

What is important about these processes is the fact that the energy which is necessary for the respective structure (minus heat loss) remains locked up in the molecules built in this way. Thus every molecule of the body is an energy "cage". When the plant needs the energy locked up in there, it simply has to break down or "smash" the molecule – that is open the cage.

The entire process of this energy production is called photosynthesis. The production of an endogenous structure is called "assimilation"; the opposite process, the opening of cages, is called "catabolism". The following important connection exists between the two: the plant needs carbon dioxide and hydrogen for assimilation, at the same time it emits oxygen. In the case of catabolism the plant extracts oxygen from its environment and gives off carbon dioxide. Since however assimilation is predominant on the whole, plants all in all absorb carbon dioxide and produce oxygen.

In so doing plants in two respects create the condition for their being eaten – *by "animals"*.

5

Already among the protozoa there are numerous species which no longer absorb solar energy but switched to obtaining energy in a predatory way. These species attack other organisms, snatch away molecules of their body – that is energy cages – , smash them and in so doing gain the energy contained therein. They consequently do the same as plants when they break down substances. What is different is simply that these robbers tap energy reserves which they have not produced by themselves.

Now we come to the other big group of energons, which we call "animals" – and from which we have developed. The energy source these energons tap is the organic structure of other organisms. They have to come close to the organisms and snatch away parts. This is a fundamentally different task from absorbing solar energy. Whereas the sunbeams reach the plants naturally and free of charge, the animals have to track down, hunt and conquer their *prey*. In order to open the "lock" the key has to be different in this case.

Apart from plants, all other animals are also potential energy sources for this energon type because each molecule of the animal body contains the energy used for developing this structure. In practice this means that the animals have many more and diverse energy sources. While the plants which are capable of photosynthesis are all directed towards the same sunlight and mainly differ only in the way they acquire materials – particularly water –, each prey is a quite different lock for the animals and requires an accordingly different key bit for unlocking.

Thus it is not the production process which determines the basic structure necessary for each animal species but first and foremost the nature of the prey. According to the way the prey looks, behaves, moves, if need be defends itself, the animal energon has to have appropriate properties to succeed in obtaining the energy of others.

For breaking down the stolen molecules animals also need oxygen. Since plants obligingly exhale oxygen, they do not only offer themselves as potential prey but furthermore provide what is necessary for their combustion (oxidation).

6

Since sunlight abounds in nature, most plants do not need any organs of locomotion.[7]Correspondingly the majority of species – especially on land – are rooted to the ground. They need sense organs only to a certain extent. Most of them can perceive the direction of light and gravitation – in the case of terrestrial plants the tip of the roots perceive humidity –, but the functional units developed for so doing are relatively simple and cannot be compared with the complex sense organs of the higher animals. Since structures which do not contribute to an active balance are a burden, it is no wonder that these energons possess only those organs which they really need.

For animals, on the other hand, the locomotor and sense organs became important tools for their predatory activity. The sponges and coral polyps which, plant-like, are rooted to the spot are an exception. They feed on microorganisms which float by: the ocean current washes the prey directly to their mouth. They only need to help it by using their cilia. Most animals, however, are equipped with fins, flukes, legs, wings and other tools of locomotion – as well as with highly developed sense organs: eyes, nose, ears and so on.

These organs in turn are not gadgets developed by an imaginative mind but requirements of pure necessity. Without such devices the key would never be able to reach the lock – that is, they would not have developed any further.

The inner organisation of animals is also inevitably tighter. Effective locomotion implies the co-ordination of numerous partial movements (for example movements of muscle) – as well as the co-ordination of sensory impressions.

A vast variety of organs for catching the prey were developed: mouths and paws, sharp teeth, chewing plates and many more. Each of these structures requires a corresponding pattern of behaviour because only then will the functional units serve the acquisition goal. The central structure of acquisition however is the intestine[8]. The amoebae flow around their prey and take it up in their protoplasm whereas the multicellular organisms have specific functional units which are specialised in the process of "digestion". Whereas we consider that the stomach and intestines are secondary organs we see the centre of our inner self as our "ego", which is a function of our brain. The primacy of this "ego" has hardly ever been questioned, even the thought of doing so seems absurd. Only in joke books can we see depictions of gourmands whose main function has become gluttony. In the face of such pictures and evaluations it is not easy to hold the view represented by the energon theory. But if we follow the course of evolution rationally, we will discover that the central nervous system is by no means a natural and central phenomenon. It is a special adaptation to the animals, an effective unit which inevitably gained control over the body. In the case of human beings our "ego" gained so much power that – in the case of a suicide for example – it does not destroy only itself but all other functional units. Seen in terms of evolution this implies an astonishing take-over of an actually secondary auxiliary unit.

The digestive tract is a good example for the far-reaching division of labour and specialisation. Starting with the teeth, the acquired food is broken down, decomposed bit by bit. It is transported like on a conveyor-belt. Glandular secretions decompose the cell walls, acids attack the food in the stomach and finally it is absorbed in the small intestine. In the biological sense – especially in terms of the energon theory – each animal organism is *a moving intestine*. Sense organs control the organism; legs, fins, flukes and wings enable the organism to come close to the prey and an appropriately shaped front opening, the mouth, has to grab and devour the prey (Figure 8).

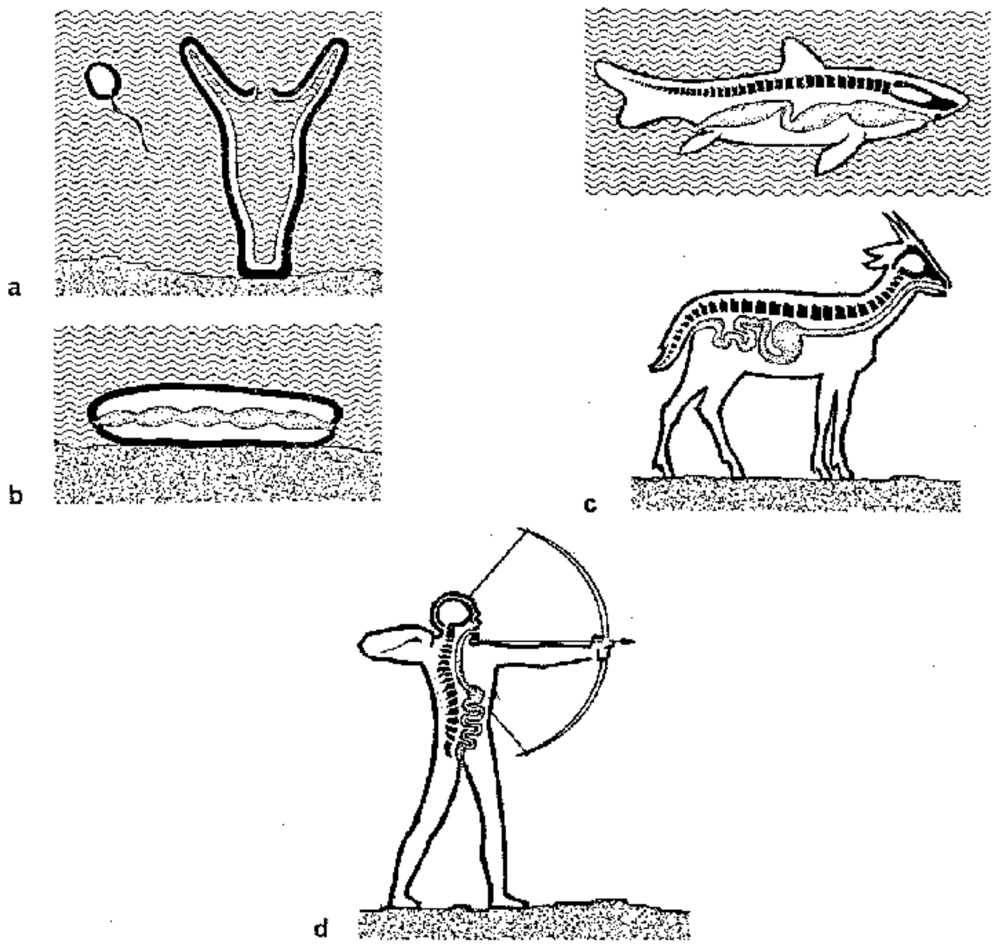

Figure 8: Main stages in animal evolution

Those units capable of acquiring foreign organisms or parts of organisms (energons) float in the water (example: protozoa) or form acquisition structures which are rooted to the ground (example: multicellular polyps). The prey is either directly taken up into the cell body (protozoa) or "digested" by specialised cells in a cavity.

A continuing "intestine" developed in which the acquired molecules are gradually decomposed. Primitive sense and locomotor organs enable the intestine to move and search for prey.

The ability to move is increased by additional functional units (fins, flukes, legs, wings), the sense organs function more properly. The front opening of the intestinal tract (mouth, teeth) specialises in tearing of parts of the prey.

The power and scope of the functional units of the body are increased by additional, artificial organs which are made of parts of the environment (e.g. bow and arrow). Even the "digestion" of acquired "food" is improved by external units (stove, fire, pot).

There is a striking difference between plants and animals. In order to absorb sunbeams, surfaces as large as possible are necessary – *external surfaces*. The "leaves" became the actual organs of acquisition; they contain the plastids. In the case of terrestrial plants these functional units – competing to gain light – are lifted up by special stalks and trunks (Figure 7). The animals however need large *internal surfaces* for decomposing, "digesting", the stolen food. It is the protuberances and folds in the stomach and intestine – and furthermore the length of the intestine – which enlarge the internal surface.

For the absorption of gas large surfaces are required, too. In the case of plants the surface of the leaves is used and enlarged by a sprawling intercellular system ending in "stomata" on the superior leaf surface. On these surfaces evaporation takes place, sucking the sap out of the roots. For animals, however – especially for the larger multicellular organisms – the surface of their body is only in a few cases large enough to absorb gas. In the case of millipedes and insects a network of tubes, the "tracheae", developed which in small branches stretches across the entire body and even penetrates individual organs. Fish and terrestrial vertebrates absorb gas with their gills or lungs and their blood transports it to the individual points where it is needed.

7

When the plant and animal energons left the oceans and inhabited the arid land – the plants first, the animals following their prey –, they had to cope with many new difficulties. They had to "adapt" themselves correspondingly to the new conditions.

In this process the actual key – lock concept was hardly affected by the transition. The respective key bit – the plastids of the plants, the intestinal tube of the animals which is controlled by sense organs and capable of moving – did not need to change. They differed however fundamentally in how they processed material and how they provided the inner support of the body.

On land it became more difficult to obtain water, whereas it was much easier to obtain gaseous substances. The sea and freshwater lakes contain only a relatively small amount of dissolved oxygen . In order to obtain the necessary amount, much vaster surfaces are required in water. In order to demonstrate this we only need compare ourselves with the much smaller cuttlefish. The gills have an area of 1,700 to 1,800 square metres whereas our lungs are only 90 to 100 square metres in area. Thus on land there was the possibility of achieving major savings.

The lack of water on the other hand became a crucial factor. In the vast deserts sunbeams and carbon dioxide abound but without water the plant energons are not able to assimilate them. No wonder that some botanists regard the acquisition and not the absorption of energy as being of major importance. Even on the most favourable ground, plants make use of only 1% of the solar energy available. Plant energons swim in energy, so to speak. The only limits to their ability to make use of energy are in general the acquisition of material, their own capability of conversion as well as the competition from other plants.

Because of their mobility it is a bit easier for animals. They do not necessarily need to find water at a certain point. It is enough for them if a suitable source of water can be found somewhere in their radius of action.

On the other hand, animals and plants are equally exposed to the threat of drying out. Thus in hot, arid regions only those energons are able to survive whose outer skin prevents evaporation as much as possible, for example lizards and cacti.

Since air is 775 times lighter than water and offers accordingly less resistance, locomotion became easier on land. On the other hand the driving force of buoyancy , which is active in water, does not exist – which in part made up for the advantage gained on land. Serpentine motions and moving fins or flukes were simply inadequate in this case[9]. The body of animals needs to be raised from the ground by special functional units. As a counteraction to gravity furthermore stronger skeletons were required. While in the water the bowhead weighing more than 100 tons has no difficulty in moving, on land the elephant is the heaviest animal with its weight of 6 tons at best. Since the weight of a body increases with the cube of its extension but the load – bearing capacity of a support only with its cross section, that is square, there are final limits to growth, due to gravity. This is the reason why the elephant does not manage with legs as thin as that of the daddy – long – legs and why a young oak does not need a trunk as thick as that of an old oak.

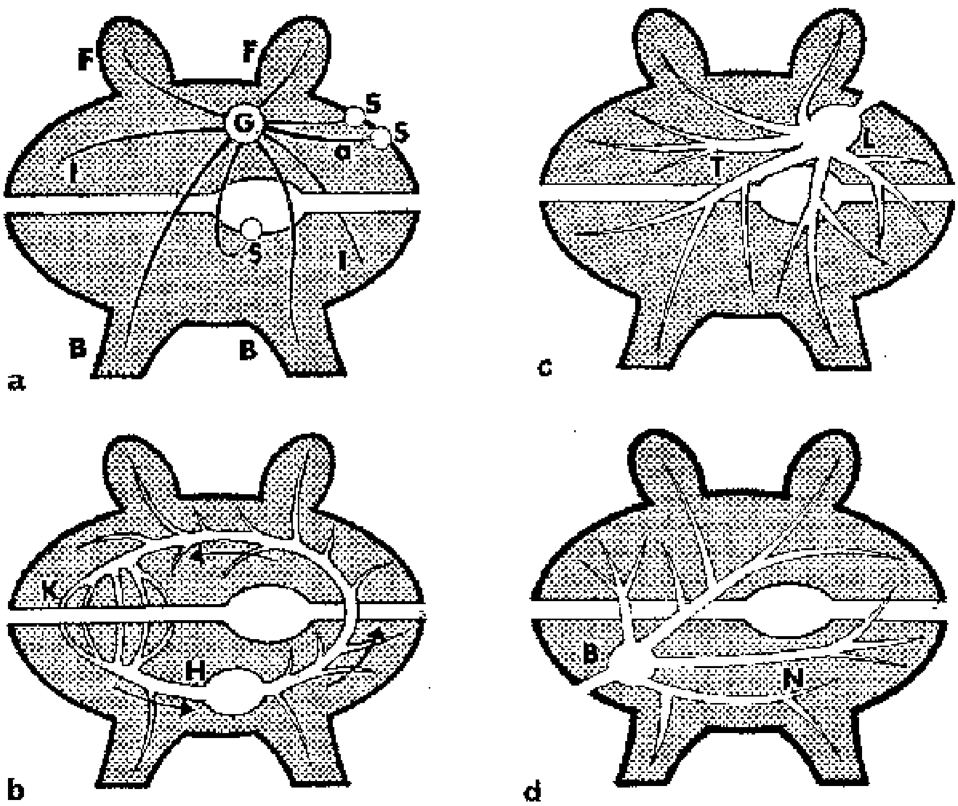

Figure 9: Necessary auxiliary aids for animals

a) A functional unit for co-ordinating the sense and locomotor organs becomes necessary: for example a nervous system with brain (B). Sensory (afferent) conductors transmit the information from the external and internal sense organs (S) to the brain; motor (efferent) conductors transmit commands given by the brain to the locomotor organs (C, L) and internal organs (I).

b) Larger animal energons need an effective unit for distributing the acquired amounts of energy and material to the individual parts of the body. A circulation system with a pump (H) is best. At the rear end of the gut the acquired product (K) is taken up and distributed through the entire body.

c) Oxygen is necessary for breaking down the "food" which is transported to the individual parts of the body; Since the intestine cannot absorb a sufficient amount of oxygen, a separate functional unit for absorbing and distributing gas is required: for example tracheae (T). This tube system can draw off the exhaled gases (CO_2). Its effectiveness can be increased by a pair of bellows – like the lungs (L).

d) Other waste products of metabolism apart from gaseous ones cannot be discharged either by the tube system of the tracheae or by the circulatory system. An additional functional unit is necessary for this function – for example nephridia (N). The waste products can be collected in a bladder (B).

Due to extension or sharing of functions (see Figure 20a) these functional units may in some cases blend and make work easier for each other. In the case of mammals, for example, blood circulation may also fulfil the task of distributing the absorbed gases and transporting the waste products of metabolism to those functional units responsible for discharging them (tracheae, nephridia). 56

On land, furthermore, weather conditions were more extreme: snow, ice, storm, rain and many other forms. The leaves of the plant and the moving intestine known as "animal" (both absorbing energy) were in many regions only able to settle down if they additionally developed certain additional functional units . Without them the energy balance of the plants or animals inevitably became negative

The forms of animals and plants thus are *not* explained by the way they were produced or the way they developed. They were to a great extent dictated by the nature of the energy and material sources. These have nothing to do with the production process but are nevertheless responsible for major structural elements. We will discuss this strange connection between cause and effect in detail in chapter VII.

8

Even the phenomenon of the key which fits a lock for which it was not developed can be found among the energons.

A good example demonstrating this is the Colorado beetle, which up to 1850 was simply known as a parasite on wild – growing solani on the North American plateaus. Then the beetle came into contact with the leaves of potatoes which had been planted there – since then it has been known as a dreaded pest. In this case the energon found a different, much richer energy source; the key unexpectedly found a lock which it opened perfectly well. Similar events seem to have taken place quite often in the course of evolution[10].

Each new animal or plant species is like a key in search of a lock. If changes of the genetic pattern result in the development of new species, these species enter into competition with all energons that are directed towards the same energy source. Then it may happen that the new species are able to adapt themselves better to the energy source – or to tap energy sources which so far have not been exploited. In the first case they put their competitors out of action, in the second case they profit from their monopoly position. The new species spreads and multiplies.

If the energy source is constant, the more adaptable types – within the new species – gain a lead over the others. In the course of numerous generations – due to "natural selection" – a key is developed which is better adapted to and increasingly specialised in tapping the source. If the source is not constant, those types have the advantage which are not highly specialised. The degree of effectiveness of their activity may be lower but they are versatile enough to tap a new energy source when the old one runs dry.

Since all higher plants compete for the same sunlight, they do not differ that much in structure. For animals, though, each new animal or plant species is a completely new energy source. Accordingly their key – lock relations are extraordinarily tightly meshed.

Single-celled frustula algae are eaten by small crabs. The small crabs are hunted by freshwater smelts which in turn are hunted by pikes which themselves are hunted by white-tailed eagles on the body of which parasites live. Each of these animals is a key which opens a lock – and at the same time a lock for other keys. The parasites are also hunted. Each dead organism is attacked by putrefactive bacteria – which themselves are an energy source for other energons and so on....

Especially the example of the parasites demonstrates how far such specialisation may reach. The isopod *Ergyne Rissoi* is a parasite on the decapod crabs, rhizocephalans is a parasite on the isopods and on these the isopod *Danalia* is parasitic. In this case each special key at the three different levels of size became an energy source for a smaller one.

Reproduction is the main problem for all parasitic energons. The energy sources they exploit are usually highly profitable. Those parasites in particular which live in the intestine of other animals are exclusively surrounded by digested food which they only need to take up. A separate mouth or intestine is no longer necessary; food can directly be absorbed through the outer skin. But how can the energon reproduce itself? If it produces the offspring in the body of its "host", the young will inevitably die together with the host. Only if these keys possess behavioural patterns which provide them with other options will they be able to survive as species.

It happened that some parasites developed in very complicated ways. There are parasites which repeatedly change not only their behaviour but also their appearance in the course of their life.

In the case of the worm *Acanthocephalus anguillae* which is parasitic on the intestine of the whitefish the procedure is relatively simple. The eggs are discharged with the excrement, sink to the ground and only have to wait for a certain water flea – *Gammarus pulex* – to eat them. Thus the first difficulty is overcome. The eggs hatch in the stomach of the crab and larvae emerge which bore through the intestinal wall and then become parasites in the body cavity of the crab. This is, so to speak, only a minor contribution. The larvae immediately encapsulate – for the second time now they need luck. The water flea serves as food for the whitefish and must now be eaten by the fish. If this happens, the crab is digested in the stomach of the whitefish – and the capsule remains. Now the parasite uses hooks in order to cling to the intestinal wall – and thus the key finally finds the lock. The worm grows ...and produces eggs.

In this case the parasite only once changed its form but there are parasites which change their appearance as often as three times or more. Each of these forms can be seen as special adaptation to an intermediate stage in the complex course of evolution. The offspring of the fluke *Baccinger baccinger* reach the intestine of fish which is their actual energy source only via mussel and crab. In some cases parasites wander through the entire body of their host. In the case of the cat for example, the larvae of the liver-fluke migrate from the intestine to the liver through the gall duct. In the case of the cow, however, the larvae bore through the intestinal wall, wander through the body cavity and in so doing reach their destination. There may be different "methods" to reach the goal but what matters is the end result.

If the parasite succeeds in its long and awkward wandering to the key that is to be opened, its net profit will be enormous – then it can produce a large number of offspring[11]. This profit in turn makes up for the high loss rate. Thus these energon types were able to survive and develop further.

In the case of non- specialists the complex and tight key – lock relations are much more difficult to analyse. The herring feeds on some dozens of different animal species and is itself hunted by a dozen animals. Thus this energon is a kind of point of intersection for different "food chains" which either end up in it or lead in different "directions".

9

Though animals and plants differ widely in their forms of acquisition it is nevertheless hard to distinguish between these them since all sorts of transitional forms exist.

Among the protozoa there are a number of species which have plastids but at the same time may act as predators. In these intermediate forms we can even today see the common origin of "plants" and "animals". In protozoa a clear distinction between plants and animals cannot be applied, from this stage on the organisms developed in two main directions.

Among the multicellular animals no species exists which developed plastids. The predators among the energons defended their professional honour, so to speak, and continued their predatory activity. Multicellular plants however developed differently.

There are numerous species among them which became semi- or holoparasites – that is they use other organisms as an energy source. The mistletoe ,for example, is a "semi-parasite". It settles on the branches of trees and steals only water and nutritive salts, that is, it no longer needs to extract water from the ground. Hellweed (*Cuscuta)* however is a "holoparasite". With its tentacle-like functional units it twines around hop vine and hemp, attacks the tissue and taps the sieve tubes of the plants. It does not rob the host only of water and nutritive salts but also of the assimilates – that is, "energy cages". The leaves are completely degenerate and without any function. As far as its origin is concerned *Cuscuta* is undoubtedly a plant whereas it is an animal as far as its form of acquisition is concerned.

It is quite similar with fungi. They are specialised in decomposing the remains of dead organisms (mould). Judging by their origin they are plants, by their form of acquisition, however, they are animals.

Despite all these interconnections in nature the development up to humans was highly uniform. Two methods were used to absorb energy, each of them involving the formation of a variety of different forms of acquisition which led the development of life in new fields[12]. It is remarkable that animal and plant forms of acquisition presuppose each other. Without plants animals would not have developed and vice versa. The reason for this is simple: plants need the carbon dioxide exhaled by the animals; animals, for their part, need the oxygen exhaled by plants. The almost constant content of carbon dioxide and oxygen of the earth's atmosphere is one of the most astonishing and least appreciated phenomena. All in all, the gas production of plants and that of animals balance each other. If plant activity were stronger, the oxygen content would increase; if animal activity were stronger, the air and the sea would accumulate more and more carbon dioxide. Nothing of the kind happens. Even the emergence of humankind has so far not changed this – except in large urban areas.

In this extremely tightly knit and interlinked community of animal and plant energons finally humans appeared. For almost two million years we had been nothing more than a very intelligent animal but gradually major changes took place. Just as the energon cell led to the development of much more complex and powerful acquisition structures, a similar but more impressive process of development set in – at the dizzy height of which we are standing now.

Let us take a closer look at this development in the next chapter.

Comments:

[1] In 1968 the team of the Nobel prize winner A. Kornberg succeeded in producing autoreproductive ribonucleic acid, which has the same structure and effect as the genetic blueprint of a virus.
[2] Ostwald wrote that one has to distinguish between the „stationary part which never will be able to

start to move again, c.q. to transform itself“ and the mobile part „which all by itself evokes events in this world“. („Die energetischen Grundlagen der Kulturwissenschaft“, Leipzig 1909, p. 31)
[3] The statement made by W.Troll (”Allgemeine Botanik”, Stuttgart 1948, S.350) refers to this connection.
[4] The smallest autoreproductive unit of life is according to M. Staudinger the bacterial spore. It consists, according to his calculations, of about 15 molecules of 106 atoms, 150 molecules of 105 atoms, 500 molecules of 104 atoms; the remaining 30% consist of about 550,000 molecules of 101 to 103 atoms. (W.Wieser, ”Gewebe des Lebens”, Bremen 1959, S.234)
[5] When in the following I talk about ”plants” as such, I am referring to those which are capable of ”photosynthesis”, that is, transforming solar energy. The above mentioned types of bacteria are usually also considered as ”plants” but to keep matters simple – as in common parlance – I will disregard them in the following.
[6] The complete name of this chemical compound is nicotinamide adenine dinucleotide phosphate.
[7] Some of the more primitie seaweed (in particular monocellular ones) have flagella and are able to move to places which provide them with better light conditions.
[8] Cuvier already called the intestine the main characteristic of animals (”premier charactère des animaux”). (”Le Régne Animal”, Brussels 1836, page 11)
[9] Even snakes do not simply wind but propel themselves over the ground with the help of scales directed to the rear and especially by their belly muscles.
[10] The contrary – that is when a ”superb” key meets the wrong lock – is almost more important for assessing organisms. The cat is a tremendously competitive and highly complex structure: if we throw it into the sea, it will be helpless and drown. There is no absolutely ”better” or ”worse” as regards the keys we call "organisms". Such an assessment holds only for a specific energy source and environment.
[11] The number of eggs of the tape worm Tacnia solium was calculated to be 42 millions per year, that of the round worm Ascaris lumbricoides 64millions. In the case of the threadworm Sphaerularia bombi which is a parasite in the body cavity of bumblebees there is no more room for the ovariole and the uterus. These organs grow out of the body so that the worm in the end looks like a tiny appendage to the uterus. This example – that an organ is 100 times larger than the its organism – is rare in the animal kingdom.
[12] This is why I keep the common division into plants and animals as far as the energon theory is concerned. Animals and plants are two big and distinct groups – just like the professional entities and business organisations in the second stage of evolution. Thus the division is carried out according to different criteria: first according to the method of energy absorption, second according to the stage of integration. Formally correct would be the following division: protozoa, metazoa, the professional entities and business organisations. Since each system of division is artificial and does not exist in nat

V

REQUIREMENT AS ENERGY SOURCE

A mixture of clichés and obsolete ideologies covers reality like a mist.
W. Eucken (1952)

However, for a car dealer or a building firm in a small town who try to obtain customers or a big deal, it is a matter of life and death. (Typically the ones involved themselves call it a cutthroat practive.
John K. Galbraith (1966)

1

Oskar Hertwig called human beings the "most difficult subjects for observation". I think that we have hardly begun to observe humans scientifically. Let us assume we could inject into an animal or a plant the intelligence necessary to look at the development of humans critically. Those creatures would then find themselves in a similar situation to what ours would be if we made contact with even further developed energons on another planet. Plants and animals would certainly follow the human workings with the greatest interest. The human being, the creature who has come from their midst... behold its many achievements!

Our acquisition forms would certainly be of particular interest to them. In that respect they would not find their way around the human gear easily. At least there would be clues for them in order to relate their own experiences ...

Let us assume the two of them observed a farmer: he carries off plants – that is nothing new. Yet, the way he acts is unusual. Instead of looking for edible ones, he pulls out inedible ones. Instead of eating seeds, he sticks them into the ground. Thus the fantasy creature human being would reveal himself to the two observers. Inside his brain he connects present actions to the effects that will only become apparent a few months later.

The animal observer would thereby be made aware of the primitiveness of its own way of acquisition. The knowledge of what its prey should look like is wholly or to a large degree inherent in all animal energons. Certain sensory impressions trigger off the appropriate actions of attack. If the animal is a herbivore it moves towards the prey and starts to nibble at it. If it is an animal of prey, it pursues the prey and tears off pieces from it, attempts to overcome it. If an animal is satiated, its "voracious mood" abates. The sight of the prey does not then trigger off food-seeking behaviour. If the animal gets hungry again later, the reaction begins anew.

Thus, animals have certain ideas in their "fantasy" too. They are innate though. What is more, the sensory impression which an animal seeks and the reaction to it – provided that it is in a voracious mood – are connected directly. The fact that on the other hand the profit can be further increased through activities that are counter to the feeding process – like the various activities of a farmer – is decidedly new!

Nevertheless, in some ant colonies mushroom patches are laid out which are properly tended and fertilised. That, however, is inherent behaviour. Individually no animal can develop such a pattern of behaviour.

All animals and plants are, as it were, nestling in the natural equilibrium of thousands of interconnections. Humans, however, change that equilibrium deliberately. What harms them, they smooth away. What is useful to them, they foster. Also by *not* eating animals but tending them they obtain more and easier accessible food.

At the same time humans – again in their fantasy –develop the notion that all other creatures exist mainly for their benefit. They like the idea that animals are provided by a higher authority in order to provide what humans need. Towards domesticated animals humans develop a patriarchal affection – and consume them.

2

62

The actual and typical form of acquisition for humans is a different one, though. It would give the two observers a headache that is even worse.

For instance, there is a shoemaker who willingly explains his actions. By cutting leather into pieces, sewing it together with needle and thread and gluing it, among other processes, an artificial organ, a shoe, is produced. It can be worn as a protection for the feet. Later the observers watch the shoemaker having a meal. How did he get to that food – to those organic molecules? The shoemaker points to the shoes. By the cutting of leather and the appropriate joining together he achieves an organic substance. – That must be incomprehensible for them.

Here the achievement of the human fantasy even goes a step further. Here an energon foresees what an activity leads to within a complicated causal chain. Between cause and effect in this case there lies not only a long interval – as with agriculture and cattle breeding. Instead, there is a further confusing connection inserted between cause and effect.

The biologists Wolfe and Cowles discovered that chimpanzees cam be led to understand similar interrelations[1]. By pulling on a handle the apes were able to acquire coins and with them obtained delicacies from a vending machine. They learned to understand the values of different coins. With one kind they could acquire food, with a second kind they could open the door of the cage, the third one got the guardian to play with them. Here, too, there was a tricky connection between the causal relations – although the elements to combine lay close together spatially and temporally.

Nevertheless, the brain of an ape is already able to achieve such results – provided that the animal is instructed appropriately. The necessary recipe of behaviour thus has to be contributed from somewhere else. Apes cannot construct them themselves.

3

What then is the lock that has to be opened to understand the human form of acquisition by *exchange*? Furthermore, what does the key bit look like by which one can unlock the respective source of energy?

As for plants, the rays of the sun are the lock and the plastids the key bit. With animals the lock consists of plants or other animals and the movable intestine that is guided by sense organs is the key bit. For plants the equipment assisting acquisition is comprised of their roots, their sap channels and their fissures. As far as animals are concerned, the equipment assisting acquisition is comprised of their organs of locomotion, the specially designed front end of the intestine, the digestive glands, appropriate patterns of behaviour and a lot more.

With human exchange the respective lock to be opened is a highly invisible and obscure affair within the central nervous system of other people. The one who acquires something cannot directly see the source of acquisition, or smell it, or make it out by touching. We call it "human needs": they are hidden impulses which produce a "readiness for demand". If they are joined by available surpluses, they will constitute a source of acquisition: the "requirement"[2].

The feeling of "being hungry" is produced by an instinctive mechanism – it creates a requirement. The anxiety drive is also an inherent mechanism – it creates a need for security and protection, for instance for shelter. The effects of coldness lead to a need for clothes. The human sexual drive is especially strong – it results in the need for a sexual partner. As the acquisition of one usually occurs indirectly, that drive also creates additional secondary needs – for instance, for pleasing clothes, a car, jewellery, cosmetics and similar things.

With humans those basic needs were expanded by others. On the one hand this is caused by human success and the surpluses connected with it, on the other hand it relies on the fact that humans are not forced anymore to spend those surpluses in the propagation of their own species.

Animals, too, "enjoy" their lives, roll around on the floor out of pure joy. However, they cannot afford a lot more "luxury" with their surpluses. If animal is happy – it will reproduce itself.

It is still the same with humans also – but over and above that they became specialists in the creation of "conveniences". Comfort, especially, for many people became the goal and the centre of their lives. Every physical, mental and other stirring which triggered off feelings in the faintest sense was investigated with insistence. For the fulfilment of all those additional needs, however, appropriate surpluses are often the precondition. Thus, the striving for comfort, happiness and pleasure became a particularly strong impulse for the striving for acquisition.

Food, clothes, housing, marriage create a rather fixed, rather clearly mapped out requirement. Everything that goes beyond that, all requirements of "culture" or "luxury", however, are labile and easy to influence. Upbringing, moulding and fashion play a crucial part. Once the basic needs are satisfied, a variety of possibilities is opened up for using gained surpluses.

That is the highly vague requirement which is determines the alignment of half of the acquisitional structures created by humans – a great many locks which can be unlocked by way of exchange. Humans have specialised in that exploitation in particular. If only basic needs existed, only farmers, butchers, greengrocers, bakers, dairies and furthermore tailors, shoemakers, master-builders and similar trades would have a basis for acquisition. On the contrary, what distinguishes human development in particular are numerous other needs that actually only came into existence on the basis of our intelligence and fantasy.

The plant and animal observer would probably not even be very surprised by the human increase of power – but more by its use. Not actually the acquisition impulse but the use of the "profit" is what makes humans differ from everything that came into existence in the course of evolution before them. Humans have turned the tables. What is a necessary impulse for animals and by which they are directed, we have made a subject of intense research and exploitation.

More than half of the human acquisitional structures are aligned with the mastering of these additional requirements. These are the locks that they endeavour to unlock. This "prey" is not less varied in shape and form than the prey that animal energons hunt.

4

Now, what must the key bit be like in order to unlock that multitude of energy sources?

For shoemakers, the key bit is the shoe he has produced. The lock to be unlocked – the source of energy – is the need for that object. The latter he fulfils by producing the object, and the exchange partner is willing to give over part of his or her energy potential to acquire the object. Concretely: the purchaser spends money, a common currency for any human achievement.

With all other products for sale it is the same: they are the actual organs of acquisition for that form of acquisition developed by humans. The source of acquisition we generally call "market"[3]. What the plastids are for plants, the intestines for animals, for humans are the sale objects which they either produce themselves, obtain by way of exchange or acquire otherwise.

Here the animal observer could spot a parallel. Many insect larvae enjoy quite light-hearted lives inside the buildings of ants. They are tended, fed and carried around by the ants – because they excrete a palatable fluid from their glands. The ants hurry to them like somebody who is fond of drinking in a pub. That interrelation developed on the basis of instinctive patterns – functionally it really approximates the human exchange. Those guests of the ants produce something that is required by other energons and they get appropriate compensation for that: nourishment and protection. With regard to the energy balance this completely corresponds to the human process of exchange.

With the example of the coral-polyp the animal observer could even better "indirectly" understand the form of acquisition. Inside the skin of the tentacles of those animals there are special units of cells which are not less complicated and effective than the plastids of plants. They are spherical constructions with pins (Fig. 10). If the latter are touched – for instance by a small living thing, then a mechanism is set into motion. An arrow shoots out, tears a wound, expands it, a hose forces its way into the wound and a paralysing fluid pours forth into the stricken organism. The latter is thus made defenceless and can be consumed.

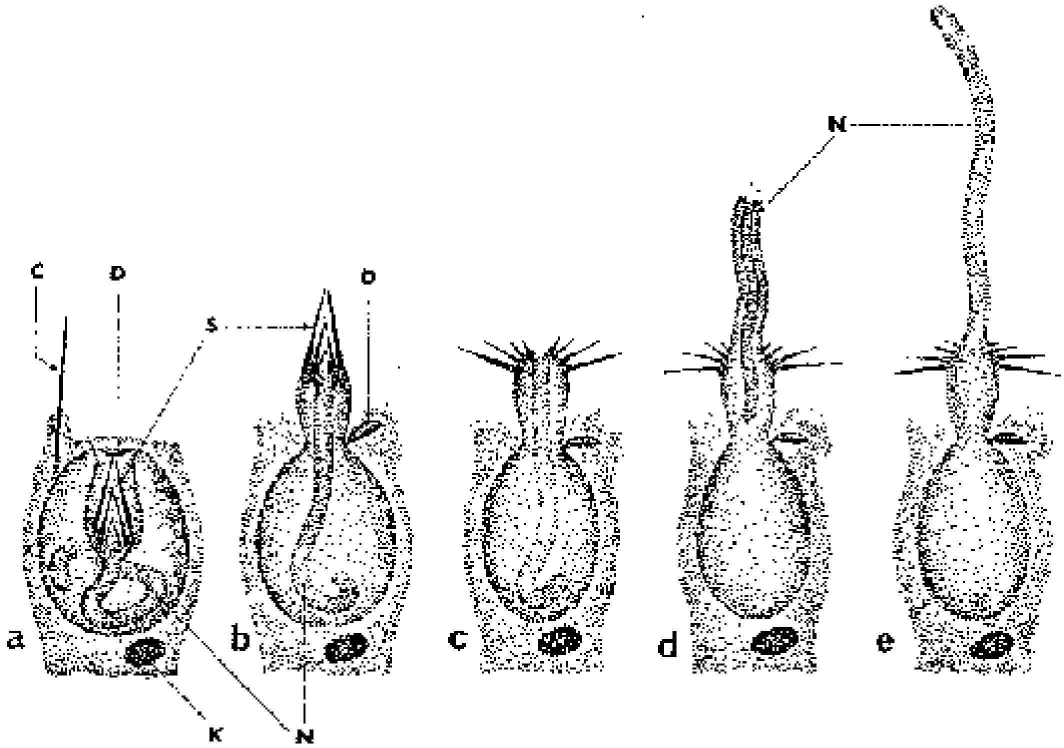

Figure 10: Example for a highly specified functional unit among lower animals.

Nematocyte (a) with the included nematocyste from the ectoderm of the tentacle of a coral-polyp. K = nucleus, C = cnidocil, D = lid, S = stiletto, N = tubule. When touching the cnidocil the capsule unloads: the stilettos pull forth (b) and drill through the skin of small prey. When the stilettos fold apart (c) the wound is expanded. The tubule is turned outside (d, e) and the paralysing fluid gets into the body of the prey. If a rapacious organism gets too close to a coral-polyp and thereby touches the cnidocil, the unloading also takes place. Thus, the nematocyte is a vehicle of effect of both the capturing of the prey and of defence against enemies – a double function. However, it can only perform its service once.

That seems to have little to do with the acts of exchange of humans – rather with the acquisitional forms of bandits – but has something in common with them, though. Every single capsule – they are called "nematocysts" – can shoot *only once*. After that it is used up. Other cells of the outer skin produce further capsules that are ready to shoot.

What is common here is that in the course of the activity of acquisition that unit gets lost. Consequently, the whole potential is correspondingly diminished. It is exactly the same with the exchange products of humans though. In the process of acquisition we lose them. We produce or obtain them by the expenditure of our own energy – and by giving them away we gain possession of more energy than our provision of them has cost us. No matter whether collar studs, machines or Christmas tree candles are concerned – it is the same with everything. A special something is produced or obtained – and then *gets lost* in the course of the acquisition process.

According to the theory of the energon, robbery and exchange are not essentially different. It is true that the one who is robbed cries for help and attempts to defend himself with all his or her strength while with the process of exchange both parties have friendly smiles on their faces and everyone is content with the process. This, however, does not show up at all in the balance of the one who acquires (Fig. 11). In both cases a drop of the potential or free energy occurs – through the search and the pursuit of the prey or through the construction of the acquisition organ. Subsequently, more energy is taken in than has been spent.

In both cases the energon manages to take away parts of the energy potential of someone else. In both cases this takes an effort. Whether that is used in order to overcome the vehicle of energy or in order to produce something that makes the vehicle abandon part of its potential *voluntarily* is secondary. It does not show in the balance.

5

There are acts of exchange where the one who acquires does not offer a product made by himself but where he performs work. Here, too, the animal observer will find parallels.

In tropical oceans there are wormlike fish which specialise in cleaning parasites from their bigger colleagues . They are called "cleaner-fish" – they are not totally dissimilar to a human delousing institution or a professional hairdresser. If a big fish wants to be cleaned, it swims to a coral cluster where such cleaner-fish live, places itself above it and spreads its gills. That instinctive movement is a signal. Thereupon the cleaner-fish leave their hiding places – which is also instinctive behaviour – swim over to the fish and start to clean it. They do a service and in a way receive a payment for it. They eat the parasites and therefore do not need to pursue such food for long. With this exchange it is delivered directly to them at home.

The delouser delouses, the hairdresser does one's hair, the cleaner-fish cleans. The human following of a profession is based on patterns of behaviour which are founded on intellectual achievements. With the cleaner-fish they are innate. As regards the balance, however, that difference is minor and is not expressed.

More precisely, the acquisition of services can be depicted as follows: if not a product but an activity is offered, then the supplier becomes the vehicle of effect for the client. He produces a required effect for the latter. By that he becomes a *rented artificial organ* for the client.

This is not really surprising, only it has not been previously so defined. If we rent the services of a hairdresser, of a doctor or of an insurance company, then those professional entities become parts of our own vehicle of effect (professional entity or luxury item) for the rental period.

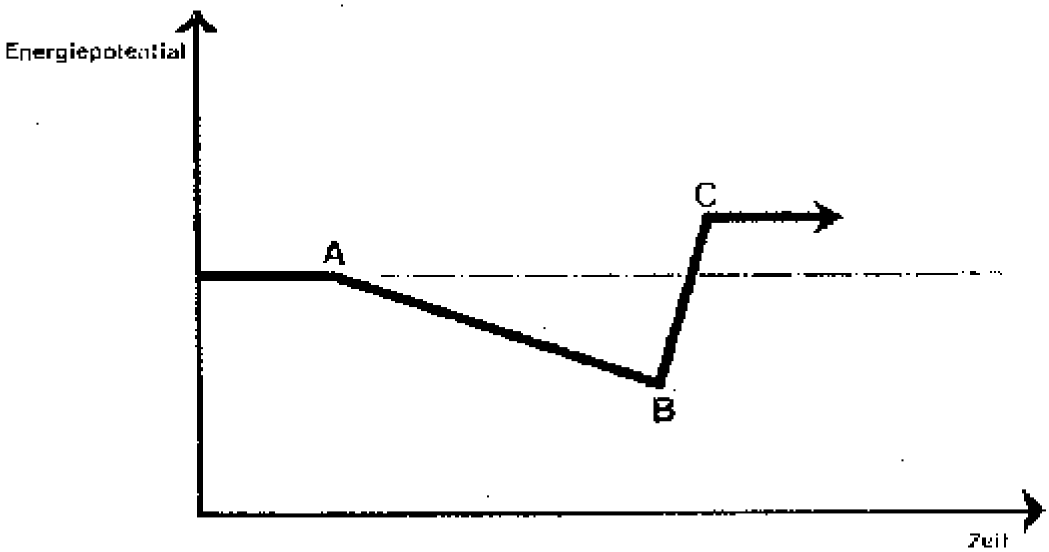

Figure 11: Course of the balance for robbery and exchange

Through the acquisitional effort beginning at A (searching, pursuing and overcoming of the prey or producing an exchange object and searching for an interested party) the energy potential of the energon drops. At point B the acquisition aim is achieved: the robbery or the exchange is secured. The result of the acquisition now flows into the energon. It has to (on average) lead to an energy potential that is higher than the initial value A. Only then can the individual energon survive and carry on the energon development (life development).

6

The form of acquisition by exchange had a number of consequences: first of all, the development of money. Only with that functional unit was it possible to exchange any service or product for *any* other. Most importantly, however, the proceeds also became divisible.

For instance, how should a smith producing swords obtain a chicken? His sword was of a higher value – the invested energy expenditure was much bigger than the energy the farmer needs to rear a chicken. Above all, maybe the farmer does not even want a sword. The universal mediator money solved all those problems. A third person needs a sword. He pays with money. This then can be divided into small units – and with some of them the sword-smith acquires the chicken.

More auxilliary equipment followed – necessarily. The supplier and the demander have to meet each other: How should they find each other? The "markets" were the necessary institutions for that. As another consequence, a special professional type developed: the mediator. We talk about "traders", "representatives", "commissioners", "brokers", "agents". With such processes of acquisition both products and services can be negotiated. The lock to be opened here is, as it were, a double one. On the one hand an offer, on the other hand a demand has to be found – the two of them have to be made to coincide. If the trader definitely buys the producer's product from him, then the former could be seen as a supplier who just does not produce the things offered himself. If he takes the product into commission, the activity of a mediator is perfect. Even for that there are already preliminary stages in the animal kingdom.

In Africa a number of different kinds of birds – the honey-guides – work as mediators. They find out the locations of bee-hives, then search for a honey-badger and fly up and down in front of him conspicuously. That is instinctive behaviour – also the honey-badger's ability to understand its meaning. He follows the bird and is guided to the bee-hive by the latter. The bee-hive is then cleared out by him. The bird in that "mediator business" receives its commission in the form of natural produce. The honey-badger is interested in honey, the wax of the honeycombs he leaves untouched. That the bird is able to unlock. Without the badger he would not be able to get at that food. Here the badger lays it bare for him, though.

For the human form of acquisition called "exchange" the formation of communities and appropriate protection were important prerequisites. What is listed in the following became supporting ancillary equipment: means of transport, telephone, telegraph, payment transactions, securing of the cash value. These institutions could only be financed and secured as common organs also.

7

Both observers, animal and plant, would probably be interested in how much can be earned in that way. Again they would discover parallels to their own forms of acquisition.

What for the robber in the animal kingdom is abundant prey, for somebody who is acquiring through exchange is strong demand. If an area is teeming with prey, it is not difficult for someone specialised in their pursuit to acquire them. They do not have to search for long. The same income is then achieved at a relatively small expense. Similarly, the supplier does not have to go hawking in cases of strong demand. What he has to offer is seized from his hands. Thus, also his energy-expense is lower. With the same income he achieves a better balance.

One possibility to improve the balance regarding human exchange is to influence the needs that build the basis for the requirement. It is true that there are narrow limits set for the basic requirement as it is quite stable ("inelastic"). For luxury requirements, however, an ample field of possibilities is opened up. Here humans are not nearly as sure about which of the many conveniences offered they should choose. This is the domain of influence of advertising.

What is it that is influenced? In any case, it is the vehicle of surpluses: the arrangement of needs, the "structure of demand". Thus in the end it is that invisible something that operates somewhere in the central nervous system. This is – as everybody knows – where clever devices have been developed in order to influence others so that they consider as desirable what is offered.

Even concerning that process the animal observer could realise that it is not completely new. Also with certain rapacious activities of acquisition the hidden patterns of behaviour of other energons are influenced and activated. Angler fish are an example. They lie hidden in the mud and at the end of a greatly lengthened fin they have another skin formation which they move up and down in front of their mouths. Small fish regard it as prey, dash towards it – and end up in the stomach of the angler. So the act of acquisition is made easier for the latter in that the behaviour of their prey is manipulated. Instead of them having to follow the prey, it comes to their mouths of its own accord. In advertising, the producer does not have to run after the purchaser but motivates the latter to pursue the product. In functional terms there is no essential difference between the two processes.

There are even further resemblances: the motives have to be disguised. Only if the prey really "believes" in its advantage can the angler be successful. The same applies to someone who is taken in by a sales trick.

8

The plant observer would probably be particularly interested in larger businesses. Finally, he would have discovered something that reminds him of his own type of acquisition. Those bodies of acquisition, too, are not rushing about hurriedly like their animal colleagues but are situated squarely and leisurely in one place. There is one major difference, though: some of their functional units make their way independently. Today directors, salespersons and market researchers undertake journeys around the whole world. Here the plant might express admiration. How utterly limited a scope of action its roots do have! Furthermore, what effort it takes to spread its semen and its sexual products! Such movable units as mentioned above would suit them well.

Here humans have built acquisition structures that, as it were, combine features of animals and plants. The major part of the load is sitting in one place immovably: that is an immense advantage. That load does not have to follow the prey in question. Only single organs – especially the organs of acquisition: the products for sale – follow it. By means of organisations of transport and trade they eventually circulate around the whole world. Only the key bit is moving in this case in that it searches for locks. With further organisational institutions – money, payment transactions – the proceeds flow back the same way ... into the firmly sitting body of the enterprise.

Another parallel to the situation with animals and plants: also with professional bodies and businesses there are both specialists and universalists and the advantages and disadvantages are the same here and there. The specialist can work better and more profitably, he beats the less specialised competitors at that. Beware, though, what happens if his source of acquisition – his "market" – is not stable. Then he will be worse off. Then the universalist who works less profitably but can adjust himself more easily has the advantage. While the specialist perishes the universalist shifts over to another form of acquisition. Those chainlike connections that are so typical for the kingdom of organisms also exist within the human "economy". Just as in an endless chain one animal lives on another and itself forms the prey of yet another, so also many human professions live on others and can themselves form the source of acquisition for others. If a form of acquisition is affected by environmental influences, the balance is upset from time to time. Here and there one finds economic trends and crises. Both in economic areas and in the biospheres of nature ("ecosystems") there prevail permanently changing and hundredfold intertwined connections and dependencies that are difficult to comprehend: that is, an always fluctuating balance.

However, the human institution of the "state" can produce a change. As long as the state does not go beyond securing internal and external order there is no essential difference between human economies and the symbioses of nature. It is true that in this case part of the individual defence of professional bodies and businesses is taken off their shoulders (for which they pay by way of taxes) while animals and plants – if they do not build states, too – have to provide their own defence. The actual balance of power is not really affected in this case, though. The stronger and more capable energons make their way here as well as there and in their wake others follow which profit from their success directly or indirectly. The situation is a different one if the state intervenes directively in the economy. Then the state itself is transformed into a large acquisition structure and starts – which is only logical – to consider its own compartments as functional units. Suddenly the state finds fault with this and that ... that is, if something does not serve the "common interest". Just as a company cannot completely leave it up to its departments to determine what they do or not, the state starts to limit certain interests while supporting others ... it tries to *integrate* the multitude of activities.

That is a process which does not have a real parallel in the animal and plant kingdom. The reason for that is that animal states – those of insects – are always organisations of individuals belonging to the same species and which differ only secondarily. No real energons have ever arisen from the coming together and integration of *different* species

What has not been realised up till now is that states built by humans do not actually consist of genetically formed naked Homo sapiens. They rather consist of professional entities and business organisations – energons – which are as different from each other as a grasshopper is from a water lily, or as a peregrine falcon is from the parasites that live inside its intestine. Especially in the "modern state" something is going on which probably for the animal and plant observer appears to be most amazing. Out of thousands and ten thousands of diverse acquisition structures there emerges a larger, unified form of life[4].

Today the economy is characterised by opposing trends that either assess the single company from the viewpoint of the whole state (especially with the central administrative economies of the East) or take the single company as the starting point for consideration (e. g. in Germany or in the United States of America). The resulting divergences lead to the following question: what interests are more important? Which ones have priority? The interests of the "whole" or of the "components"?

Let us first look at the individual interests.

Comments:

[1] J. B. Wolfe, “Effectiveness of Token-Rewards in chimpanzees”, in Comparative Psychological Monographs”, Vol. 12, 1936, p. 1-72; J. T. Cowles, “Food-Tokens as Incentives for Learning by chimpanzees”, in “Comparative Psychological Monographs”, Vol. 14, 1937, p. 1.96.
[2] In economics need is defined as “a conscious feeling of a lack with the striving for its removal” and requirement as “the totality of the needs that finds its effective expression on the market as demand”.
[3] Here I follow Sombart: “We understand the term market in the most general and abstract sense as the epitome of the possibilities and opportunities of sale.” (“Der moderne Kapitalismus”, Munich 1921, p. 185.)
[4] W. Eucken was of the opinion that the economy as opposed to physical, chemical and biological processes didn’t have an “invariant overall style”: it lacked “the openly underlying uniformity of natural processes,” it showed “an enormous multiformity and historical diversity”. (“Die Grundlagen der Nationalökonomie,” p.22.) Here the objection has to be made that the effect-network of plants and animals is just as variously shaped and diverse and that the interactions within economy do not differ fundamentally. The formation of states is the only reason for the emerging of complicated interconnections. Within the biospheres of nature the “laissez faire, laissez passer” is maintained. There is no such thing as a superior, intervening unit there.

VI

THE FRAMEWORK OF COMPETITIVENESS

This world order, which is the same for all beings,
was not created by one of the gods nor
by one of the human race; it simply has always
been there and will be forever: a living fire
which dependent on certain measures glows or goes out.
Heraclitus (540-480 b.C.)

Shirt wash: within four days DM 1,80, within
two days DM 2,70, within one day DM 3,60.
Hotel Breidenbacherhof, Düsseldorf (1967)

1

The reader may in his or her imagination put four pictures next to each other: first a small marine worm which lives buried deep down in the seabed. It eats sand, digests the organic 72
particles included therein and excretes the residue at its other end. Secondly, an oriental goldsmith in a winding side-street. He hammers at his workbench in his tiny shop. In a small shop window his works of art are displayed resplendently. Pedestrians outside pass them by. Thirdly, a beech tree in a forest. Its slender trunk is bare. High up its treetop becomes entangled in those of neighbouring trees. Fourthly, an international commercial enterprise. It has its headquarters in some capital city, its products circulate in all directions around the globe, telegrams are sent, energetic instructions are communicated from one place to another.

However different those pictures are, each of these bodies stands and falls with the same characteristic – competitiveness. If it does not have that, it will disappear from the scene sooner or later. There is not the slightest doubt about the eminent significance of that special quality, either in terms of economics or in terms of biology. In the latter case it closely corresponds to the "value of selection". However, neither in biology nor in economics has any serious attempt ever been made to measure competitiveness in terms of criteria with universal validity. Companies alone are so very different that it appears pointless to try and find a general scale of measurement for them. If all kinds of professions and also all animals and plants were included in the problem, the challenge would be practically impossible.

In what follows it is my intention to show that the competitiveness – the *"competitive power"* of all energons – is based on fundamentally the same interactions: in an invisible framework of values which can be measured in principle – that is, with the same criteria everywhere.

Let us take a look at the curriculum vitae of energons.

2

However different energons may appear individually, in the curriculum vitae of each of them two periods can be distinguished: a *period of construction* and a *period of acquisition* (Fig. 12a).

It is characteristic for the construction period that the energon is supplied with the required energy and organisation from somewhere else, these have to be "put at its disposal". With organisms the "donors" are always the parents – which means energons of the same species or at least, in the case of mutations, very similar energons. With human acquisition structures in contrast, the energy and organisation required is often – in fact in most cases – derived from energons of a completely different species: energons are always (if one disregards the very first ones in the course of evolution) built from the surpluses of other energons. So when Harvey said in 1651 that every being derived from an egg (Virchow modified this in that he said that every cell derived from another one)[1], this is – to generalise – valid for all energons: every energon is always constructed by other energons.

For this construction corresponding substances and most importantly a "structural blueprint" are also required, apart from the energy. However, both the substances and the blueprint are at the expense of the energy of the one who donates them. These necessary units thus also 73
represent energy values – so they do not have to be treated in a special way. They are part of the total energy stake ("investment") that is required.

The period of acquisition starts when the energon is able to achieve an active energy balance independently. Usually that cannot be determined as one particular point. Frequently the energon in construction already carries out an activity of acquisition and thus contributes to its own financing. Examples are parasites and animals which have "alterations between generations": the cockchafer acquires in a different manner than the bug does later. In professional life it is not different. Some students earn the money they need for their studies with private tuition, baby-sitting or by working as waiters or waitresses. Similarly, companies may start part-time acquisition even before their construction is finished. Nevertheless, the transitional point can more or less be determined – both for organisms and human bodies of acquisition. From that point onwards the energon starts to exist practically. The "subsidies" stop.[2]

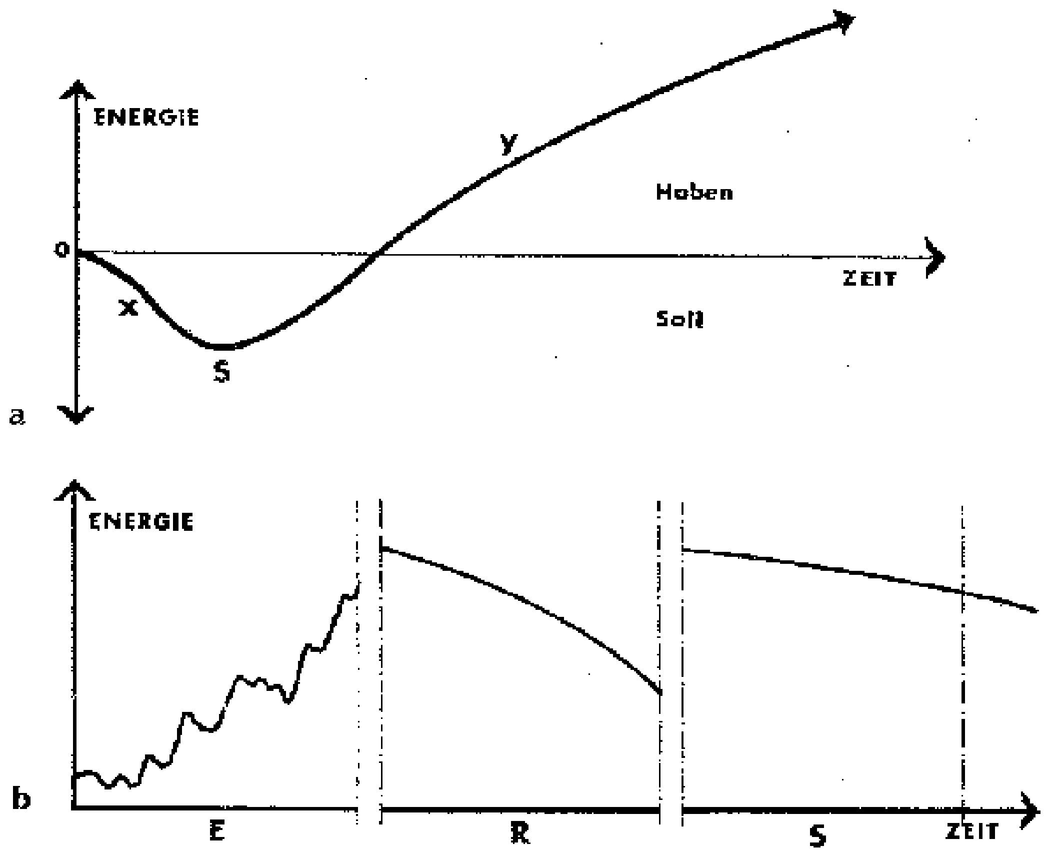

Figure 12: The typical life history of all energons.

a) In the *period of construction* (x) the construction of the energon-individual has to be carried out by other energon-individuals: therefore an investment of energy is necessary. Next, at point S the energon attains the ability to acquire independently: the *period of acquisition* (y) starts. Now the energon on average increases its potential: this results in surpluses.

b) The three relevant phases which form the period of acquisition of energons. E = *phase of acquisition*, R = *phase of rest*, S = *phase of standstill*. In the phases of acquisition the actual acts of acquisition take place – also activities of defence against disturbing or hostile environmental influences. In the phases of rest no efforts of acquisition take place, the ability of the defence is reduced. Out of that emerge "regular costs" which lead to a drop of potential. Periods of standstill occur with energons whose possibilities of acquisition are regularly interrupted for longer periods of time. The "regular" work is then reduced to a minimum which, however, allows for a reactivation – with the emergence of favourable conditions for acquisition.

Within the now following *period of acquisition* three types of phase can be distinguished which I regard as decisive for the establishment of competitiveness. First: the *phases of acquisition*, secondly: the phases without acquisition or *phases of rest*, thirdly: the miscellaneous *phases of standstill* (Fig. 12b). As for the first two phases in question, they can be found with every energon. They follow each other alternately. Phases of standstill, however, can only be observed in some energons. Here they occasionally take the place of the phases of rest. Most important for every energon – and for the assessment of its competitiveness – are the phases of acquisition. That is where the actual acts of acquisition take place and in their course the whole energy that is necessary for all expenses has to be absorbed. Those phases can have very different lengths.

The same is true for the phases of rest. Within those phases – as a rule – no intakes of energy take place but, on the contrary, they cause "regular maintenance costs". In these phases the energon’s capability of acquisition has to be maintained.

Eventually, for some energons additional phases of standstill are profitable. If the source of energy is such that it periodically does not "flow" over longer periods of time or cannot be tagged, the energon can increase its competitiveness if it manages to reduce its work to a minimum. This can be seen, for instance, with deciduous trees when they throw off their foliage in autumn. Other organisms build "permanent states" in order to get through inconvenient periods, some animals hibernate. It is the same with seasonal companies. The winter sport hotel dismisses its staff in spring and closes. The sugar industry only produces in the time after the turnip-harvest.

I maintain that both the period of construction (in its totality) and each of the three phases of the period of acquisition (on average) provide measurable data which say essential things about the competitive potential of any energon. In the case of similar energons (with the same sources of acquisition and in the same biospheres), then those values show clearly which energon is a superior competitor to the other. Moreover, those values are also comparable in general. Perhaps not every single value is always relevant for every energon, yet, for the measurable determination of competitiveness each of them – I maintain – has to be scrutinised constantly.

As the phases of acquisition are the most important ones, let us look at these first.

3

There is no denying that the individual acts of acquisition – the actual unlocking of the respective lock – are extraordinarily different with plants, animals, professional entities and business organisations, and that they also require very different amounts of time. That is only to be expected, considering the diversity of the forms of acquisition.

In the case of gnats the individual act of acquisition covers in the first place locating the prey, after that the approach and landing, the breaking through of the skin with the suction-drill, the saturation of the very dilatable stomach, the withdrawing of the drill, the take-off, retreat to safety and finally the digestion of the prey. With plants the "incorporation" of solar energy into a carbohydrate molecule covers the light and dark reaction: thus as a rule it takes one day and one night. The capture of a photon for a ADP-battery is incomparably faster: it merely takes a hundred millionth part of a second. With human professional entities individual acts of acquisition may possibly take a very long time. For a dealer in old paintings there is often a year of trading between the purchase and the sale. With the East India Company every journey of its vessels to East India took two to four years. Michelangelo took more than eight years to finish his frescos in the Sistine Chapel – but he was paid in instalments by his customer, the Pope. This shows how a very long act of acquisition can be subdivided into shorter, partial acts.

A further difference: some energons specialise in one particular process of acquisition while others carry out very different ones. The gnat mentioned above is a specialist where every act of acquisition is the same as every other. The same is true for somebody selling hot sausages or for a single product company. In contrast, every servant has highly varying tasks. Department stores sell all sorts of products. Among animals the wild pig gets its food in very varied ways – it is an omnivore. Just as that, "conglomerates" in America also use an abundance of very different forms of acquisition[3].

Another difference: with some energons one act of acquisition neatly follows the preceding one; with others hundreds, even thousands, happen simultaneously. Most animals belong to the former group, all plants and also most production companies belong to the latter.

Finally, also the result of the acquisition is not always strictly tied to the act of acquisition. This becomes obvious with employees who work for a lump sum. Among animals, this can be seen with parasites: if they eventually achieve their goals, the bodies of the hosts, food – that is energy and substances – flows into them in a regular stream. With a roundworm or a liver fluke, individual acts of acquisition are out of the question.

In spite of those and also other considerable differences it is always possible to determine average values. And this is what matters. Whether the individual acts of acquisition follow one another slowly or fast, whether they differ or are alike, whether they are interwoven: there is always a specific average effort of acquisition confronting a specific average gain of energy. The latter can be recorded with three measurable values.

First – and this almost goes without saying – the acts of acquisition have to be adduced in the most energy saving manner, that is they have to be as *cheap* as possible. Secondly, a high percentage of the effort of acquisition should be successful – that is, produce a profit. With regard to that the acts of acquisition should be as *precise* as possible. Thirdly, every act of acquisition is supposed to take the least possible time – that is it should be carried out as *fast* as possible.

These three factors of costs, precision and speed are very well-known both in economics and biology. Here, however, they are described in a more detailed way – and so are their correlations.

The first factor of competition – which has validity for a bacterium as well as for General Motors – is the average cost of the acts of acquisition. If an energon is able to achieve the same result as another similar competitor at a smaller expense, it is without doubt superior to the other. This is stating the obvious. If there are unfavourable times of acquisition approaching, that energon will just about be able to work actively while the competitor, on the contrary, is working passively, and if the state of emergency lasts long enough it will drop out.

That is also part of a concept that is familiar in economics, the "economic principle". In this context we are not talking about total costs but only about the average costs of the acts of acquisition.

Second factor: the *precision of acquisition*. It is expressed as the average number of acts of acquisition that are successful. Or even more generally: what percentage of the effort of acquisition leads to an average acquisition result ("probability of reaching the goal"). If we look at the gnat again, we will see that not all its attempts at acquisition lead to success. The prey twitches its skin, waggles its ears, scares away the insect. A new attempt has to be made. With a vacuum-cleaner salesman it is similar. The little piece that he recites at every door only occasionally leads to an acquisition result. In that case the precision of acquisition is very small. With businesses it first depends on the number of the products that go wrong in production (rejects), secondly it depends on the percentage of the products that get damaged in dispatch (dispatch risk), thirdly it depends on the number of products that are not sold (sales risk)[4].

The term "acquisition risk" complements the term "acquisition precision". If for example the degree of aim-achievement is 40 per cent, the acquisition risk is 60 per cent. For the energon theory the notion of risk as commonly used in economics is too general: a distinction has to be made between the risk of acquisition on the one hand and the risk from enemies and of disturbance on the other hand. The reason is the different effects they have. The acquisition risk is solely derived form the relation key–lock. The more precise the key works, the less often attempts at unlocking fail, the smaller is the acquisition risk. The risks from enemies and disturbance (I will come back to these later) on the other hand are arise from completely different relationships. For instance, if a gnat is frightened away by its prey, then the loss of the cost is part of the acquisition risk. On the other hand if the gnat is caught by a predator, for example a bird, then this is part of the risk from enemies and disturbance. In modern economics to a large extent the state takes over the protection of individual professional bodies and businesses – therefore the distinction within that field of evolution is no longer so clear. However, if we try to find a universal system of evaluation we have to consider functional differences even where they are not very marked.

The third factor of competitive value, as outlined above, is the *speed of acquisition*. Someone who carries out acts of acquisition at twice the pace of his competitor usually has an advantage over the latter – not always, though[5].

In economics the saying goes "time is money". This, however, means something different – namely the saving of "fixed" overheads. The businessman calculates: the regular business costs me so and so much and if that expense is not exploited fully the capital invested forgoes an alternative opportunity of earning. So interest on capital is lost in unproductive time. This relationship – which is also important – is not the one that is meant here. In our context it is rather assumed that an energon achieves the same acquisition result as another one faster but with the *same costs*[6].

	costs	*precision*	*Time/speed/duration*
Period of construction	**1** How much does the construction cost?	**2** How often does the construction succeed in percentage terms?	**3** How long does the construction take?
Acquisition phase	**4** How much does the intake of 100 energy units cost on average?	**5** What is the percentage of successfully performed acts of acquisition?	**6** How long does the acquisition act take on average?
Rest phase	**7** What are the regular costs in periods without an acquisition effort?	**8** What percentage survives the rest phases on average?	**9** What is the percentage of the acquisition period that is represented by rest phases?
Standstill phase	**10** What are the regular costs in phases of standstill?	**11** What percentage survives the phases of standstill?	**12** What is the percentage of the acquisition period that is represented by standstill phases?

Twelve basic questions for the determination of the competitiveness of an energon

For professional bodies and organisations of acquisition built by humans the values 1, 3-7, 9 and maybe 10 have a predominant significance. For plants and animals, however, other values can be decisive for their competitiveness also. Here the twelve questions are related to the energon as a totality. More precise values for the competitiveness can be determined if functionally related functional units are investigated according to these categories (chapters 8-18).

First reason: the profitability of the source of acquisition is often limited. Somebody who recognises it as such, exploits it and exhausts it has an advantage over competitors. If there is only one fly to be eaten, then the bird who is on the spot first has the advantage. he wins 100 per cent while the one following next gets 0 per cent. Even if there are more seeds there to be pecked up, the one who pecks faster – assuming all peck with the same precision – acquires correspondingly more. It is no different in the field of economics. Somebody who notices a limited need faster and who satisfies it is a hairsbreadth ahead of his competitors. The English say: the early bird catches the worm. Germans say: the one who comes first, grinds first. Someone who is better at power-plays and thus reaches his goal faster has an advantage.

Secondly: Somebody who is faster can more easily "establish" himself in an area of acquisition. Whether it is a plant, an animal, a working human being (professional body) or a business organisation: the one who creams off the best part has the advantage. He gains reserves, is able to enlarge, gains experience, attains "connections". It is difficult to oust somebody or something once established – no matter whether this is an organism or an economic structure.

Thirdly: faster acquisition provides the possibility of faster growth. In many cases superior height gives a decisive advantage. A big lion is able to overcome a buffalo but a small one cannot do so. Larger businesses with greater capital can afford (beside other advantages) special units that often enable them to gain a lead over smaller competitors.

In addition, there are also advantages which only come to fruition with some types of acquisition. For animals faster acquisition thus diminishes the risk from enemies. Especially during acts of acquisition many animals are in greater danger of being caught by a predator. The shorter the periods of their own concentration of acquisition are, the smaller the risk. In economics, on the other hand, one characteristic feature is that "satisfaction" should take place as fast as possible. If somebody wants to buy a sailing boat and there are two companies offering equal products – one of them with a delivery period that is only half as long, though – then the buyer will decide in favour of the faster supplier (most of the time).

4

The "correlations" between the three values mentioned are also very essential in terms of "interaction" and "interdependence".

The fact that there is an interaction between the costs of acquisition and the precision of acquisition is certainly well known to every businessman. If, for instance, the precision of acquisition should be increased – through better machines, increased controls, more careful packing, improved estimation of the market – then the total costs of acquisition are increased. On the other hand, if an attempt is made to reduce them, then usually the precision will deteriorate.

Which of the two criteria has more significance in the individual case is usually decided by the form of acquisition. If the object of acquisition is bricks, the precision will be less important than it will be with electronic measuring instruments. If a particular business transaction can only be carried out with one person, then right "handling" is more decisive than if there is a queue of people waiting for service from a supplier. To date not much interest has been shown in this relationship as it applies to organisms, although it is also significant for them. If it is difficult to catch the prey but lucrative, the costs of the acquisition are less crucial than the precision of the acquisition. If this is the case, the rare opportunity has to be taken. As for the earthworm which lets soil move through its intestine and digests the useful elements that it contains, any reduction of the cost of acquisition is more important than the increased precision of individual acts of acquisition.

If a computer is to process the values for acquisition costs and acquisition-precision in order to determine competitiveness, further data have to be provided – for instance, the size of the investment needed for the development and production of a product, the amount of energy of the source of acquisition and its constancy. Yet, these values can also be quantified or can at least be estimated[7].

Similar correlations exist both between the acquisition time and the acquisition costs and also between the acquisition time and the precision of acquisition. Faster acts of acquisition almost always diminish the precision and also often raise the costs. If one and the same piece of work has to be achieved in half the time, then – inevitably – it will be carried out less carefully. Machines – but also the organs of animal bodies – then show faster wear and tear. In the case of overexertion the operating costs rise rapidly.

The "optimal capacity" of the operational means, so important in businesses, is to a large extent covered by the correlation between the first three competitive values. If the precision is heightened, the optimal zone of use of the operating devices becomes "narrow", so that even with small deviations unit costs rise sharply. Where functional units having high precision are not really required, they constitute a disadvantage.

Many methods of acquisition require a certain minimum quantity of demand – or prey. Accordingly, for technical reasons it is not possible to start operating a furnace to produce less than a certain minimum yield. Similarly, a 100 HP engine cannot provide a constant output of only ten HP – without being worn out prematurely. And a shark is not able to live on sprats even if it is almost starving.

Consequently, there are considerable differences as regards specific cases of forms of acquisition – especially concerning the correlations. However, what is important is that the criteria of assessment, namely costs, precision and time, are applicable and *relevant* for every energon. Those three form a net, as it were. where the value of *every* process of acquisition can be captured – a value that influences *every* form of competitiveness decisively.

In the phases with no acquisition activity – the "rest phases" – the same criteria are valid. From the viewpoint of the energon they also constitute an achievement and an effect – in that the energon has to survive them.

It is fairly obvious that smaller average costs are an important competitive advantage in periods without acquisition. If in those phases the regular expense of energy is lower than is the case with an otherwise equal competitor, this is a point in one's favour.

Here we are not talking about a value that remains the same but about a falling curve. The reason – among others – is that the liquidation of various reserves can be more or less expensive. As long as one pays from the credit of a current account there is no loss. If, however, one has to dispose of stocks and shares and of property or even – in a terrible emergency – of parts of the business, then the concomitant losses become considerable. For organisms – despite completely different circumstances – it is very similar. Direct payment with ATP is the cheapest. The breakdown of sugar and fat is already more costly and causes a greater loss of energy. If eventually one has to draw on one's own structure, the losses are considerable.

And what about the other two criteria during the phases of rest?

The factor of precision here also plays – at least for some energons – a role: it is expressed in terms of the percentage perishing from internal causes[8]. For organisms diseases might be the causes, for businesses there is the possibility that staff leave it or that they are headhunted by competitors. If the phases without acquisition are too long, people stand around idly and the morale drops. With organisms the relationships are of a different kind – but they lead to a similar outcome. However, the "precision of rest" is also not a constant but instead falls like a parabolic curve. If the phases without acquisition get longer, the risk that the energon perishes from internal causes rises

The third factor, time, demonstrates an interesting problem. Of course, it is a competitive when the phases of rest are on average as short as possible – but how can that be achieved?

If the only reason rest phases are necessary is because the vehicles of effect (employees) have to sleep and relax, then the solution is shift-work. With plants and animals that principle may already be applied – in that cells, tissues or organs take turns to perform a certain function. The second possibility is that the energy source "stops flowing" at times or that it becomes unacquirable because of the environmental conditions. What ways are there to shorten the rest phases?

Here the solution is interim earnings. There are enough examples of this both with human bodies of acquisition and organisms. Some other form of acquisition is interpolated. Even if it only covers the regular costs or only part of them, it already creates some relief – an advantage.

The same arguments are valid for the phases of complete standstill which are important for seasonal businesses and organisms that are confronted with long periods of forced unemployment. In those cases the business is reduced to what is absolutely necessary. As far as possible, vehicles of effect are cut back or closed down. That can go as far as only maintaining one germ cell for the reconstruction – with animals and plants this already amounts to propagation.

Here too, there are average values; here too, the criteria of costs, precision and duration are valid. If these criteria are treated separately from the ones of the periods without acquisition, it is because the basic situation is a different one, for instance there is the risk from enemies and of acts of nature. An energon that is completely closed down is highly passive and thus exposed to influences from the outside. An animal during hibernation can be approached much more easily by an enemy. It is much easier to break into empty buildings.

6

Also in the *period of acquisition* – at first sight – the three criteria costs, precision and time pay off. Naturally – experience shows – it is a competitive advantage if the construction of an energon (with the same quality) costs less. Naturally, it is an advantage if the likelihood of mistakes – "failures" – is smaller. Naturally, it is an advantage, at least frequently, if construction can take place faster at the same cost..

If one thinks about this more carefully though, the following question arises: for whom does that create an advantage? For the individual?

If a business is constructed using means which then have to be paid back regularly to somebody then the situation is simple and clear. In that case low construction costs (including the necessary start-up costs) determine the competitive advantage. So the energon is burdened less long. This can be seen clearly in its balance sheet. With animals and plants the individual still receives the construction costs as a gift from its parents, so to speak. Thus the difference in the amount of the construction costs is not included in its balance sheet. For the competitive value of an *individual* it is thus irrelevant how much it has cost practically[9].

Here only the energon *species* is concerned. Lower costs of construction mean that with the same surpluses more individuals can be produced. This results in better chances that one of them finds favourable living conditions and thus survives. What follows from that is that for the energon type in question lower costs are indeed an advantage – *for the individual, however, they are not*.

The same relationship also exists – and here we enter an interesting field – in economics. How does a new energon come into existence there? Let us assume that a few financially strong people get together and plan the construction of a new business. They formulate various announcements and receive various offers. Let us also assume that there are two fundamentally different ways to produce the planned product. For each, different machines and facilities are necessary. The total achievement is exactly the same in both cases – everything else is equal, except that one of the facilities costs twice as much as the other.

Then the financiers will certainly decide in favour of the cheaper method – *for the energon in construction*. Thus also in this case the cheaper type prevails. The other disappears from the scene because nobody will finance it any more. Thus also in economics, lower construction costs are a decisive advantage for the energon species.

The same applies to the values of construction precision and construction time. With some energons they influence competitiveness – with others, however, they do not. For the species, on the contrary, they are always relevant.

That is an important conclusion which will occupy us more thoroughly later on. There is more than one level of assessment of competitiveness. The values for the individual and for the species do not coincide[10].

For the time being we will stay with the individual. There is another, very controversial term connected to competitiveness.

Comments:

[1] W. Harvey: „Omne vivum ex ovo." R. Virchow: Womne cellula ex cellula." W. Preyer: „Omne vivum ex vivo."

[2] In botany this point is called the "compensation point". There the system of acquisition becomes active.

[3] Companies with very different activities are affiliated to these enterprises. In the first place they are mainly those on which the original programme of production depends (companies for supply, financing and transport) but as things develop they can come from completely different branches. By means of such variation ("diversification") the conglomerate increases its ability to surmount crises. In the United States this development is also linked to antitrust law, which is directed against monopoly within single branches. This limits the growth of businesses but can be circumvented by conglomeration

[4] In trade the „lasting quality" of the acquisition and the repeatability of acts of acquisition play an important role. This comes under the idea of "precision" also outlined above. If a trader cheats his customers, this gets about – and his subsequent acquisition efforts will be less successful. His precision of acquisition is then diminished.

[5] If a tenor sings the part of Siegfried at twice the speed as another one, this is no competitive advantage.

[6] In economis the „maximum principle" means higher profit with the same costs. From the viewpoint of the energon theory, in contrast, it has to be distinguished whether the increased profit is based on higher precision or higher speed of acquisition.

[7] With plants and animals the individual types (members of one species) appear in a large number of individuals over generations. Here it is in principle possible (though to date there are hardly any such measurements) to determine fairly accurate statistical values. With the energons built by humans, however, an increase in the individual diversity occurred. Also, the relevant environmental conditions are becoming increasingly more difficult to assimilate, that is, they change faster and faster ("non-transparency"). The energon theory does not claim that each of its values can be measured practically. It merely tries to show which values determine the "viability" of all energons, what the decisive framework of values for all energons looks like.

[8] Animals show very differing abilities to get through periods without acquisition (i.e. "starving"). A river-

stayed alive for 657 days while its weight dropped from 65 gram to 21.5 gram. Small warm-blooded animals form the other extreme. A mole can only last for two days at the most without any food, the marigold finch and shrews already die after a "period of fasting“ of one day. (R. Hesse and F. Doflein, „Tierbau -- Tierleben“, Jena 1934, Vol. 2 P. 330 f.)

[9] Animals and plants are forced because of their blueprint to use their surpluses for the breeding of further descendants. This is a burden for them - but only in case there are surpluses. As for the individual, the “construction costs" that are contributed by the parents are thus clearly a gift ... and therefore do not have to be „repaid“ (via the duty of propagation).

[10] Here the economist may associate himself with the view that not all costs and profits necessarily have to make significant differences for the individual but that they can also appear at a higher level of integration "social costs“ – "ssocial benefits“). However, we will come to those differences in assessment later. Here it is merely intended to point out those for the individual and the „species“. There are also parallels for that in economics. Contributions that are paid to professional associations (guild, union) do not secure advantages for every professional individual -- but for the professional species.

VII

THE ENIGMA OF EFFECTIVENESS

In nature nothing happens at random.
Aristotle (384-322 B.C.)

For many the main point of my presentation,
that man is descended from a lower form
of being, will be, I am sorry to say so, against their liking.
Charles Darwin (1859)

1

A tour through a factory shows us that everything is geared towards functionality. Within the general frame, every machine and every human being has got a certain place, a certain task. Each process, each part is concentrated on production. At the headquarters, directors are paid to monitor and even constantly increase this functionality: they may face difficulties such as shortages, here or there they may have a lack of suitable workers or tools, one section or other may not work properly... it seems as if the human spirit is constantly at work in order to create functionality.

There is a common agreement that human beings create functionality. We admire the functionality of the great inventions.

The same applies to studies of animal or plant bodies: The more we know about the inner machinery of these living structures, the more we realise its appropriateness. With a few rare exceptions, each organ fulfils a function, i.e. carries out a task. They are carefully matched in size and efficacy. It is difficult to detect any fault within this organisation. Apparently, everything serves a single purpose ... But what purpose?

Soon after having connected cause and effect in his imagination, primitive human beings must already have encountered the phenomenon of this amazing functionality. Whenever they were lying on their back and staring at the blue sky, nothing functional resulted. Whenever they needed an arrow, they had to carve it – a quite absorbing task. If they wanted a safe hiding place, then they either had to search for one or they had to build it, both solutions requiring some planning as well as physical work. However, each animal and each plant, as well as their own body showed primitive humans a whole range of functionalities. Even if they did not actively reflect on these, they clearly showed them the necessity of effort and of planning: *action*.

Where was the origin of these effects? This question developed right from the start from the basic function of human thinking - from the connection of cause and effect in our imagination. Even primitive human beings could hardly neglect it. Wherever they turned, this most obvious question followed them.

But there is more to it: The high degree of functionality within this world of organisms – including one's own body – not only required action, but also a clearly defined *interest*. Put simply, if someone invests so much effort, he must have a reason for it. What then was this purpose?

Very likely primitive human beings conferred a special name to this unknown cause. In their imagination, it may have looked like a powerful, strong and invisible creature. Furthermore, it seems quite plausible that primitive human beings thought that nature and themselves were the focus of interest of this higher being.

None of these numerous beliefs, not even the most primitive ones, formed by humankind over centuries, can be disproved. Hence, this book does not consider them all to be absurd constructions of the mind; however, it seems quite likely that most of them developed from this origin. Once such a belief had come into existence and persisted through tradition, it then was hard to abolish ... precisely because no counter-evidence existed. It is also quite likely that, in the course of cultural development, humans linked their most precious values to these highest beliefs. Later on, such constructions could hardly be demolished.

My assertion is that this enigmatic functionality represented the starting point for many such processes. I further assert that the basic function of human intelligence – combining and analysing clearly separate causes and effects – required such a development. It inevitably required human belief in supernatural creatures and in particular their belief in being the centre – together with animals and plants – of divine interest[1].

The first person that found another explanation for functionality in nature was the Greek philosopher Empedocles. He considered functionality to be quite a normal thing: only functionality could "survive" and spread. Everything else had to perish. Consequently, in the end only functionality remained.

Empedocles had a rather strange thesis about the origin of animals and plants: He took two diverging principles as a starting point. Their interactions, he explained, had led to a whole range of different formations. The organs of plants and animals – arms, legs, heads – were developed separately. Nature then combined them: one time like this, the other time like that. Innumerable deformities occurred and perished. However, at some stage, functionality entered the game. It survived, spread ... precisely because of its character. This is the way Empedocles thought animals and plants came into existence.

Two thousand years were to pass before this thesis was revived – by Charles Darwin. However, his approach to organisms and their development seemed much more moderate, less fantastic.

He based his theory upon two incontrovertible premises: First, the offspring of a huge variety of animal and plant species do not always look exactly like their parents: they "vary". Sometimes, such changes are hereditary. Secondly: almost every species gives birth to more individuals than can in fact grow up. Food is scarce, enemies and competitors are all around. In consequence, only the most suitable, the most functional survives and reproduces itself, everything else will founder at an earlier stage. A "natural selection" takes place.

What a gloomy scenario. There is no doubt: functionality can arise *entirely on its own*. Simply because non-functionality is being eliminated.

Generations of scientists after Charles Darwin carried out closer analyses – they wanted to find out how hereditary changes occur. In the process of division of the genetic material, mistakes occur – they were called "mutations". But also external influences – for example cosmic rays – can effectuate such changes. However, this process is based on a *random* occurrence. The cause and reason of functionality are – more or less – a matter of chance.

Various mechanisms were discovered that can foster and accelerate the formation of functionality. The most important one is androgyny. As different germ cells – i.e. different genetic blueprints – melt together, occasional changes in the hereditary material are also combined. There is a drastic increase in the probability that functionality will be enhanced. Additionally, – as Charles Darwin had already demonstrated– the strongest males win the fight for females. Hence, the stronger and more suitable types can impose themselves[2].

Darwin and as well as Lamarck – who first proposed the idea of evolution – also believed in the transmission of *acquired* characteristics. Such a process would indeed explain the formation of functionality far better. In this case, functionality would not be created by pure chance. If creatures were able – and most of them are – to transfer *individual* adaptations to environment to the next generation, functionality would spread faster. However, to date, no such transferral of acquired characteristics – despite numerous experiments – to genetic blueprints has been proved.

Therefore, at present, most biologists believe that random mutations were sufficient to bring about the superior development of organisms. But even radical selectionists fear the following question: Was there enough time – merely three billion years – for this random process? It is quite possible – one could even expect – that, within cell structures, there exists another selective mechanism, which we simply have not yet detected.

Nietzsche wrote that those iron hands of necessity which shake the dice-box of chance play their game eternally; there *must* be some throws corresponding to functionality and appropriateness of every degree[3]. Today, however, we know that evolution started not earlier than 3 billion years ago; a long, but not an eternal, time span.

The "vitalists" believe in a "vital force" that guided evolution towards functionality. The biologist Driesch called it – with reference to a term used by Aristotle – "entelechy" . But could such a supra-sensual, supra-causal vital force be at the origin of the functionality of organisms?

To take up a position this question, let us return to the energon. Nobody – not even the "vitalists" – denies the efficacy of "natural selection". Let us take a closer look at this process.

87

3

Figure 13 shows a model situation. At time T^1 TT three energon-types A, B and C are confronted with a source of energy Q and acquire it. We assume that they represent 3 populations equal in size – approximately 1000 or 10 000 individuals each. The three types (species) possess identical qualities, they differ only in their vehicle of effect (x, y, z). The difference – for example the formation of an acquisitive organ – could have been caused by mutations. Energon B represented the former type, the two variants A and C were formed through changes in the hereditary system. A shows how mutation reduced functionality: the new unit x is less efficient than y. Type C, in contrast, has gained functionality: z works better than y: cheaper, faster or more precisely. It is not difficult to guess what will happen in this case.

At time T^2 – so and so many generations later – type A has disappeared, is out of the game. Owing to a less efficient unit, the key did not unlock the keyhole as well as it did before. Consequently, this energon has been displaced by the two other types. Now, there might come a hard time, and even B could become unable to maintain its active balance sheet. The remaining individuals invest their last reserves, and finally, they perish. This type, this "species" dies out.

Thus, at time T^3, type C was the only one surviving. If we enter the process as observers only now, we ascertain that species C possesses an excellent *adaptive capacity* with regard to the characteristics of energy source Q – thanks to its vehicle of effect. The latter (z) is highly functional. Our brain immediately asks: Who caused this finality, who planned this process, who worked on it?

The answer: no one planned, no one worked. The changes in the hereditary system happened at random. The best remained, of its own accord.

Here two separate processes overlap. The first one is the reproduction of the energons A, B and C, whereby changes in the hereditary system occur. The second is the permanent interaction between these energons and the energy source. The more suitable keys unlock the keyholes more efficiently and obtain better results. Those which fit less well – the less appropriate ones – are eliminated. In the end, it is the energy source that controls the kind of structure.

Even if energon A was generated by supernatural force and C by chance, such constellations do not influence the final result. Even then, only type C is the one which remains at time T^3. Hence, the producer cannot determine functionality. Functionality stands for a very relative fitting state, given that the laws of nature remain constant. In our example, it is exclusively determined by the characteristics of the keyhole Q – the source of energy that is – which is to be unlocked. This source has no direct influence on reproduction and processes of formation; still, it steers the direction of the energons' development.

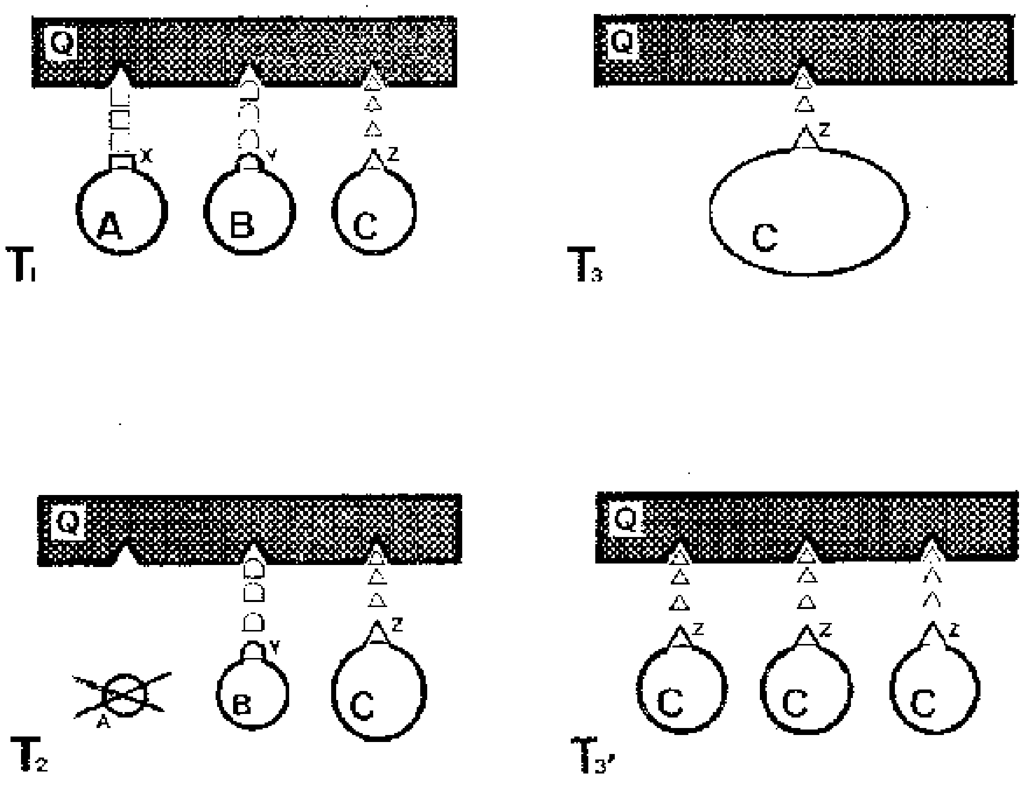

Figure 13: The *positive* selection effectuated by the source of acquisition.

At time T^1 three energons (A, B, C) compete for one source of energy (Q). The vehicle of effect ("key bits") that should use this source are x, y, z: y is more effective than x, and z is more effective than y. At time T^2 (that may be several generations later, or the same energon may still be involved), A has been eliminated, B can still keep pace, C dominates. At time T^3, only energon C remains (given it is able to grow at will), or three energons share the energy source $T^{3'}$. This source "decides" – without "intention" – which energon type will survive. The selection chooses a *positive* characteristic: the superior ability to use the source.

This steering process – it has indeed not been planned – becomes even clearer, if we look at *negative* selection (Figure 14). It concentrates, so to speak on the weak points of the energons.

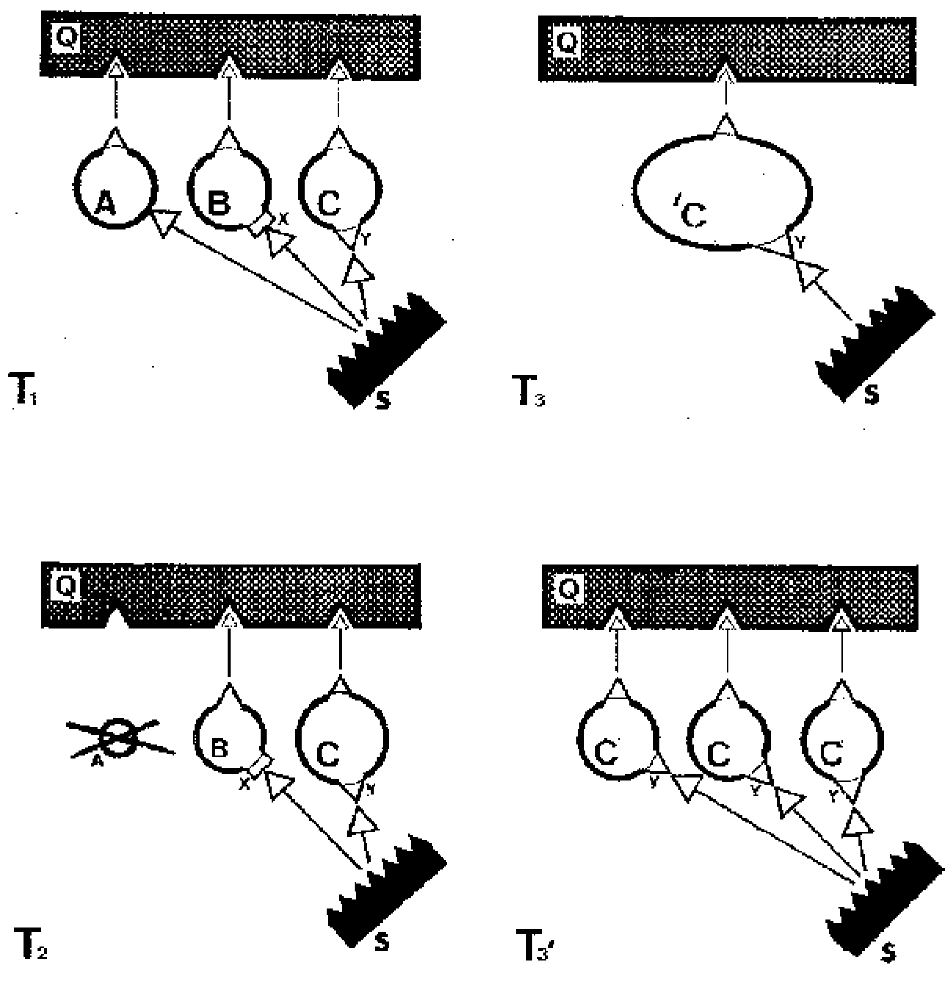

Figure 14: The *negative* selection caused by disturbing or hostile environmental influences

At time T^1, the energons A, B and C compete for the energy source Q; they are equal in their ability to do so. However, A does not possess a protecting functional unit against environmental disturbance or danger S. Energon B is equipped with such a protective functional unit (x), but it is less effective than C's functional unit (y). At time T^2 (that may be several generations later or the same energon may be involved), A was eliminated by the influence of S, B is still present, and C dominates. At time T^3, a single energon C remains (if it is able to grow), or three individuals share the energy source $T^{3'}$. Disturbing or hostile environmental factors decide, – without real intention – which energon type survives. In this case, selection concentrates on *weak* points: the lack of capacity for self-protection.

In snowy regions, for example, black rabbits can be detected quite easily by birds of prey, and are eliminated first (A). Their disadvantage is just too great. Grey rabbits can survive a longer time, but they are facing strong competition from white ones. Their acquisition is also impeded, they cannot gather as much food as necessary. If food is scarce, this type may also entirely disappear. If we observe the situation at time T^3, we only find white rabbits in the area in question. Our brain – given that it understands the connection with birds of prey – explains then: these rabbits have excellent camouflage, their colour is most *functional*.

Again, this selection is not steered actively by someone, but the birds of prey are responsible for this colour. They do not have the slightest influence on reproduction and processes of formation of the rabbits; *still, the birds steer their evolutionary development*.

This example is even more extreme. In fact, it would benefit the birds of prey to choose from a maximum of black rabbits. But they bring about exactly the reverse effect! *They foster the development of a characteristic which is to their disadvantage*. One must consider the full dimension of this situation.

Until today we have ignored that there exists a causal connection, exactly the same as one which has been analysed in technology for quite some time already, and which more recently has been preoccupying the young scientific field of cybernetics.

4

Cybernetics deals with the basic principles of all control processes. It specifically analyses a phenomenon described by Norbert Wiener, the founder of cybernetics[4].

If we are steering a motorboat a steady pace, we need energy to operate the steering wheel. Not the slightest part of this energy is transferred to the process we are controlling, though: However energetic our steering movements may be, there is no increase in speed. We only influence the direction, and the motor moves the boat. We observe the combination of two causal interactions: the motor drives the propeller – the boat moves. We turn the wheel and thus define the direction. The steering energy is much smaller than the energy generated by the motor. Still, it influences – without interference – its direction.

Bernhard Hassenstein, a biologist and expert in cybernetics, called this causal connection "control causality"[5]. This term describes almost the entire range of control processes – not only the technological ones, but also the organic ones. The scheme is simple: an energetic process influences, controls another one.

It is important to notice how by means of a low energy input we can achieve a high energy output. Furthermore, one form of energy can influence a *totally different* one. A control using a variable resistance shows both phenomena. If I turn it, I can decrease or increase the electric current. The turning movement is *mechanical* energy, and with its help, I control *electric* energy.

In other words: One form of energy controls the development of another one – while the controlling energy is not integrated at all with the controlled energy.

This is precisely the process that applies in "natural selection". Our example with birds of prey and white rabbits clearly demonstrates it. The energy used by the birds of prey is not incorporated into the rabbits' development. Nevertheless, it *controls their evolution*. Whether such an action happens consciously or unconsciously is not relevant with regard to the process itself. Human forms of control involve conscious action, in contrast to natural selection where the action succeeds unintentionally. In both cases, however, one energetic process influences another one – without being integrated into it.

Basically, the energons' evolutionary adaptation to their energy sources – i.e. *positive* selection – can be explained by the principle of control causality. Here, the connection is less obvious, as an integration of controlling energy (the source) into the controlled energy takes place.

However, one must consider that also here no direct connection exists between one energetic action and the other – i.e. between the consumption of food and changes in the genetic blueprint. The energy source has neither the ability nor any reason to influence genetic processes in animals or plants, and yet it controls their development. If a certain species of gazelle incarnates the source of energy, and lions as well as other predators stand for the energons which use this energy, it would be an advantage for the gazelles if their enemies were to become blinder and weaker. But they bring about exactly the opposite effect: only the strongest and fastest predators survive.

Thus we arrive at a causal explanation of this enigmatic functionality in nature: *it is the result of unintended and unplanned connections of effects succeed arising from the principle of the control causality*. Even the eternal dispute in biology between mechanists and vitalists – as a consequence of which nowadays most biologists strictly avoid the word "functionality" – is called into question: If the producer – whether his name is coincidence or God – cannot influence the existence of what he creates, this quarrel has no real basis anymore. A supernatural force could speed up the genesis of functionality drastically. But it has absolutely no influence on what functionality must be like for it to be effective – given that there are unchanging laws of nature[6].

For our analysis it is important to understand functionality because functionality and competitiveness are closely related. With regard to the energon, when competitiveness increases there is always at the same time an increase in functionality.

5

Thanks to their intelligence, human beings are able to create functionality – at least that is what we like to think. The overwhelming progress we have made over the last thousand years seems to support this statement. But are *we* really the ones who decide whether what we create is functional or not?

Let us – first of all – look at the pure efforts of acquisition, i.e. the energons which are generated by human beings. How is this with the acquisitive organ called the "sales product"? Is it really the producer (or inventor) who decides whether it is functional or not? Is *he* the one who decides whether it will beat the competition?

No, he does not. The purchasing decision depends on the demand. Whatever a customer wants, i.e. what is bought, is functional and able to compete. In this form of acquisition, the customer represents the source of energy. Again, the energy source decides how the key has to be shaped so the source can become accessible. So, it is the energy source which decides which product is accepted and which influences the competing enterprises in their mode of acquisition[7].

And when it is not a product, but a service that is offered, the scheme remains the same. In this case, demand, i.e. the consumer's need, decides which services an energon must offer in order to be successful in its acquiring activity. Again, the source of energy determines the most functional and most competitive behavioural pattern, i.e. the performance, and thus controls the formation of functionality.

In any case, those control processes are unintentional. If I drink Coca- Cola or Gordon's Gin, I do not do so because I want to support the owner or the shareholders of an enterprise, but because I like these drinks. In general, the customer is not interested in influencing enterprises that sell products to him; he merely wants to satisfy his needs as well as possible. *Nevertheless, he influences their development!*

The intelligent action of a producer – or "inventor" – intelligence merely consists in pre-empting natural selection, i.e. he does its work. Here, human imagination again proves its importance. In his imagination, the seller tries to understand the market, the demand, the consumer, the customer from within. He gathers information about the source's behaviour, reactions and wishes, and he tries to anticipate what appearance a product should have or what it must offer in order to be attractive to the consumer. In this process, he will normally not produce or offer anything he regards as non-functional.

If a producer offers two different types of the same product on the market, he leaves the decision to natural selection. The market – the source of energy – decides which product will win. He then concentrates on its (re)production. In this case, the source's control effect is still obvious.

Wherever someone can reinforce the usual selection process, however, in particular with the help of marketing research, he will do so. Evolution no longer depends upon small, incidental changes that will only in a hundred or thousand years' time lead to an increase in the functionality of an energon or of a vehicle of effect. Human beings change dozens of characteristics at one time and often create something completely new. They thus create structures which could have not been produced through normal selection.

Until human beings came into existence, evolution always had to face the hurdle of every link within a line of development requiring functionality. A decrease in an energon's competitiveness could not be permitted under any circumstances – otherwise it might be eliminated in no time, and the corresponding course of development would end at this point. Hence, only those formations could survive whose intermediate forms did not have a negative impact on the balance. As human beings can build new structures out of foreign bodies, however, there is no need for them to consider intermediate forms. They can omit them., we develop in our imagination – as well as we can – a functional final product which is then offered on the market.

Consequently, humans can*not* dictate what in their acquiring activities is functional. It is determined in the first place by demand – by the energy source to which access has to be established. Harmful or hostile environmental influences, such as governmental regulations, also interfere: They determine what will survive and what will not.

6

However, what is peculiar to human beings is that they are able to influence the demand themselves – in particular through advertisements. This means that the key does not adapt itself to the keyhole, but that the keyhole is changed in such a way that an already existing key may unlock it. In the evolutionary context, this process seems quite odd and new.

In this case, the control effect of the market is suppressed. The consumer is manipulated in order to suggest that he has a need for a certain product. At this point, humans indeed succeed in creating functionality. Because in this special case, and only in this one, they generate the entire system on the one hand giving shape to the key and on the other hand by defining the shape of the keyhole. This is especially the case with the creation of a new, previously non-existent demand, e.g. a fashion.

In a very similar way, humans can also modify *negative* selection, for example the harmful effect of hostile environmental influences. When, for instance, a river at times inundates the surrounding fields and farms, as a first step some farmers may construct protective walls. Future inundation will not harm them anymore. The type of energon that is surrounded by walls will establish itself in this region. This process corresponds to analogous safety devices produced by plant and animal energons. The harmful factor (the river) defines which defensive structures are necessary, i.e. it dictates what is functional in this region.

In contrast, if farmers combine forces in order to regulate or divert a river, they generate functionality. They control the factor that normally directs the formation of energons. Let us return once more to the example with the rabbits in snow regions that are decimated by birds of prey – consequently, only the white ones remain. The farms are decimated by the river – consequently only those protected by walls will remain. An analogous step to the river's regulation or diversion would be if the rabbits were able to take some initiative which would lead to predators without any beak or with no interest in rabbits. In that case they would also have created functionality: an adaptation between the influencing factor and a characteristic inherent in the rabbits.

This example – which may seem a bit far-fetched – is designed to demonstrate what a novelty this procedure is within the frame of evolution. Human beings take over control both as regards positive and negative selection. By influencing or manipulating the consumer, they create new sources of acquisition; by defusing disturbing environmental factors, they make protective devices redundant.

With regard to human luxury, functionality must be analysed separately.

In the field of acquisition, functionality and competitiveness are identical. In the luxury sector, however, there exists a whole range of functionalities: a person always considers those things as functional which increase his comfort (pleasure, happiness, joy). The notion of what is comfortable, however, differs from person to person and from one minute to the next, and depends on disposition, education, the situation, depending on drives, emotions, mood, habits, influence, health, pathological predisposition, etc. For a theatre fan wanting to go to a play, the idea of the visit is "functional". Similarly, for a murderer in a mood of wanting to kill for pleasure, it is extremely "functional" to encounter a suitable victim.

In this publication, I will not expand on the manifold "functionalities of luxury". Or only to the extent to which it creates needs offering a basis of acquisition for other energons.

Thus we return to where we started. Human functionalities of luxury create a variety of demands: this is the source of acquisition for many human acquisition structures and thus controls functionality in their acquiring activities. This need may also be reinforced – through advertising or by other means of influence – by the acquisition structures themselves. In that case, it is not the functionality of luxury that dictates the functionality of the acquiring activity, but the converse: the functionality of the acquiring activity dictates the functionality of luxury.

In order to understand the dynamics of the energon's development we will, in the following section, analyse the control effects of harmful and hostile environmental conditions.

Comments:

[1] In his work "Système de la Nature", the French philosopher Baron Holbach gave a cogent description of how ideas concerning God were conceived, saying that if we track things down to their roots, we will find that ignorance and fear created gods, that caprice, fanaticism and deceit confirmed and disfigured them, that weakness and naïveté feed them, that habit respects and despots back them – in order to use the blindness of humans for their own purpose. (Quoted in W. Durant's "Die grossen Denker", Zürich 1943, p.225)

[2] Another "selective factor", considered important in biology is "isolation". The smaller a "population" (the number of species in one area), the greater is the probability of an random improvement through mutation and reproduction processes. W. Ludwig justifies this argument: by pointing out that 10 players are more likely each to throw a six each than are 100 players. In smaller populations, a

favourable chance is more likely to influence the whole system. "Die Selektionstheorie, " in G. Heberer, "Die Evolution der Organismen," Jena 1943.
[3] F. Nietzsche, "Morgenröte", Chemnitz 1881.
[4] He published his fundamental work in 1948: "Cybernetics, Control and Communication in the Animal and the machine", New York
[5] Bernhard Hassenstein: "Die bisherige Rolle der Kybernetik in der biologischen Forschung", in "Naturwisenschaftliche Rundschau", Stuttgart 1960.
[6] A theologian would say that God could of course change the laws of nature, thus creating another kind of functionality. The most important factor, however, is that apparently no such influence is exercised. Hence, functionality seems to be left to itself – and represents only a very relative value.
[7] Further down, I will talk about the possibility of influencing potential consumers. At this point I am referring to the normal dependence which is not influenced by advertisements or other measures. In "Grundsätze der Wirtschaftspolitik", W. Eucken wrote that in the case of competition consumers determine the sort and the amount of production, and entrepreneurs, although they have some room for manoeuvre, finally respond to their needs. (Bern-Thübingen 1952, p.115).

I

Spear and Shield

I embrace my enemy, but in order to choke him.
Jean Racine ("Brittanicus", 1969)

Man seeks harmony, but nature knows better what is good for his species. It wants discord.
Immanuel Kant (1784)

1

No energon can acquire energy without being disturbed in some way or another. Almost every energon is like a fortress that is under siege. As every energon represents a potential of energy, it automatically becomes a possible source of acquisition for other energons.

Those animals and plants which have no predatory enemies at all might be found – if at all – only among the most specialised species. As to the energons created by human beings, the defence problem is not as pressing as it used to be. Within organised political systems, the human germ cell and its acquisition structures no longer need to defend themselves to the same extent as previously. The state guarantees security – in return for which every professional entity and business organisation has to pay taxes. The community organs such as national defence, the legislative and executive authorities relieve them – at least to a large extent – of the need to take individual protective measures.

In the case of animals and plants it is only their organic elements that are the target of predatory activities: for predators only molecules which can be broken down are useful as a source of acquisition. This is radically different in the non-coalesced acquisition structures and luxury items of mankind: Cannibalism is rather the exception. Human beings also produce predatory energons; these, however, mainly head for artificial organs, which do not have to be "digested" – they can immediately be used, and "sold" as well, on the basis of their functions. Therefore they are not really an actual source of acquisition, but they have some kind of exchange value. In the case of a watch or a diamond ring, the energy equivalent is even much higher than it could ever be in the form of the chemically exploitable energy of the same organic mass.

Until recent times, the human body, too, was a target for human predators. A fellow human being, subject to his own sets of rules, represents the most universally usable artificial organ. At the beginning of this development – which characterises all human ontology – there was the obedience of the family members. Wife and children were subject to male authority. Slavery and serfdom were the next stages of the exploitation of human beings. The artificial organ which is the 'obedient human being' can be forced to perform almost any physical and sometimes also mental work.

For thousands of years these institutions were taken for granted: many professional entities and business organisations were based on slavery and serfdom. They were protected, almost without exception, by the individual state systems. Only by exerting influence on these state systems did the individual gradually become able to free himself from this terrible danger of being made an artificial organ by force. It is common knowledge that in some parts of the world this process has not come to an end even today.

In the balance-sheet of each energon the expenses for *defence against predators* can be registered in the same category. They belong together in so far as they exert a very similar effect and because on a functional level they require similar countermeasures. Just as all entities which immediately serve acquisition form a kind of community, all vehicles of effect and all behaviour patterns aiming at protection and defence are functionally related, even if they occur in huge numbers and great variety.

2

The most original and simple form of protection is the shield. This kind of function unit is very well illustrated by the sea-urchin. Here, the defence mechanism is strongly reinforced by its sharp points.

This solution applies to plants only to a limited extent. For their mode of acquisition it is necessary that the light-rays are received by the surface facing them. The cellulose wall of the cells is not only a functional unit offering support, but also protection. Thus, for smaller predators it becomes more difficult to feed on them, bigger ones have difficulties when digesting. Trunks and branches, on the other hand, being non-acquisitive, are protected by the bark. Further protection units may take the form of spines or poisonous hairs.

In the case of human professional entities this protection principle manifests itself in may ways. In unprotected areas a farmer's farm becomes his shield. Up until today we continue to be impressed by the mightiness of a castle's walls. Termites provide primordial evidence of the fact that entire acquisitive organisations are protected by hard shields. Where human beings are concerned we can see this in fortified towns of the Middle Ages. However, hardly any country had the possibility of protecting itself in this way – the famous Chinese Wall is an exception here. On the other hand natural obstacles, rivers and mountain chains played an important role as fortifications. As to minor professional entities and business organisations, fences and barbed wire give evidence of the same defence principle. Between the energon and the potential predator an obstacle is put up.

This most simple method of defence shows major weaknesses, however. Defending oneself against predators hardly improves the balance-sheet if at the same time the acquisition of energy is made impossible by the protective vehicle of effect.

A possible solution to this dilemma is offered by shellfish. In the case of danger they close up – and consequently a shield surrounds them on all sides. For acquisition they open up just a little and stick out a suction tube for the acquisition of plankton.

Another possibility for solving the functional conflict between protection and acquisition is given by the principle of the 'door'. Every operculate snail illustrates this. Here the shield has an opening through which the actual acquisitive organs can leave the enclosure. If an enemy comes, they quickly withdraw and the opening is closed again.

The doors of our houses as well as the gates of castles and town walls are by no means a trivial and superficial analogy to this. In both cases units like these came to be developed as a functional necessity. There are doors and gates not just because X or Y built them. They rather emerged as a necessary way out of the functional conflict between acquisition and protection against a potential enemy. Wherever armour or walls were built, such units were automatically implied. Otherwise this method of defence was simply not possible.

In all animal energons which were designed for acquisition through locomotion, armour became a particular problem. In this case not only the acquisition organs but also the locomotive organs needed doors in order to be able to become effective outside the armour. This is very clearly illustrated by turtles, who stick their legs and their head forward through the respective openings. Some species are able to withdraw their organs completely behind their "town walls".

Another solution is found in crayfish and insects. Their locomotive and acquisitive organs are armoured as well – which on the other hand calls for hinges. The artificial organ, the knight's armour, can be seen as the human counterpart. This armour, though, had an advantage: it could be taken off – whereas insects and crayfish have to carry their armour around for all their life. Growth is particularly stunted by that: Insects as well as crayfish have to "slough". These regeneration processes are connected with considerable expenditure and have a negative influence on the balance in so far as each sloughing process involves increasing risks. As the new armour is at first soft, the animal has to hide in gaps or holes. This requires the development of the respective behaviour pattern.

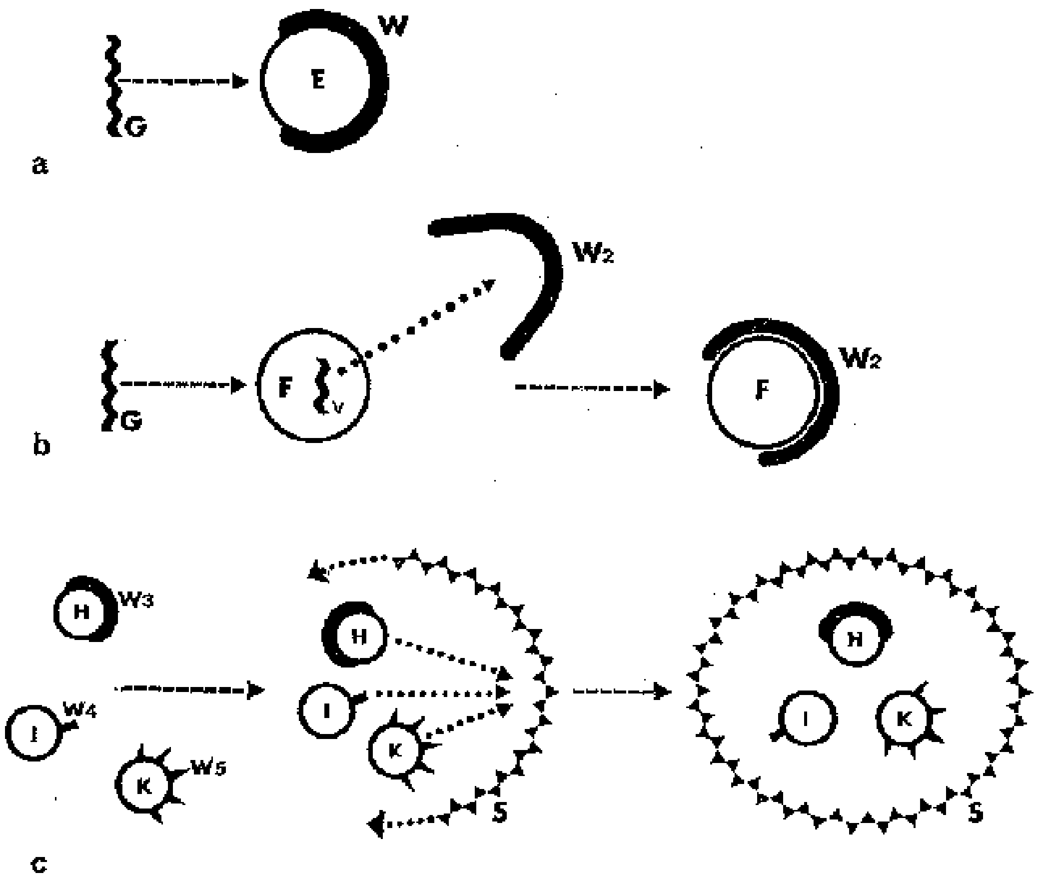

Figure 15: Evolutionary development of protection against predatory enemies

First stage a: The genetic blueprint G together with the protecting vehicle of effect W builds up the energon E. This vehicle may be armour (as indicated in the illustration) but it can also be a poisonous sting, a camouflage paint or a pattern of flight behaviour. W represents, in a very general way, the totality of all units serving for protection against predatory enemies.

Second stage b: In this case the genetic blueprint G develops an originally unprotected (or insufficiently protected) energon F, but provides it with the behaviour pattern V, which enables it to acquire vehicles of effect from the environment all by itself and to incorporate them into its effective body (W_2). These can again consist of armour (as is the case with the hermit crab), but can also be elements which have to be joined together in order to form a protective unit (e.g. stones, used to erect a protective wall or a castle). in this case V represents the totality of all behaviour patterns which are useful for the artificial acquisition of additional protection units.

Third stage c: The energons H,I and K are human beings, each of them having acquired protection units. H may have acquired a house (W_3), I a gun (W_4), K body guards (W_5). These three energons (there may be many more) join their forces and together form a united structure which protects them all: a community defence unit against predators. This can be a kraal as we can still find today in primitive African tribes, but could equally well be armed forces or finally a protective organisation including laws, jurisdiction and national defence. Thus, the "state", in its role of a vehicle of effect protecting its citizens, is the result of a functional development of all protective institutions built up in course of evolution.

Another method to solve this problem is seen in animals which roll up, which are found in various animal species. Only their upper side is armoured – so in case of danger they roll up: the pill-bug, the woodlouse, the pangolin. The hedgehog rolls up as well. The porcupine, however, just spreads out its spikes, and the porcupine fish sucks itself full with water which causes its spikes to stick out on all sides. In each of these energons particular behaviour patterns had to be developed. Only in connection with these patterns did their protective organs became fully effective.

The characteristic mode of defence devised by human intelligence is the shield. It can be put aside, it is not very heavy and it allows free movement. If the enemy's spears or arrows come flying, the shield is held out against them. The expenditure for its protective effect is thus restricted to the absolutely necessary minimum.

The problem of growth affects not only insects and crayfish but also companies and state systems. If a company grows, new walls and doors have to be built. If a state enlarges its territory, new frontier fortifications become necessary.

3

Most animals– as a prerequisite for their mode of acquisition – are able to move freely. If they also use this proficiency to escape from predatory enemies by fleeing from them, this seems to us to be just natural. We have to consider, however, that again certain vehicle of effects are necessary for this skill, i.e. behavioural patterns.

Squirrels flee to tree-tops; mice into their holes; the beaver dives away; the pheasant takes wing; The mouthbreeders' offspring rapidly flee into their parents' mouths; young kangaroos jump into their parents' pouches; rabbits dodge; moths loop; for each of these performances the animal needs a very concrete material unit in its central nervous system – a corresponding behavioural pattern.

If acquisitive and locomotive organs are *additionally* used for defence – if for example fish defend themselves with their mouths or deer by using their hoofs – then this is anything but "self-evident". Prey and predators are totally different: the energon has to be able to distinguish between the two. Besides, flight calls for an entirely different co-ordination of movement than does attack. Here again defence is based on an additional development of behavioural patterns.

Some animals instinctively play dead whenever they are in danger. Their protective reaction is based on the fact that many predators are only stimulated to attack their prey if it is moving. In this case the protective behavioural pattern is adapted to the behavioural pattern of the predator. Human beings also still have this protective reaction inherited from our animal ancestors. When we become aware of danger, that is when we become "terrified", a physical rigidity comes on to us, we are "paralysed" with fear.

A rather desperate and costly way of fighting one’s enemies is the shedding of some body parts. If the lizard is in danger, it sheds its tail. This part continues to move and thus attracts the enemy's attention – the main body escapes. When the sea cucumber is attacked it sheds its innards. The predatory animal eats them, and might then leave the rest alone. Later on the innards regenerates. If the freshwater ringed worm (Lumbriculus variegatus) has to face attack, its body disintegrates into several parts. Those which are not eaten up by the enemy regenerate the missing body parts.

Regeneration as the main defence weapon can be found in nearly all plants – but some of them also defend themselves via corresponding "behaviour". They "escape" from their pursuers – even though they do so in their very slow manner, i.e. by means of growth. Every goat plucking off the leaves of a sprout illustrates the advantages bigger trees have as soon as their leaves grow more than two metres above the ground. This is primarily a measure of attack against rivals, which are thus deprived of light, but furthermore it also serves for defence.

Also in this case we can speak of a behavioural pattern. The difficulty of distinguishing strictly between developmental and behavioural patterns is clearly illustrated in this example.

4

It is widely known that animals and plants are provided with extremely variegated and effective defence and fighting mechanisms. It is new, though that the expenditure involved is assessed in terms of energy – regardless of what individual defence measures may actually be taken – and to sum them up under the same category. Regarding their effects, all actions of predators are similar: they can be compared with spears threatening the energons. The defence mechanisms against these spears are –in stick to the terms of symbols – like protective shields. Whether such a "shield" looks like armour with spikes or appears in the form of a control structure in the brain which induces the creature to flee, to play dead or to use its locomotive organs as a means of defence is – with regard to the balance-sheet – of very minor importance.

It is a fact that almost every energon is threatened by predators. It is also a fact that it has to protect itself in one way or another. To be more precise, it has to be protected by some kind of vehicle of effect; otherwise it is likely to become a victim of the predator and it would not be able to survive nor to evolve further.

Here, too, the only essential thing is: what does the defence mechanism cost ? How effective is it ? How fast does it work ?

Camouflage, as a defence mechanism, is totally different from inflicting an electric shock (as in the case of the electric eel) or from intimidating the assailant by inflating oneself – or by systematic propaganda. The energon theory claims that it is not the differences that are important but the energy expenditure involved and the actual effect.

If a monocellular parasite invades a body – for example a pathogenic agent – then all defence functional units which are directed outwards are totally useless – and the functional units in the energon have to take action. In the human body it is the leucocytes that sacrifice themselves in a most unselfish way. They swim around in the blood or they creep around in our tissues like freely moving amoeba, eat up as many invading enemies as possible and finally, loaded with this dangerous burden, leave our body; so they commit suicide for the higher purpose. As we experience them as something which causes us discomfort, our "ego" rejects them. We call them "pus". They are units which sacrifice their lives for our benefit.

Other even more highly specialised police units are the antibodies. They are tailored to order depending on the kind of enemies invading. These units – just like the leucocytes – have so far been the subject of physiological research; the defence mechanisms against the environment, however, have been an issue discussed within the fields of ecology, morphology and ethnology. Within the scope of the energon theory these phenomena belong together. If a defence effect neutralises the enemy outside or inside the body makes no difference to the balance-sheet. The only essential is that the enemy is eliminated. And all factors that contribute to that belongs together functionally.

Some tissues are capable of eliminating invading predators by surrounding them with a firm shield. In pigs, for example, invading nematodes are enclosed within a capsule which then gradually calcifies. These predators, however, are quite obstinate. They go on living within the capsule for up to 30 years. If a suitable host (a rat, a dog, a human being, a bear, a pig) eats meat which is infected by them, the capsule decomposes, the energon is set free – and within the new host further development and procreation is initiated .

Companies, too, have security units. The same is true for State bodies – where they gain particular importance in wartime. If in the interior an enemy is detected – in this case any citizen can become an enemy – he is eliminated as well. Or he is enclosed by a firm capsule: he goes to "prison".

Another way of fighting the enemy can be seen in the earthworm and in the comb-clawd beetle. The former has a liquid within its physical cavities with a disgusting taste: if a predator bites it, the assailant may pause for a moment, and the earthworm gets away with just some injuries. If the predator is capable of learning, it will associate the outer appearance of the earthworm with the disgusting taste. Consequently it will leave other earthworms alone –

which is favourable to the species as a whole. The comb-clawd beetle has highly poisonous substances in its body. If the assailant happens to eat it, it will probably die. This doesn't help the comb-clawd beetle itself, as it does not bring it back to life. *But it is useful for the species*.

Why? That is quite simple: If many such predators die because of the comb-clawd beetlethis means a disadvantage in terms of natural selection – a disadvantage to the species as they are not able to compete with others which do not eat thecomb-clawd beetle. At best these predators can become mutants (a genetically modified species), which then avoid comb-clawd beetles. Consequently, this variant survives. Such processes may take a thousand generations, and many poisonous animals (in our case the comb-clawd beetle fall by the wayside. But the descendants finally profit from this "pioneer sacrifice". *It is again the species that benefits*.

For the human germ cell such defence measures, though not protecting the individual, but fellow members of this species and descendants, are particularly important. Whoever is killed by another cannot be brought back to life by any jurisdiction in the world. But if the murderer is executed, this has a deterrent effect which gets around. The retroactive effect works in a different way, but leads to the same result: other people will be killed less readily.

So there are defence effects which do not work for the individual, but which do for its descendants. As for animals and plants, these descendants are always members of the same species. As for human energons, as far as their procreation is concerned, they are no longer restricted to fellow human beings – and so it happens that protective measures for the human germ cell are useful to the whole variety of energons set up and controlled by human beings within a certain territory.

All in all, it should be noted that all energons are threatened by "spears" and therefore need adequate "shields" for defence. What such a shield in each separate case has to look like in order to be successful depends on the nature of the spear, e.g. is determined by the nature of the enemy. So, to a considerable extent predators influence the evolutionary development of the energons they attack – *without ever even intending this at all*. By means of influencing causality they force energons to develop vehicles of effect for their defence – additional structural features and activities, i.e. additional costs

The energon USA spends a huge part of its budget on national defence: In 1965 – before the war in Vietnam made itself particularly felt – it was more than 50 billion dollars. As for the sea-urchin, the expenditures for developing a shield and its spikes (nobody has rated it) may be almost equal to the expenditure for the actual acquisition organs: mouth, bowels etc. As the sea-urchin, however, uses its spikes also for locomotion, these expenditures have to be categorised partly also under the heading "acquisition". If the military forces in the USA are also in some way or other useful for the promotion of foreign trade – as is very likely to be the case – then also here a correction is necessary.

Apart from the predators, there are also other environmental factors which threaten and influence energons. Though their effect is arbitrary, they can have even more serious consequences than the effects of predators.

Let us have a look at these other "spears".

II

THE LIMITS OF WILL

Necessity is the basic thought and inventor
of nature and her bridle and eternal rule.
Leonardo da Vinci (1502)

You should rather make footclothes out
of it for the cold season because stockings
don't provide warmth...and as for the overcoat
you will probably have to buy a new one.
" Nikolai Gogol ("Der Mantel", 1847)

1

"Do we have a free will?" is a question that has been much discussed. Within the frame of the energon theory, however, the edge can be largely taken off this grim discussion. Whether free or not – *the result of our free will is not free*. No matter if we act one way or another, the structures we obtain are largely traced out. They are dictated from elsewhere. The development of human power as a whole is part of a larger process, which, from the very beginning, was never in control of itself.

To us, who are used to thinking in a self-glorifying manner, this approach seems so unfamiliar that it can only be approached in a roundabout way. As long as we feel separate and distinct, we consider ourselves the masters of our deeds. When following the line of evolution that brought mankind into existence, the rigid tracks we move along become evident. Influenced by the frequently overlapping force fields, our will leads us – whatever it decides – to a so-called "crystallisation" that is mapped out for us.

In the field of biology – particularly in "ecology" – one speaks of the "forming" powers of the environment.[1] The same applies to sociology, where we talk about the "forming" powers of tradition, manners and customs. This, however, is not really meant seriously. We always consider living creatures and in particular human beings to be the subject, the "actor". Inundations, storms and thunderbolts, wars, laws and fashion may probably toss an individual living creature back and forth – but human beings in the end are the ones who decide, who adjust, who create and invent. That is what we believe.

We arrive at a different perspective if we look at the flow of life's evolution when dealing with the forces of nature. In this process these powers force evolution to go in a certain direction.

They define which forms the process of life adopts while slowly moving forward like a myriad of flames. The single individuals in this process are merely vehicles of a will that has been imposed on them. Human beings are capable of reflecting on themselves and of leading their lives one way or another. The process that continues through them is so slow that human beings are not able to see its unyielding inevitability. We think that everything we do and finally achieve is *our* doing. But it is only the detail that is up to us. As to the rest, we, too, are only small components in the interaction between the process of life and extremely variegated powers acting on it.

The nature of the "will" of living creatures and humankind's "free will" is quite clearly demonstrated by the chemical processes that constitute the process of life.

2

In their development most of these processes are influenced by temperature. If the temperature rises the processes develop faster, if the temperature falls any chemical process slows down. This applies to the anorganic world as well as to all vital processes. A decrease in temperature by 10 degrees means that the vital processes are reduced to half or even to a third of their original rate (van 't Hoff's Equation). The process of life is subject to this influence like a jumping jack: When it gets warmer, invisible powers pull the strings, and the jumping jack vehemently lashes out; when it gets colder, the pull on these strings decreases, the jumping jack moves slowly.

All energons that have not produced any functional unit for their own heat regulation ("poikilothermics") are such jumping jacks.

When the temperature drops below a certain minimum, the wheels of life come to a standstill. When the water in the cell structures freezes, the organism will be destroyed. At that point there remains no possibility whatsoever for an active energy balance. The cells "die".

As a protection against this malignant spear that penetrates into the very centre of the energon, sparing nothing, searching its way into every functional unit, one or another protecting shield was produced. The energons used to produce these shields but the cold controlled the production. Just as predators determine the formation of defence mechanisms directed against them, the cold also forced and controlled the formation of protective devices against it.

It is primarily a matter of behavioural patterns. If the cold strikes the areas we live in the microorganisms of the meadows and open fields start moving towards the forest. They find frost-free shelters underneath the fallen leaves. Snails with shells hide in small openings, bury themselves in the ground. Some close their doors with several mucous membranes which are lined up one after the other, providing an insulating effect. Frogs bury themselves in the mud, caterpillars spin a nest of leaves to protect themselves against the cold. Dozens of spotted salamanders are closely pressed against each other in deep holes in the ground..

In each of these energons a behavioural pattern of self-protection has developed in the course of evolution. The cold steered this development. It did not contribute the least amount of energy for the development of such patterns but it was crucial in the development of their forms. Only animals that possess *appropriate* behavioural patterns are able to survive in cold zones. All the others –*no longer exist in these places*.

Along with a drop in temperature, changes in the cells of some animals and plants occur. Free water is bound to the colloids more tightly. In thin membranes and capillaries it crystallises only at a temperature of minus 20 degrees Celsius. The shield bug can survive in this state of adjustment at a temperature as low as minus 26 degrees Celsius. If exposed to low temperatures in spring, however, it dies at a temperature of only minus 10 degrees Celsius. In Alaska the algae living in the tidal zone can cope with temperatures up to minus 20 degrees by similar changes in the plasma. Deep sea algae which cannot adapt like that die at temperatures of only minus 5 degrees. In this case the behavioural pattern for processes within the body are the ones which neutralise the effects of the cold.

Dragonflies, caddis flies and many bugs survive the winter at the larval stage under water which is the perfect shelter as the temperature never drops below freezing point. Unless the water freezes entirely this is where they find protection. This form of adjustment is based on quite drastic changes in the genetic blueprint: an entire phase of life is transferred to an underwater environment. In springtime this energon then adapts to the new setting and turns into a creature whose habitat is the air.

So far these phenomena have been dealt with by separate scientific branches, but in fact they belong together. The energon as a whole faces the effect of the cold. The various defence mechanisms merely differ as regards the methods. What matters is the overall expenditure necessary for neutralising the spears of the cold.

How things are concerning the individuality of the animal energons is illustrated by the protozoon *Amoeba vespertilio*. Usually it is 70 mm long. If it continues growing beyond that length, it splits up. This ability to split, however, is lost as soon as the temperature drops. When we keep it at a temperature of 5 degrees Celsius, it grows to 300 to 400 mm long; consequently its volume multiplies by more than a hundred. This may be considered an advantage for the individual: the enterprise is getting stronger and bigger. This, however, does not depend on the individual. Invisible strings are pulled here and largely determine its fate.

This also applies to many larger animals. At a low temperature their sexual maturity sets in much later. But as the growth process stops as sexual maturity sets in, there are many animals – for example in the Antarctic, where this process sets in at a later point in time – which are much bigger compared to related species. Also here a mechanism which is in no way linked to this life structure and its success steers formation in every single case.

The "warm-blooded animals" – birds and mammals – have produced a particularly efficient shield for defence. They heat up their bodies and maintain their inner temperature at a constant level by means of feedback.

This way, a significant competitive advantage is gained. While the movements in non-heating competitors get slower and their life spirit deteriorates when the temperature drops, warm-blooded animals remain active. They pay for that with a significant energy expenditure. But the additional benefits are definitely worth it.

This fact, however, also leads to certain complications. When a body grows, its volume increases by a power of three, its surface only a power of 2 (in a cube V equals a^3, the surface $6a^2$). This means that larger bodies have a relatively smaller surface. But as it is the surface via which heat is lost, larger animals are better off. They have a relatively smaller heat loss ("Bergmann's rule").

In a dog weighing 20 kg the heat loss per kg of body substance is only about half as much as in a dog weighing 3 kg. Consequently, this correspondingly means that smaller animals need to increase their temperature to a larger extent. This also requires increased activity of the lung – but most of all of the heart. Hence smaller animals have a relatively large heart. In an owl weighing about 2 kg the weight of the heart is approximately 5 per mill of their total weight; in a little owl, which is ten times lighter, however, it is 8 per mill. There is an even greater difference between the wandering rat weighing 200 grams (heart weight 4 per mill) and the pygmy mouse weighing only 5 grams (13 per mill). In this context we usually say that the size of the heart is adjusted to the environmental conditions. It would be more precise, however, to say that the effects of the cold lead to a larger heart in small warm-blooded animals.

In some warm-blooded animals the necessary fuel resources) are accumulated inside their bodies, in others outside. The reindeer stores glycogen in the muscles as well as in the liver; it accumulates fat mainly under the skin and so, as an additional advantage, there is an insulating effect. The hamster on the other hand carries up to 10 kilos of cereals into its hole. In burrows of polecats you would find heaps of half-paralysed frogs which are still alive but cannot move an inch. Through one bite in the spine the polecat paralyses the frogs. The meat stock thus remains fresh and cannot crawl away.

This again shows how useless it would be to study the processes that take place inside the body (storage of glycogen and fat) and the behaviour of the body as a whole (bringing in cereals, biting the neck) in different fields of science. Both are methods of providing heat; each of them with its pros and cons. Heating material that is stored within the body always has to be carried around and thus means a certain strain for the individual – but is less prone to getting lost. With separate storage the body is relieved from the burden – but the cache might be forgotten (something that happens to squirrels quite often). As far as the energy balance is concerned, the only thing that matters is the energon has access to the heating material which it needs to survive the cold period, and the question is how much each storage mode costs in the end.

This example also shows that it is entirely insignificant whether a functional unit is connected to the body or not. The energon has to be able to make use of it – that is what matters.

Human beings became even more independent of the cold by wearing clothes and by artificially heating their shells (houses). This, however, is how we usually express ourselves, and it does not really take all actual circumstances into account. It is rather the case that the temperature forces human beings living in cooler regions to use such shelters. If they does possess them, they can survive in these areas, if they do not, they cannot. The additional expenses which in a professional entity or in an business organisation are caused by the necessary shield against the cold (ovens, insulation, heating/fuelling material, etc.) are a perfectly concrete value that can be measured in any case. In animals the building costs of individual structures have hardly ever been measured so far. But also in this case the energy expenses which are necessary to fight the cold represent a concrete percentage in the total balance. If the shield against the cold can be installed at low cost, this is – in both cases - an advantage. How this is achieved in individual cases is of secondary importance.

4

Heat is an even worse tyrant. When the temperature increases by 10 degrees, the vital processes take place at a speed two or three times as fast as usual. From a commercial point of view this means an increase in the running costs a factor of two or three; this certainly makes a difference, particularly in periods when no acquisitions are possible. In such a case, the animal or plant energons are *forced* to spend two or three times as much for unproductive periods. That is extremely strenuous!

In the shell *Pecten groenlandicus* that lives off the coasts of Greenland at an average depth of 25 metres we see what difference this can make. These layers of the water do not offer much nutrition, but as soon as the shell moves to higher layers which are warmer (and richer in food), the running costs of its metabolism increase to such an extent that the balance becomes negative. As the Danish biologist G. Thorson found, this is the reason why the shell is compelled to settle exactly in this layer between colder and warmer water. Its body lies in the cooler region, and thus it can live more economically; it obtains its food from the higher layers of water.

Even life span is significantly influenced by heat. The life of a fruit fly *Drosophila melanogaster,* at 15 degrees Celsius, starting from emergence of the larva from the egg until the mosquito dies, lasts 124 days on average. At 30 degrees, its life span is reduced to an average of 25 days, which means that it is five times shorter. One might take the view that in fast vital processes the actual life proceeds in a more dense and concentrated way, and also one might say that a mosquito, not having any self-awareness, knows nothing about its existence and thus is not affected by a shorter life span. De facto, however, it can hardly be denied that this means a rigorous interference with life.

The paths of evolution were often winding roads, and individual steps of progress very much depended on external circumstances. Even human evolution gives evidence of this. Our ancestors, the apes, developed in tropical or sub-tropical regions. They lost their fur – from our present point of view – when they started to pursue predatory acquisitive activities in the savannah. When chasing fast animals, the thick fur was too inconvenient and too hot. The hairless predatory apes, in turn, were much less apt to live in cooler regions. But it is specifically in such areas that the functional unit which is the "human brain" developed and attained higher capacities – which is clearly illustrated by the fact that technical progress in the evolution of humankind took place in cooler regions. The bridge to this state was built by the production of the artificial organs called "clothes".

5

Not *every* intruding spear affects *every* energon. For instance light – an enhancing factor for most energons –, whenever it becomes too intense, has a harmful effect on small organisms. This is one reason why in seawater, plankton sinks down to a depths of 50 metres by the mid of day and returns to the higher layers, which usually provide better acquisitive possibilities, only in the afternoon. Also for the human professional entities light can have a negative effect – like, for example, the acquisitive activities of thieves.

Another example: the salinity In fresh water the absence of salt poses a problem to all organisms living there which have a skin permeable to water: it takes their body minerals. This effect is countered by special processes (osmo-regulation). From the energy point of view these processes are costly. The water fleas and the water hog louse have fixed costs that are two or three times as high as related species of approximately the same size living in brackish water. This has to be made up for by higher revenues. On the other hand, to a chaffinch or a fashion designer the salinity is of no importance whatsoever.

There is, after all, a spear that affects every energon, making no exception, and that causes additional costs not only to every plant and animal but also to every professional entity and every business organisation. I am referring to the force of gravity. There is nothing that can withstand it, nothing that can stop it.

Nowadays, in the textbooks for zoology and botany this "forming power" is hardly ever mentioned. Only when discussing the sensory organs for the perception of gravity it is briefly touched on. The comparison of a leaf of grass to the trunk of an oak or the legs of a spider to those of an elephant, however, makes it plain how incredibly strong the impact of this power on every organic formation is. Only in animals living under water doe buoyancy partly neutralises this power. On land, however, it constitutes a major problem to all energons.

Every part lying on another has weight and has to be carried. How much load a structure can carry is not only determined by its material but generally speaking by its sectional area. If an energon grows, the sectional area of all carrying units increases only by the square, the load that is to be carried, however, increase by the cube. *That is why* spiders are able to stand on such thin legs, whereas the much bigger elephant needs enormous pillars in order to be able to lift its body above the ground. *That is why* for a young plant a slim trunk is sufficient, whereas large trees need massive columns. In this respect the force of gravity – caused by the size of our planet – forces the stream of life to remain within certain limits. Only when the energons had overcome the obstacle of being forced to consist of parts that had grown together did this factor lose much of its controlling power. Also human professional entities and business organisations can erect structures only up to a certain height, but they have the possibility to divide their units up, using space as wherever available, and thus – in principle – reach any size they aspire to.

In the field of technology the force of gravity is important in the creation of all kinds of larger structures. In the construction of buildings, of any bridge, but also of all larger machines it has to be taken into account. However, as it constitutes a constant quantity, we have got used to regarding it as a self-evident circumstance.

Only when the problems of space travel came up did this situation change. Today we have to deal with the question as to what characteristics and size devices suitable for the moon have to have and how they have to be dimensioned. What would a means of locomotion, a house or any other facility on a larger or smaller planet – with a different gravitational force – look like?

It is exactly this question that should be asked in the fields of zoology and botany. Which structural features did this power, which is present everywhere and never subsides, impose on the formation of animals and plants?[2] Which additional costs did it force upon the energons – and which did it save them? What would functionality like on a planet half or twice as big?

One might say the process of life somehow grew into overlapping fields of effect. Each of them forced upon the energons a certain structure, a certain expenditure of energy. Via the means of controlling causality each of these fields also took part in the formation of form and behaviour. The germ cell "human being" was able to confront all these influences far more successfully. Practically speaking, however, this means that the energons formed by it are confronted with even more complicated defence structures. Areas prone to inundation force us to build dams, otherwise there would be no possibility for acquisitive or luxury activities there. The water forces the diver to carry an artificial breathing apparatus with him and to a wear protective suit. Many human beings fight their way up to the coldest regions of the Arctic – but only if their energy potential is big enough to produce the protective structures needed there. Nowadays, spaceships leave the earth’s atmosphere, and nations send functional units to other planets. But this, too, is only possible if these energons have the means necessary to work as a protective shield against forces – in this case particularly the force of gravity.

Environmental factors thus interfere from all sides with the energons’ developmental flow and in the energon itself lead to a kind of crystallisation. They control the formation of functional units which are directed against themselves. Wherever energons do not succeed in producing the appropriate vehicles, there is stagnation in the evolutionary flow. In cases where they are succesful, the flow continues[3].

6

In the very same manner the environment artificially created by human beings reverberates on them[4]. Just like the force of gravity, tradition, customs and laws act just as invisibly on the energons from all sides and lead to additionally necessary structures and behavioural patterns.

The rules of politeness and consideration force us to take or to desist from certain actions, which appears in the balance of acquisition efforts as an expense entry. The humans' aesthetic sense and fashion force structural elements upon very many acquisitive organs (products) which they otherwise would not have. Because of customs and rituals human beings are pushed into channels which quite often put a certain strain on their energons. Sundays, holidays, peer and class distinctions, habitual meal times, styles of education, of conversation and behaviour compel them to respect certain limits and guidelines. The laws of a country invade the utmost privacy of each one of us. In the labyrinth of interlinkages these constitute invisible but thick walls. And to make things worse, there is a vast quantity of foreign interests influencing the human germ cell, awakening desires in it, making it dependent, winning it as a buyer, wanting to turn it into a source of energy for others.

Those and other fields of power (religion and the repercussions of our technical tools belong to these fields as well) significantly determine life and power structures of the energons formed by human beings. In this network our free will oscillates – and unavoidably leads to results that are not results of our will but are forced upon us.

7

For the balance of the individual energons both predatory as well as interfering influences are equally important; they hamper or jeopardise the energon. No matter what each of them may look like – they have to be protected. Whatever the functional unit designed for this purpose may look like – in the end it serves the same purpose.

So, in order to determine the competitive value, one can add up all defence mechanisms and the costs caused by them. The difference – the impact of the predators is directed towards a certain target, those of the other interfering or threatening environmental influences, on the other hand, are not – is functionally speaking of minor importance. Very often the same functional unit – for instance, a protective shell – both keeps off enemies as well as interfering influences.

In the first part of my book I showed that three criteria, expenses, precision and quickness, provide values on the one hand in the developmental period and on the other hand in the three typical phases of the acquisitive period, – resulting in a total of twelve values – which give us important information on the competitive power of the energon. Not every value is relevant for each energon – but each of them in principle has to be examined and considered.

When doing this, we first measure the energon as a whole. We obtain more precise values when we define different groups of functional units that are functionally related and apply the twelve standards to each group.

The first group represents the expenses as a whole that are directly related to acquisitive activity. The second group we are discussing here: the combination of all functional units and all effects that serve the purpose of defence against predators and interfering environmental influences.

As far as the costs are concerned, there is little need to prove that they, too, are very important for defence. If an energon succeeds in neutralising the same hostile effect at lower costs, this eases the strain on its energy balance.

Another factor which almost always plays an important role is the one of precision. If a predator or an interfering factor can be warded off ninety times out of a hundred – at the same cost –, this would be better than if it could do so only eighty times. How fast the defence process , however, may or may not play a role. In the defence against predators it quite often tips the balance between being or not being; in the defence against interfering influences in comparison, it may play only a minor role as regards the factors of expense and precision. Here, too, there are correlations that may turn out differently depending on the environmental circumstances.

Also here it would make sense to asses the developmental period, the acquisitive phases, the non-acquisitive phases and possible phases of rest separately. In each of these stages the energons are confronted with a lot of very different problems as regards their defence against enemies and interfering factors. In resting phases the energons are particularly endangered by their enemies. During the developmental stage, however, they have to face other influences. Longer acquisitive actions increase the risk of falling victim to enemies.

In economics usually no distinction is made between acquisitive risk and danger from enemies or interfering factors. According to Oberparleitner's definition, a risk is any possibility outside the sphere of will and power, which by its occurrence or non-occurrence is capable of jeopardising the success of some performance. Following this definition, risk is simply anything that has a hampering effect on commercial performance[5].

Others base their definition on the planning activity typical of all human form of acquisition, and define risk as the "measure of deviation from a plan" (Wittmann), as the "distance between the data of a plan and factual data" (Eucken) or as the "occurrence of a case which was not in accordance with the objective" (Krelle). Eventually, also the difference between "internal" and "external" dangers was used; Walther, for instance, distinguishes between "production" and "entrepreneurial risk"[6].

From the point of view of the energon theory, we need to differentiate between acquisitive activity and defence against interfering factors. The acquisitive risk is a result of the relation between the key and the keyhole. The more precise the latter is, the smaller is the risk. The risk from interference or enemies, on the other hand, results from the shield-spear relation – from a trade-off on a completely different front.

These two risks are not identical, but are significant in relation to each other. A high acquisitive risk is not necessarily accompanied by a high interference risk. If a machine has a high output, the acquisitive precision is low – but not at all influenced by interfering factors. If the interference risk, on the other hand, is high, the acquisitive risk almost always increases as well.

Insurance companies which practically cover risks differentiate perfectly in accordance with the energon theory: insurance against storms, hail, earthquakes, looting, theft, robbery and fraud clearly cover the risks arising from environmental factors and from predators. Insurance policies against acquisitive disability in old age, against unemployment, transport damage, breakdown of machinery, credit loss and disruption of business activity equally are clearly defined safeguards against acquisitive risks. Even in fire and accident insurance, which covers a mixed risk, the insurance policy shows that the corresponding distinctions are made. If in a company processes take place which involve a risk of fire, the insurance premium is raised – as the *interference risk* is higher. The same applies to accident insurance contracts when the insured person has a dangerous job, i. e. when his *acquisitive risk* increases.

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8

The defence sector – as a whole – thus provides, just as the acquisitive sector does, twelve types of data relevant for the assessment of all energon types. At this point, though, some sort of correction has to be inserted.

In order to simplify my explanation I have so far included the acquisition of substances in the energy acquisition. This is in principle possible, although we obtain more precise values if we look at these two acquisitive actions separately. A very clear conceptual distinction is provided by the fact that energy acquisition always has to lead to an increase in the free, usable energy potential, whereas each acquisition of substances always uses up free energy, thus reducing the potential.

The closer we get to the processes on a molecular level, the harder – or even the more impossible – it is to separate them. In animals, too, this separation can only be made by means of estimates: their food intake supplies them with both energy and substances. In plants the separation is much more obvious. Plastides clearly are functional units in the process of energy acquisition, roots and the inter-cellular system are primarily such in the acquisition of substances ("primarily", that is because the obtained oxygen has free valences, and so also here energy is acquired along with the substance). In a production plant, however, the two functional circles clearly diverge. The acquisition of energy – the production and use of the acquisitive organs – definitely is part of the responsibility of the divisions for "production" and "sales", the acquisition of substances, on the other hand, runs under "purchase".

So, if we want to program a computer for the assessment of competitiveness, we can calculate more precisely if the acquisition of energy and substances is kept distinct as far as possible. This is also justifiable insofar as substances are necessary not only for the acquisition activity but also for each growth process.

This, however, means that by now we have arrived at as many as three separate groups of factors with twelve measurable values each that can, even must, be used for assessing the level of competitiveness.

There still are several others. But before we go into these, we have to turn to the "parts" of the energons again – the functional units. In the last paragraphs we have continually dealt with influencing factors which *control* the evolutionary development of the energons. What does this process look like in detail? Where do these influences have their effect?

Comments:

[1] The current study has emerged from this branch of science, particularly influenced by the presentations of R. Hesse and F. Dorflein in their work "Tierbau – Tierleben", Jena 1943. Many of my statements derive from this book.

[2] Plants provide their seeds preferably with fat as vehicles for the energy they need for their development. Thus, they become lighter, which enhances their proliferation by means of the wind; still with this kind of storage more energy is lost than if storage took place via carbohydrates. The spear "gravitation" thus forces these plants to adopt an uneconomical procedure.

[3] The basic concept of the energon theory has to be taken into account in all these considerations: it is not the producer who dictates the structure related to time and space necessary for an energon, but rather the circumstances which have absolutely nothing to do with the production process. Not a drop of the influencing energy enters this developmental flow.

[4] This is the topic Marshall McLuhan is concerned with. See appendix III.

[5] K. Oberparleitner, "Funktionen und Risiken des Warenhandels", Vienna 1955

[6] F Philipp, "Risiko und Risikopolitik", Stuttgart 1967.

III

FUNCTIONAL EXPANSION

Human knowledge emerged rather
like islands emerge from an ocean –
its soil slowly raises and its water
slowly recedes.
Wilhelm Ostwald (1912)

Consolation: wisdom becomes eternal
through death. Stupidity does not:
that is merely inheritable.
Karl Heinrich Waggerl (1950)

1

Every energon is composed of nothing but effects. In the course of evolution the environmental conditions changed permanently. The energy sources changed, the sources of substances changed, new interfering environmental circumstances developed. The energons were only able to survive by also changing, i.e. by producing new effects. How is this achieved?

There are two possibilities: either the energon produces a new functional unit or the already existing functional units take on additional functions.

In every enterprise both processes are applied. The first would be when a new building is erected, a new machine is bought, a new staff member is hired, or a new department is founded. As in a work-dividing economy such units in most cases already exist, ready to be used, to be purchased, or to be leased, this form of acquiring new functional units is rather easy. All it requires is awareness of their existence and capital – i.e. adequate energy surpluses – in order to integrate these into the effect structure.

The second process occurs when the boss calls his staff and tells them, "Listen, I have a new task for you." Or when he says, "Listen, from now on your department is going to take on the following in addition..." In that case no new unit is added to the effect structure of the energon, but, instead, one that was already existing is induced to perform an additional function

In the professional entities and structures of states we see the same alternatives. An example of the first process: a new tool is purchased or a new ministry is founded. An example for the second one: with a tool already existing a new operational process is carried out, or an additional function is given to a consulate already in existence.

In plants and animals whose functional units in almost all cases grow out of a germ cell, things are a bit different. As long as evolution was tied to this production principle, it was not that easy to acquire *new* functional units. It was only through changes in the genetic blueprint that such structures could be created – and this road was often barred by the fact that all stages of development had to increase their competitiveness – or at least not to reduce it. Otherwise, such a development would immediately come to an end.

It was much easier to achieve new effects by changing an already existing unit.

This process is what I call *functional expansion*. The tasks ('duties') of a functional unit are augmented by another – its effective field is 'expanded'. So far little attention has been paid to this process, which was of significant importance during the evolutionary process. The phenomena of *sharing functions,* of *changing functions* and of *pooling functions* were realised both in biology as well as in economy as regards their significance and thoroughly discussed. Functional expansion, however, which constitutes the starting point for these phenomena, was overlooked or not given the attention it deserves.

This process gives profound insight into the development of functionality in nature.

2

First of all there is the possibility of a functional unit instantly rendering, thanks to its composition, further useful 'services' free of charge to the energon. For instance, with insects their hard armour not only protects them against enemies, but also against the evaporation of body fluid. In the leaves of plants small openings and channels of the inter-cellular system not only serve to transport necessary gaseous substances to the cells, but it is also through these very same channels and openings that the gaseous waste products escape. Or: apart from *developing* interconnections in the cells many enzymes also render valuable services in the opposite process of *catabolism*.

The cnidocysts of the coral polyps give particularly clear evidence of such a double function (figure 10). We have reason to assume that these highly specialised functional units were developed primarily as tools for seeking prey. At the same time, however, they also were, from the very beginning and without any additional elements, extremely effective means of defence. For if, for example, a predatory enemy touches the trigger, it is also hit by the poisonous arrow. Nowadays we are accustomed to classify all 'weapons' as belonging to one and the same category, thus making such a double function appear to be natural. As regards the energon, however, we are talking about actions in two totally different effective fields.

In more highly developed animals most of the sensory and locomotive organs also possess this double function. On the one hand, they are functional units for acquisition, but on the other hand also of protection. The whale's thick layer of fat, for example, not only serves to protect this 'self-heating' (warm-blooded) animal against loss of heat, but it also provides great buoyancy, and thus diminishes the costs of 'defence against gravity'. The webbed feet of many aquatic birds are also of good use when they walk around in the soft mud of the shores. Their feathers are supportive means of flying, but are equally important as a protection against the cold. Regarding the spear of primitive man, we will probably never know whether it was originally developed as a hunting tool or as a tool for defence – in any case for both it proved equally successful. The inventors of the nuclear bomb assure us that their original idea was to develop a means of defence against tyrants: it is, however, not less effective as a means of attack for aggressors[1].

Thus, in evolution, new balance-enhancing effects could, so to speak, develop in the wake of others. In order to actually make these really useful, however, it was necessary to develop additional patterns of behaviour.

This is, for instance, illustrated by the legs of a toad. Controlled by certain behavioural patterns, they fulfil six different functions for this energon. First of all, the toad uses them to move on land. Secondly, for the purpose of catching prey or of escape, they enable it to jump. Thirdly, using another method of movement co-ordination – they also move its body across the water. Should the male toad come across another male (during the mating season), it uses its legs to repulse the rival. If, on the other hand, it comes across a female toad, its front legs embrace the female: consequently, she releases her eggs. At that point the male toad forms a kind of basket, and catches and inseminates them.

These six patterns of movement co-ordination were definitely not present all simultaneously, but were developed in the course of time. The functional unit, however, was already there. By means of the expansion of functions, the number of its energy-balance-enhancing effects increased.

Spiders use their threads not only for the purpose of catching prey, but also for lowering themselves, or use them as supports for sailing through the air, for insulating their winter shelters, wrapping up their egg clusters, wrapping up their prey; they also connect themselves to their web via the thread, so that its vibration tells warns them whenever some prey has got caught in the web. Each of these effects is rendered due to innate behavioural patterns through which the functional unit, the spinning thread, becomes available for a number of other applications.

Three applications of the woodpecker's beak are rather instructive. In the first place, it enables the woodpecker to capture insect larva hidden in the bark. A second application consists in constructing a sort of cave by using this very beak as a hammer. Thus, an artificial protective organ is created. Thirdly, in the course of evolution the woodpecker's pecking noise became a signal defining its territory. This way, rivals are deterred from getting too close. In that case the pecking is more regular and more rhythmic than during the building of the nest, which increases the functional value of the signal. In this case, too, the development of additional co-ordination patterns led to further functional effects.

One example for extreme functional expansion through the forming of additional behavioural patterns is provided by the human hand. Even apes have a series of instinctive hand movements (clasping branches of a tree, looking for lice, scratching, etc.), and in addition they also acquire a couple of others by learning. We human beings – due to our more sophisticated learning ability and intelligence – have a learning capacity which is almost without limit. A major part of human skills is linked to certain co-ordination patterns for our hand movements. Whether we cook, write, use tools, swim, play the piano, drive a car, or tie our shoelaces: for each organised movement of the hand we first have to develop adequate co-ordination, we have to 'learn' it. Only with this universal tool, the hand, which can be induced to perform ever new effects, could humankind conquer the world.

At the next stage of integration, in enterprises, human beings themselves represent a universal functional unit, no less universal. Thousands and hundreds of thousands of different 'functions' are exercised by human beings in business organisations. The patterns for 'suitable' behaviour relating to each position are either to be found in the incumbent himself or in another person giving him orders or perhaps in written regulations. The basic unit – just as in the case of the hand – is always the same: the human body. It can either be equipped directly or indirectly with any given number of behavioural rules – thus allowing this universal unit to take on innumerable different functions within the business organisations by functional expansion.

3

Mostly when additional functions are developed the mere formation of additional patterns does not suffice; the functional unit has to undergo structural changes. In the simplest case differences in dimensions would be enough.

This can be seen in castles and battleships. As regards houses, appropriately thick walls are sufficient to keep out the cold, thieves and noise, as well as to support the upper wall structure and the roof. As far as ships are concerned, the required thickness of the hull's walls results from the size and the construction material. If, however, we want these functional units to be forearmed against the effect of projectiles, the dimensions have to be greater.

On land, the primary function of the roots of plants is the acquisition of water (and of the nutritive minerals contained therein). In those species that grow to a greater heights these functional units adopted – by way of functional expansion – the additional function of anchoring and support. Consequently, they are stronger.

The whale's layer of blubber, too, was developed as a result of quantitative change. Most of the whale's ancestors, vertebrate animals living on land, already stored fat under their skin. This function alone fulfils two purposes at one go: the required reserve substances at the same time have an insulating effect. In the water this fat layer was even enlarged – out of which a third function developed: a significant buoyancy of its body.

Even protozoa went through quantitative changes in order to achieve the necessary floating ability. In Radiolaria the supporting skeleton is extended into the free water. The surface area and hence the friction are thus increased. Just like in the fat layer – the additional function consists in a countereffect against gravity.

In most cases, however, what is necessary for the functional unit is structural changes. If, in Egypt, the flat roof of a house is supposed to collect rainwater, it has to be built higher at the edges and to be connected to the cistern via a tube. The roof, originally designed for protection, now becomes – as a way of functional expansion – an acquisitive organ as well. In many cars the water used for cooling the engine also has a second use which consists in heating the interior of the car. Also here additional devices are necessary – but what is most important, i.e. water that has been heated, is provided by an already existing functional unit.

In the dynostarter (of some cars) the dynamo also takes on the function of the starter. In almost all fields of human technology such functional expansions are quite common and are striven for whenever they make it possible to save money. In many passenger aircraft, for instance, the door of the lavatory is constructed in such a way that locking the bolt on the inside at the same time switches on the light. Here, too, the bolt takes on an additional function.

Plants and animals needed to develop such performance enhancement to a much larger extent by changing already existing units. The water ascending in trees also carries the ground minerals needed by the cells. The roots perform additional tasks: they excrete mineral-solving substances and increase the concentration of the dissolved substances by osmo-regulation. If roots excrete substances that prevent the growth of competing plants (allelopathy), or if they store reserve substances (as, for instance, in the sugar beet), these processes, too, can be considered as functional expansions requiring adequate structural changes.

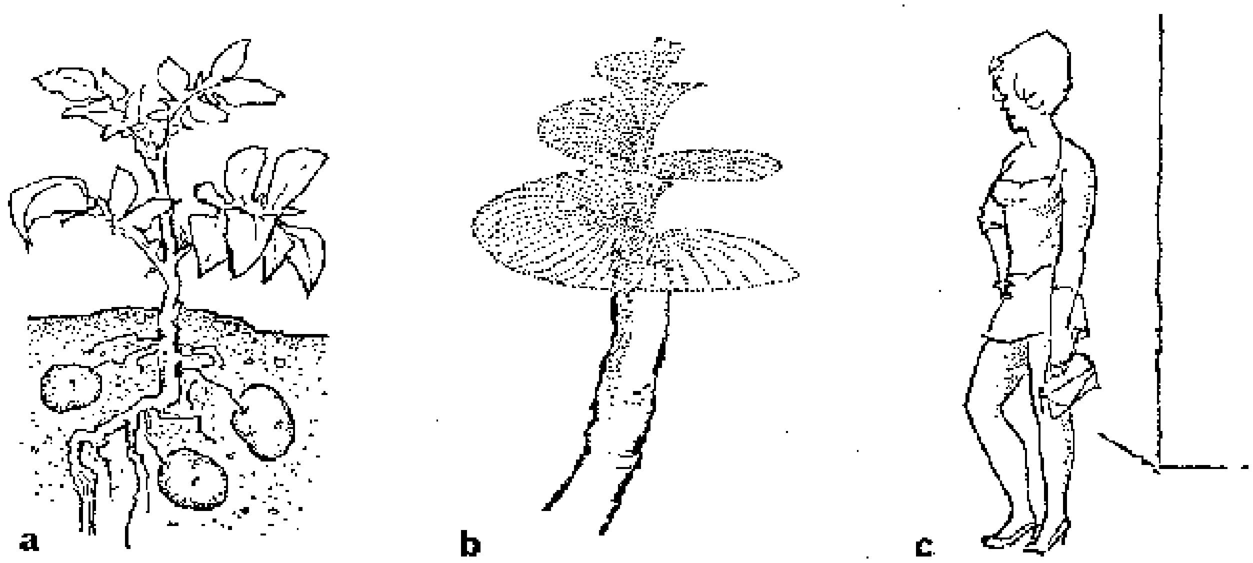


Figure 16: Examples for functional expansions

a) In the potato plant the rhizomes, which are equipped with roots, originally were functional units for the acquisition of substances and in addition take on the function of accumulating reserve substances.

b) The gills (functional units for the acquisition of gas) of the tube worm became – as an additional function – acquisitive organs. They are larger and are spread out like a fan. Small organisms and organic particles trickling down in the water are thus caught like in a net and brought to the mouth.

c) When looking at a prostitute we see that the genitals (vagina, breasts, plus all other parts of the body which have a sexual effect: buttocks, legs, face, hair, etc.) as an additional function become acquisitive organs. (Those who consider this approach and the comparison of a prostitute with a tuber and a tube worm absurd are advised critically to examine the further examples of functional expansion in this chapter. Here as in many other respects the energon theory leads to views that differ significantly from those we are used to.

We already discussed the angler fish In this fish, one of its back fin rays is longer and equipped with a worm-shaped device which it moves across its mouth. To other fish this looks like some sort of prey – and so they are lured directly in front of the angler's mouth. It would hardly have been possible to develop such a deceptive organ via gradual changes in the genetic blueprint. The development of this device would have been, however, through modification of an already existing unit – the fin ray. However, – and this fact must always be taken into account – a suitable behavioural pattern had to be developed as well: to move the "bait" back and forth across the mouth.

In the tube worms, which also live at the bottom of the sea, we see blossom-shaped formations on top of a towering stem (fig. 16). These are gills spread out like a fan which not only serve the purpose of acquiring oxygen and of excreting carbon dioxide (double function), but also – as a way of functional expansion – became tentacles. Nutrients that trickle down are caught in this feather-like ring and brought to the mouth by movements of the cilia. The ciliated epithelium did not have to be added separately: it is already there in most of the gills and facilitates a better gas exchange with the movements of the water. The ability to protrude the gills and quickly to withdraw them again is also already developed in worms which do *not* use their gills as catching organs. Thus, it is only necessary to develop a larger ring of gills as well as a specific position in order to turn a respiratory organ additionally into an organ for catching prey. All mussels also have this functional expansion. In these sluggish animals the respiratory organs could otherwise be much smaller. Their gills, however, became a fish-trap-like device, and an additional suction tube makes it possible for them to pump water into this device, even if they lie completely buried in mud. Along these lines, the respiratory organ of the tunicates– just as in the whale shark – became a device for catching plankton, thus fulfilling an additional function.

One of the most efficient organs of locomotion is the respiratory tract of the above mentioned octopus. As it was transformed into the shape of a nozzle, it is used as a "funnel", through the water is breathed in and is expelled abruptly: these animals move according to the reaction principle. The same applies to the scallops, which are the only ones that are able to move about swimming. They produce a reaction by suddenly closing their shells, and this way are able to perform "leaps" up to 1.5 metres high and up to 3 metres far. In *Pecten maximus* the weight of the contraction muscle amounts to 30 % of the total weight of the soft body. While in all other mussels this muscle only serves the purpose of closing the armour, it has in this case – in the course of a functional expansion –a much bigger dimension.

Also the original function of the vertebrates' tongues, i.e. to move food around within their mouths and to support the act of swallowing, underwent manifold expansions. In animals which feed on ants and termites (the green and the grey-headed woodpecker, the anteater, the pangolin) it is many times longer than in other animals and it is made sticky via special glands: it became an organ for catching prey as it is able to penetrate small openings like a worm. Humming-birds have a tongue shaped like a long paint brush: it enables them to reach insects on the bottom of the calyx. The chameleon's tongue turns into a rapidly protruding catching device. In ruminants it turned into an organ that grasps tufts of grass and presses them against the teeth of the lower jaw. Dogs and cats use it as an organ with which they clean their body and take in water. In human beings, the tongue has become an instrument of speech.

In this explanation I cannot restrict myself to only giving a few examples because otherwise the reader might get the impression that curiosities and exceptions are being presented as an important evolutionary principle. As soon as we start out to study organisms and human acquisitive structures with regard to the principle of functional expansion, this process, so decisive for evolution, is encountered almost everywhere.

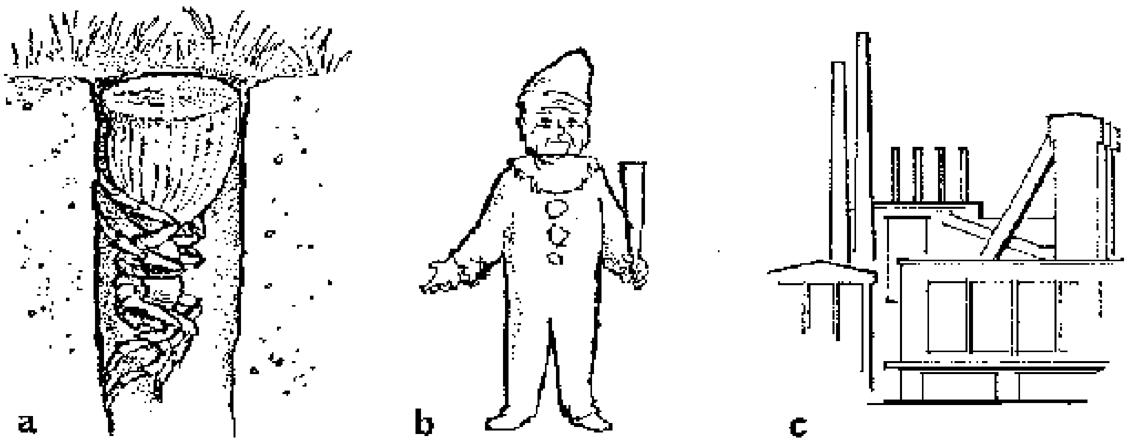


Figure 17: Functional expansion of entire parts of the body and of the body as a whole

a) In the spider *Cyclocosmia truncata,* which lives in North America, the hind part of the body has the shape of drops and is being used to close up the hole it lives in. Here it takes on the additional function of a door.

b) The abnormally small size of the dwarf becomes a prerequisite for him being exhibited for money. Here, the source of energy can be found in the human desire to see something unknown and abnormal (the drive of curiosity); the body as a whole thus becomes an acquisitive organ as an additional function.

c) When a factory has a pleasant and impressive design this increases its representative power and reinforces the staff's wish to work there. Here, the factory's body as a whole gains an additional credit-enhancing and bond-reinforcing function.

If a waiter sticks his pencil behind his ear, his outer ear gains an additional, totally new function. Nowadays the African elephant has these extremely magnified auricles: the animal uses them as fans for cooling effects. The male Chilean bell frog transports the eggs deposited by the female via its mouth into its sound bladder where the young ones develop further; they only leave it when they have turned into fully developed frogs. An organ designed for producing sounds here becomes, through functional expansion, a functional unit for care of the brood. I already mentioned the Australian toad *Chiroleptes* which accumulates water reserves in its bladder: here, an organ of excretion becomes a container for water storage. In Byblos on the Libyan coast, 6000 year old – one of the oldest excavated settlements –, the dead were found buried in large earthen-ware pitchers. In these vessels, water or cereal was stored – as a second function, they became functional units for burial as they were broken in two length-wise. In the swordtail characin the gill covers are prolonged in such a way that they look like a cyclops: during mating the male protrudes this functional unit, the female believes it to be a cyclops and so jumps forward trying to catch it: copulation takes place. Here, the gill cover becomes a organ to support reproduction. In us human beings the genitals of prostitutes do not only have their natural function, but also become their acquisitive organ. In many birds the feathers assume the additional function of making them visible to and impress the potential mate because they are large and have splendid patterns. Equally, the clothes of human beings become – as a second function – a means of impressing others by fashionable design and ornaments. The spiders of the species *Cycloscosmia* close the access to their living holes by their extremely large behind which looks like a plug. In this example, an entire part of the body assumes the additional function of protecting the body (Ill. 17). In the Cuban toad *Bufo empusa* things are quite similar; it closes its home, a tube, by means of its flat hard-crusted skullcap. In the case of the inchworm, which might easily be mistaken for a dry twig, the entire external appearance assumes the additional function of camouflage. If a dwarf is put on show in a circus, his entire appearance becomes his acquisitive organ – the human curiosity drive creating the demand. The spaceship "Eagle" of the US Apollo 1 rocket, which landed on the moon, had a four-legged landing stand which at the same time served as a starting stand. In the female body, fat is deposited particularly in the buttocks: it becomes a secondary sexual characteristic to which men respond.

4

It is *effects* that are decisive for the energons, not structures. If a structure can assume additional effects, this is in most cases easier and cheaper than developing new ones.

Our blood vessel system shows to what crucial extent this process dominated and accelerated evolution. Its original function – this becomes obvious when we compare it to animals of a lower developmental stage still existing nowadays – was the transport of food to the individual cells. When the metazoans had reached a certain size, such an organ became absolutely necessary for the distribution of what it had acquired. In the beginning, (as up to this day is the case in trematodes) it consisted of channels that were widely ramified throughout the body. Next was the formation of a closed circuit where the body fluid is kept in motion by means of a pump (the heart). This circulating fluid (blood) now not only carried nutrients to the individual cells but also took up the waste products of metabolism that were accumulated there. In order to be able to excrete them additional functional units developed (nephridia, kidneys). The circulating fluid now took over the result of the predatory activity from the intestinal cells, carried it to the individual body tissues – and from there transported the waste products to organs which drew them from the blood and excreted them from the body. Another functional expansion that was added subsequently was the task of gas transport. The fact that the latter does not necessarily have to take place via the blood, is shown by the insects. Their body has a second widely branched system of tubes that carries oxygen to the tissues and then disperses the accumulating carbon dioxide (trachea). Vertebrates, on the other hand, can do without this: in their case, the bloodstream takes over this transport as well. Only for the taking in and excreting gases were additional functional units produced: under water it was the gills, on land the lungs. Apart from that fact, specific cells, the red blood cells (erythrocytes), specialised in taking up and carrying oxygen and carrying away carbon-dioxide. Thus, further important functions were taken on by circulation. Moreover, the bloodstream going through the body as a whole was a suitable "traffic route" for the "internal police": the white blood cells (leucocytes). This also applied to the antibodies. This, too, is a task taken on by the blood circulation as a form of functional expansion. Furthermore, it was a suitable means for the transmission of orders between the individual organs. For such transmissions, primarily the nerve system is in charge, but there are also chemical messenger substances. The hormones are secreted into the blood by the glands and evoke the desired reactions in other parts of the body. In warm-blooded creatures, finally, the inner central heating was added. These animals would have never been able to develop a separate system of tubes designed for this purpose – considering the extremely complex form they had reached by now – by changes in the genetic blueprint. This, however, was possible by functional expansion. Blood circulation already existed and was also ready to take on this additional function. Upon the penetration of pathogens, the inner heating is turned up even more in order to harm invaders - this is another function: fever. Gradually this functional unit, the blood vessel system, developed its competencies. Once formed, it could just as well serve additional purposes as well. It is true that this made auxiliary devices necessary – but the most expensive, most sophisticated part already existed.

We have a comparable process when looking at an enterprise – as is quite often the case in underdeveloped countries until today – that acquires generators or builds the necessary feed pipes in order to produce electric power. The two main functions required that justify this effort are the production of light and of power current for operating the machines. But as soon as the facility exists, the secretaries can also prepare coffee on a hotplate, loudspeakers can be installed for the pleasure of entertaining the staff with music, slides can be shown. Neither the hotplate, nor the loudspeaker, nor the slide shows would have been reason enough to provide the place with electricity. But as power was crucial for acquisitive purposes, it can now – as functional expansion – perform a series of other functions as well.

I already mentioned the most important functional expansion in evolution: in human beings the central nervous system – which was originally only responsible for the co-ordination of the individual functional units – furthermore took on the task of forming organs outside the body. To this functional expansion we owe just about everything we are; practically, it is to this that we owe being human.

5

Even up to this day many people are convinced that extraterrestrial powers made us as we are, and that the great variety of forms in animated nature is the result of what these powers intended it to be. In the formation of individual creatures and in human beings themselves they see the most obvious expression of divine wisdom and creative power.

Not only religious people believe this – deep in our hearts every one of us may believe it. Our brain, used to linking cause and effect, sees such extremely complex effects in the phenomena of life that it just cannot think of them without any concrete intentional cause behind them. The idea that a sequence of highly diverging – i.e. "coincidental" – processes may have caused all that just appears to be too absurd.

As already shown (part 1, chapter VII), it is, however, impossible that the functionality that is evident virtually everywhere is the direct work of extraterrestrial powers. The latter may have been the preconditions for the process as a whole – they may at the most have accelerated the coming into existence of individual structures, but how these had to be in order to be functional, they definitely could not determine. As long as the laws of nature remain the same on our planet (which is the case according to experience so far) it is environmental circumstances which control the evolutionary development of all living creatures.

The phenomenon of functional expansion provides further hints pointing in that direction – namely, the fact that a continuous influence by extraterrestrial powers did not take place[2].

If the organisms were the result of intentional powers of formation and if humankind really was given such utmost importance as a "final product" and "goal" of this development (a concept which not few adhere to), this purposefulness in evolution consequently – as one might be led to expect – would show its face in some way. *However, it does not*. It rather gives the impression of a strongly meandering process taking the most strange detours. It presents the picture of a perfectly casually developing process which – just as a gladiator in Ancient Rome – had to face and deal with dozens of opponents.

Almost all the main characteristics to which we owe our being human, happened to develop via the most weird detours.

Firstly: the ability to expand our genetically developed body, to carry our power potential to the boundless. We owe this ability to the fact that our functional unit which is the central nervous system at first added the development of behavioural patterns to its ever increasing competencies and then secondly the creation of and passing-on of development formulas for functional units. The functional unit which is the genetic blueprint would not have been able to do so.

Secondly: our hands, the prerequisite for our being able to make use of the possibilities provided by our intelligence. We owe these functional units, which are of such decisive importance to us, to the fact that we descend from energons which specialised in living in trees. This led to a thumb which worked opposed to the other fingers, and thus to the development of the prehensile hand. The function of this organ was – quite plainly – to make it possible for them to hold on to branches. If today we use the hand to write with a pencil, to play the piano, and to read the latest news on the Stock Exchange while stretching out in a comfortable chair, these actions all constitute functional expansions of an organ originally designed for climbing.

Thirdly: our ability of speech. Without it we would not either be what we are. The "bellows" which is necessary for that purpose was primarily developed for breathing, i.e. for the intake and output of gas. This unit – as another form of functional expansion – also took on the provision of the air flow absolutely necessary for human beings to be able to speak. Our genetic blueprint would hardly have been able to produce a separate bellows fulfilling this purpose. Further auxiliary services are rendered by the tongue, the lips, and the teeth. All of them have another basic function, all of them took over this new function only additionally. Our larynx was the only one to develop as a special auxiliary unit for acoustic signalling.

Fourthly: our cognitive thinking. That, too, came about via detours. For the purpose of verbal communication we had to summarise more concretely the diffuse variety of what we experience and to attach them to verbal symbols. The latter, however – this has been acknowledged for quite some time – constitute the basis for our thinking. In this case we can actually no longer speak of a functional expansion of speech, but rather of a waste product. For in this case a specific mental process became necessary for the function of speech: the verbal creation of terms. This again in our central nervous system led to an improved manipulation of our ideas.

A possible answer to this is: God's ways are unfathomable. And to those who consider this argument as valid there is no refutation. But whether we judge our existence one way or the other – it will still not become any less mysterious. The mere fact that there is energy and that this stream *can* manifest itself in thousands of ways is just as divine as if the unfathomable origin of all living creatures had made the effort personally to form every single locust and every single putrefactive bacterium. This, however, has obviously not been the case. And this is all that is being claimed here. The actual origin of the entire evolutionary stream will for now remain inaccessible to us – maybe even forever. None of the manifold views or speculations on this topic is worse than any other. But *how* this stream of evolution "crystallised out" into individual forms *was not decided by extraterrestrial powers*. As long as the laws of energy and the influences of gravitation, climate etc. do not change in principle – and there is no indication for such a process –, development is traced out. Functionality is a consequence of interactions. *They are the ones* to determine the events of which we are part.

Comments:

[1] Another double function: the shepherds of the Puszta wore their coats made of sheepskin (turned) inside out during hot periods (as a protection against the rain), during cold times they are worn the other way round (for warming up).
[2] This interpretation is not supposed to be some sort of argumentation line pro or contra "God's" existence. Views in this respect are a matter of faith: and thus neither provable nor not provable. This is supposed to exclusively deal with the question of whether a higher power influenced and controlled the evolutionary process directly – i.e. whether it interfered during evolution itself, during the past 3 billion years.

IV

CYCLES

Whatever explanation there is for the objects themselves, separated from all the receptivity of our sensual perceptions, remains completely unknown to us. We know nothing but the way in which we perceive them, characteristic for us, but not necessarily inherent to every being, even though it is to every human being.
Immanuel Kant (1781)

What masses them together and connects them is a secret similarity alien to our mind; with which, however we have to come to terms.
Teilhard de Chardin (1947)

1

In one of his writings Konrad Lorenz called the internal structure of effects of an organism "causal felting". A very apt description. If you look at a piece of felt through a magnifying glass, you see a immense unsystematic entanglement of threads running throughout. Looking at the inside of the organism and trying to understand the causal connections you find a network which is just as unsystematic. It seems pointless to try and detect regularities in this jumble.

Enterprises and state systems are created by human beings. There we deal with every causal network, we try to foresee every interaction or at least to understand it in retrospect. But also in this case the jumble is such that even the best planning meets with surprises. To date, it has also seemed hopeless to find a generally valid scheme for disentangling the individual threads of this causal "felting".

In the following I would like to demonstrate that there is common aspect according to which this mess can be disentangled. This is not a universal key, but it shows the way how this mess can be sorted out. These are *circular processes* which recur continuously in the evolutionary process: The connection of cause and effect which succeed each other regularly. Even in the lowest protozoa you can clearly prove that. They characterise the whole evolutionary process up to giant corporations and gigantic state systems.

We have already talked about the first part of these circular processes: functional "expansion" (Fig. 18 a).

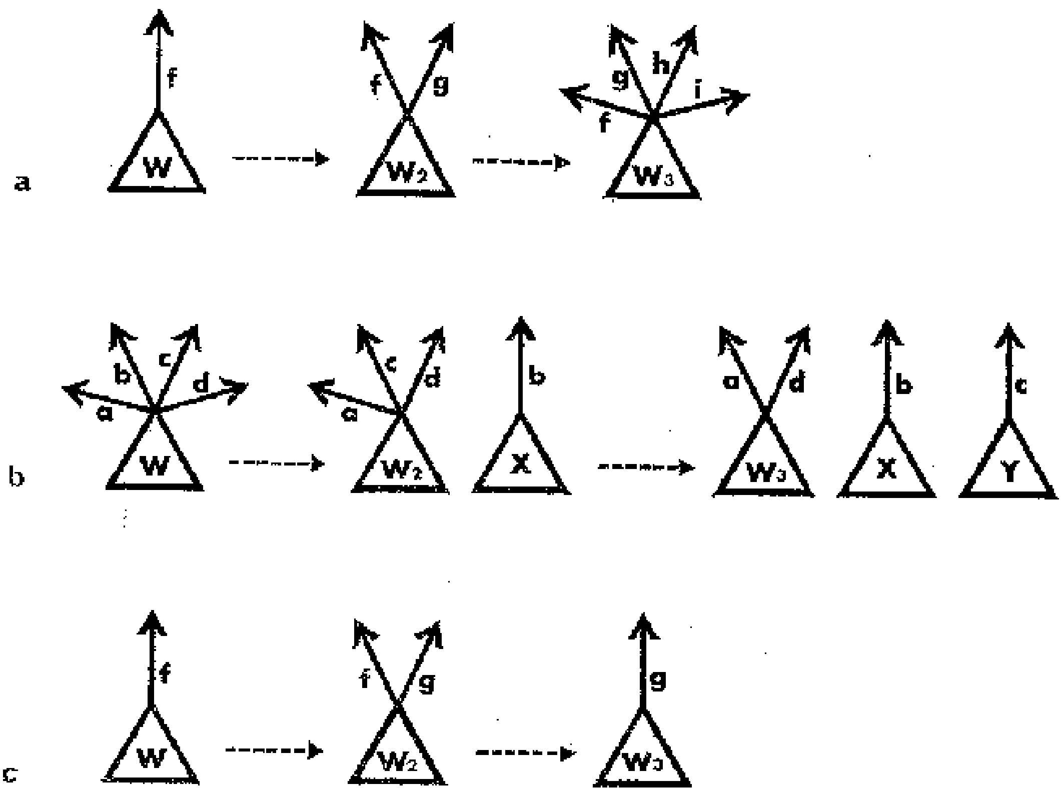


Figure 18: Main forms of functional changes

a) Functional expansion. W is an functional unit inside an energon (for instance in an animal body or in a company). By means of its structure it produces a required effect within the framework of this entity based on division of labour: the function f. In the course of the individual or evolutionary development of the energon the functional unit assumes additional functions (first g, then also h and i).In most cases certain structural changes or additional patterns of function are necessary for that. This can therefore lead to a *functional overload* in effective agents (for example in an organ of an animal or in an employee of a company).

b) Sharing of functions. An functional unit (W) is overloaded with functions (a-d). The individual acts of carrying out a function hamper each other. A new functional unit (X) takes over one of these functions (b). In the course of the further development also function c is passed on to a third functional unit (Y). This development often occurs if energons increase and consist of more and more units. This leads to an increased division of labour, to a more precise "differentiation". In organisms as well as in human acquisitive structures more and more functions switch over to specialised individual units.

c) Change of function. This change of function starts with a functional expansion according to type a. An functional unit takes over an additional function (g). In the further individual or evolutionary development the original function f becomes redundant and degenerates. So the functional unit finally has a different function from the original one. In this way some organs have taken over other tasks in the evolution of animals and plants, and also in business it is not rarely the case that some units assume another new function. In this way new functional units emerge out of already existing ones.

Examples for all three forms of functional change see text.

Every assessment of energons always has to consider that these structures all in all consist of effects. The latter only can be exerted by material structures, with the energy itself having to be considered as well – according to findings of modern physics – as something concrete, as "material" in the widest sense. In a simple case an functional unit exerts just *one* function, but it can happen, however, that it offers some more functions "for free". In the majority of cases changes are necessary however, if the number of outputs is to be increased. The structure has to be changed – just as a flat roof must be if it is supposed to become a tool for collecting water. Or an additional behaviour pattern has to cause a controlling mechanism – just as in the case of our hands, which are capable of carrying out so many activities. As to the balance it is decisive that such functional extensions have to lead to improved results. Otherwise they are meaningless or even a hindrance, and are not maintained and developed any further. The controlling factors of natural selection consequently eliminate them.

The circular processes we are talking about here start with an functional unit which by modification produces additional outputs supporting the energon. The example of the blood circulation illustrated how in this way more and more effects can join the original one. Just as well as in a company or a state system a unit – a human being or a department – can take over more and more tasks. The consequences, however, are the same in both cases. Gradually the functional unit is overloaded, overstrained. One duty interferes with the other. As it performs much too many tasks, it cannot do justice to any of these. In the blood circulation this stage has not yet been reached.: its main function – to create a circulation for the distribution of energy and substance – is so simple that it can be used for a lot more additional tasks as well. In our central nervous system – this is what I finally want to demonstrate - such an overburdening has already taken place. An analogous process is illustrated by the employee who sees his boss and says, "I'm sorry, I can't make it any more! It is not that I lack the will, but there are simply too many tasks, too great in variety and in number!"

The solution to this is already known, it is "sharing of functions" (Fig. 18b). The task of the overburdened organ is taken over by two or three others each of them now having a more strictly defined task. The precondition – in organisms as well as in any human acquisitive structure – is, however, again that also this change has an effect favouring the energy balance. Only in this case is the sharing of functions justified; only then can it be lasting. So the boss says, "Mr. Meyer, from now on you will only do this and that. You can fully concentrate on this now. I will transfer the remaining tasks to somebody else".

This procedure becomes relevant particularly when energons increase or specialise in a certain acquisitive form.

2

In the evolution of animals and plants the *sharing* of functions plays a decisive role. In almost every structure and every behaviour this process has left its traces. The bodies of animals and plants – as we see them individually – are just a momentary sectional view of a very slow process. It is not birth, maturing, and death that matter, but the processes that which develop over hundreds or thousands of generations. In the single organism all we see is the momentary form of co-ordination of the individual elements. What we cannot see, however, is the dynamics on which these co-ordinations are based.

The protective outer skin in smaller animals living in water, for example, can – without any 128
problems – also partly take over the function of breathing and excretion. If such creatures, however, move to the land – as was the case in the history of the earth – this is no longer possible. A *conflict of functions* arises. The cells are not able to protect the body from dying of thirst or desiccation and at the same time keep up their breathing and excreting activities. Thus, only those animals can live on land – a process that is significant for us, as we are descended from one of these pioneers in our long line of ancestors – in whom these functions had split off. Special units that end at single points had to take on the breathing function, others were responsible for excretion. Only that allowed the rest of the outer skin to keratinise and offered protection from the dehydrating effect of air.

Another even more vivid example for the process of the sharing of functions are our intestines – the central structure of every animal energon. In the simple multi-cell organisms – such as in coral polyps or jellyfish – there is only one opening. The prey has to be taken in and the unusable rest has to be excreted via this opening. The intestinal cells have to perform three different functions here: excrete digesting enzymes, taking in food, and storing it. Even in worms a second opening took on the task of excretion – thus making a continual acquisitive process possible. Accordingly, muscular movements now pushed the food through the intestines, always in the same direction. This was the precondition for further *sharing of functions*.

The cells at the front end formed functional units for the grinding of the food: jaws and teeth. Other cells specialised in the production of enzymes. By forming small sacks opening out into the intestines, they could prevent injury from the often sharp-edged food. One section of the intestines was specialised in the intake of larger amounts of food: the stomach. Particularly in cases when the source of food can be opened up only on rare occasions, it becomes vital to make full use of it. The glandular secretion already sets in behind the teeth (salivary glands), in the stomach the prey is subsequently ground up efficiently. In the small intestine that follows the substances are absorbed and passed on to the blood. The function of storage also was eventually carried out by a special organ: the liver. There were several artificially added units: for instance, the "chewing stones" in the birds and crocodiles, which help grind the food in the stomach. Or the digestive strategies – as in insects or ruminants.

Within the insect empires a similar differentiation took place, though at a higher stage of integration. Here, sharing of functions did not take place between cells or organs but between organisms. The empires of ants, bees, and termites, too, are energons: though here only a very limited sharing of functions has developed. Special units perform the function of protection: the "soldiers". The "queen" is in charge of the business of procreation for all the others – a considerable relief for all of them. The bumblebees form peculiarly shaped honey-pots out of wax for the storage of food in times of need. In the American ant species *Myrmecocystus melliger* several members of the colony took over the same function. All others feed them with the nectar gathered, making the hind part of their bodies swell enormously. They cannot walk any more. They hang down from the top of the "honey chamber" as living "honey pots". Hungry members of the hive approach them and take food from out of their mouths. Here, too, the efficiency of the "people" –the energon –is increased by function sharing.

The fact that the central nervous system took over the development of formulas increased the possibility of function sharing in human beings enormously. Every community is based on this process. If the individual had to take care of everything, it would be overburdened. One activity would interfere with the other. Within an organised community, however, one can specialise in one thing, while another may specialise in something else.

It was Adam Smith who realised the special possibilities of selective function sharing in the economy. Taylor subsequently revolutionised modern production technology by his "Funktionsmeistersystem" and created the foundation for the now extremely well-developed technology of scientific plant management. The sharing of tasks among executives has turned out to be of great importance here. Production and administration have to be separated. ("Managers off the production floor!") It is also not good if, for instance, personnel recruiting is part of the responsibilities of the finance department – for the letter is used to economising which may have an adverse effect on the employment of good staff. If the top executive keeps research and development under his own authority, this is bad, for he in most cases sticks to his own field and does not recognise other possibly unsatisfied demands.

This is the second process within the evolutionary *cyclical processes*. At first, functional expansions lead to overburdening. That again leads to function sharing[1]. Later on, functional expansions may also arise in the newly developing functional units – leading to further overburdening and further sharing of functions. The cyclical processes which always start out with *one* function in functional units and finally lead back to functional units with *one* function thus continue.

They may, however, also proceed differently and take their course via a *change of functions*.

3

This process, too, starts from functional expansion. In addition to an original function one functional unit takes on a second, secondary one. This, however, gradually gains more and more importance – and eventually the original function is lost (Fig. 18 c).

Goethe discovered this process in plants. On 17 May 1788 he wrote to Herder, "Forward and backward, the plant is just a leaf." He spoke of a "metamorphosis" of the leaves. The quotation that was put at the beginning of this book was taken from a poem that Goethe had wrote on this subject[2].

Later research fully confirmed Goethe's discoveries. This is true in peas, for example, where the tendrils are transformed leaves. As well as in the berberries. where the thorns have developed out of leaves by functional change. The same applies to the pitchers of the pitcher plants in which they catch insects. And the same also applies to all stamen and pistils in flowering plants (Fig.19).

By change of function the organisms were able to achieve new formations relatively easily. It only took minor changes in the genetic code to produce them. Each intermediate stage thus has a positive selection value, and thus increases the competitiveness. A new function is added to an original one. The new one subsequently proves – maybe in a changed environment – to be more and more important, and by the controlling effect of the selective factors the new function is developed further. The original one loses its significance. In this case the superfluous energy does not regress any more. It has turned into another form of energy, one that enhances acquisition.

The plants thus could acquire new important functional units by modification of *some* leaves. This may be compared to the legs of insects. Some turned into cleaning instruments, others into eating instruments; some species of insects even developed a suction tube. In the porcupine some spines developed into organs of sound production. They are extended into a hollow tube and look like organ pipes. By clicking them together a sound is produced that can be heard from afar. In sharks some of their thorn-like placoid scales turned into teeth. At the rim of their mouth they become correspondingly longer. This development can be seen in every shark up to this day.

At the time when the progeny of the primary sharks left the sea and went on to live on land, the body scales became superfluous, the scales that had turned into teeth, however, were preserved and developed further according to their new function. The teeth of all higher-developed vertebrates –including our own –have their evolutionary origin in the placoid scales of primary sharks.

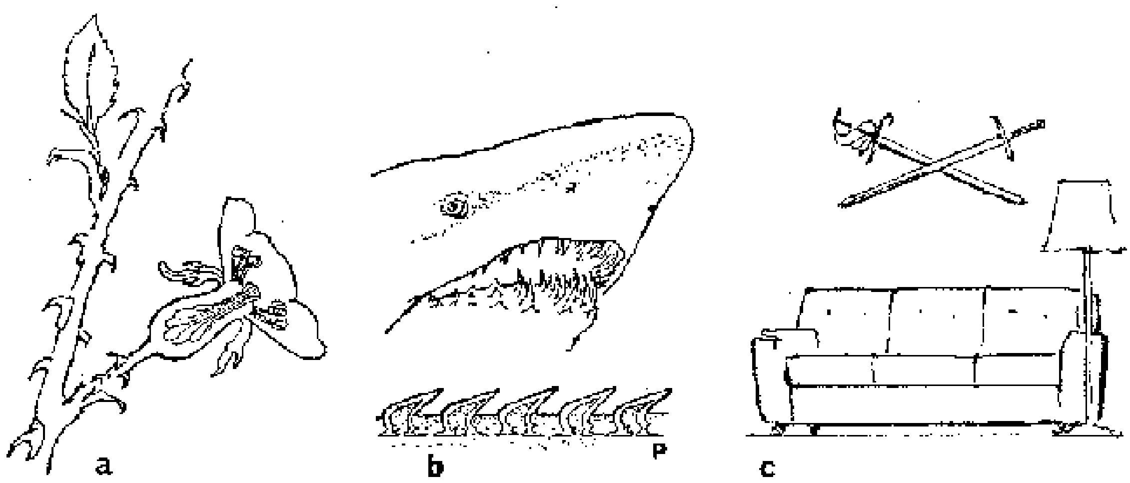


Figure 19: Examples of functional change

a) Rosebush. Pistil and stamen of the blossom are (like in most phanerogams) transformed leaves. The ability to photosynthesise regressed, and other functions dictated their required form.

b) Teeth of a shark. They are placoid scales (p), which developed more strongly at the rim of the mouth and there they became function carriers of food acquisition. When the offspring of the primary sharks moved to land, the body scales regressed, the "teeth" were differentiated further. Human teeth, too, have their evolutionary origin in the shark's placoid scales. (Even in the shark species existing today, you can see how the teeth emerge from the placoid scales.)

c) Swords and other "antiques" are often used to decorate apartments – and are even reproduced for this purpose. A completely new function replaces the original one: they become functional units of display and the conveyance of aesthetic pleasure (in this case to elements of luxury items).

When the fish proceeded to live on land, their fins gradually transformed into toes and fingers. We can see changes of this kind even up to this day in various fishes, such as the mudhopper. For a long time it was generally believed lungs had developed from the swim bladder. The context here, however, is far more complicated – as more precise research showed. The exact opposite is true. In some fishes living in fresh water under unfavourable conditions as regards oxygen supply a lung was formed by invagination at the top of the intestine. However, not only the vertebrates living on land but the bonefish as well descend from the latter. It was the lung that came first. It was only from the lung that the "swim bladder" regulating buoyancy developed by means of functional change.

The gills that had become superfluous regressed only very slowly. How difficult it is for the genetic formula to get rid of such ballast is illustrated by the fact that the human embryo forms branchia at an early stage of its development (at the beginning of the fourth week) even up to this day. The shark's air vent developed into the middle ear. The upper part of the front gill arches turned into the auditory ossicles called stirrups.

This process of development mentioned above is referred to as a perfect example for functional change in zoology. It is cited in almost every textbook, though it is exactly this example that is not appropriate. For in this case, at first a gradual regression of these bones took place. For millions of years they had no function at all. Only later did these rudimentary units became useful again and develop further within the scope of a new function. There was no actual change from one function to the other taking place in this case. Here a rudiment – useless waste – was integrated into the formation process of a new functional unit.

In the energons created by humans the significance of the functional change receded strongly. In our new formations we are no longer dependent on the fact that each transitional stage has a positive selection value. With us, improvements do not depend on gradual transitions.

After all, the process still exists here, too. Some buttons on our clothes no longer serve the function of fastening but only of decoration. These functional units thus have gone through a radical functional change. The differential which is so important in a car was not invented for the car as such but rather for the loom at a much earlier point in time. In this case, a unit not only changed its meaning but also its energon. This is a kind of functional change which is only possible with human beings – as our artificial organs can be used by various energons.

Each functional change leads to a new functional unit –and the *cyclical processes* may then also continue in this very functional unit: functional expansion, overburdening, sharing of functions, functional change, and so on.

Or the cyclical process may lead to a bundling of functions (Fig. 20 c).

4

This process mentioned above may be observed in the artificial organs of man more easily than in the natural ones of animals and plants.

The development of all technical devices – particularly of all machines – took place along these lines. If an engineer wanted to improve an already existing device (functional unit) by adding auxiliary units, he would at first consider those already existing, invented by others. Even if he cannot take these over the way they are, he at least takes over the principle they are based on. He copies it and adjusts it to the given requirements.

Here, we see the eminent significance of human language and writing. Every plant and every animal has to – in its evolutionary development – make every new invention *itself*. If the energon dung beetle attains an improvement, there is no way at all for the energon poplar to benefit from that improvement. Up to the human species, each of the innumerable branches of the development of life could only make headway by own progress. In the energons created by humans, however, it became possible for an energon to benefit from improvements made by others.

To an already existing functional unit others are allocated which virtually are fief to it. This allocation leads to a *bundling* of functions, to the development of functional units of a higher stage of integration. Just as every energon consists of subordinated units, these now also in turn consist of subordinated units.

In the development of animals and plants such an accumulation of already existing functional units was not possible in most cases. A mutation in the genetic formula could hardly cause an already existing unit to move over from one part of the body to another and to combine with a functional unit as an auxiliary unit there. However, there was an analogous process that took place in another way.

The component of all multi-cell organisms, the cell, is capable of a wide range of functions and differentiation. This is an inherited quality of their independent past as protozoa. In the multi-cell organism only either one or the other abilities of individual cells are activated at any given time, and many cells remain undifferentiated: as a back-up, so to speak. Mutations made it possible that such cells next to a functional unit received orders to differentiate themselves and to form an auxiliary unit. If, therefore, an accumulation of *already existing* units was not possible in most cases – in this totally different way it was possible to achieve such an accumulation. Hence, here, too, ever more complex organs of a higher stage of integration could successively develop.

This extremely important process – for the first part of evolution – ultimately also comes under the principle of functional expansion. It is not the functional unit itself that increases the number of its abilities in this case, but rather it is undifferentiated reserve units that are activated to perform functional expansion and that combine with the functional unit as auxiliary units.

Even this form of development has a parallel in human evolution. Just as the undifferentiated cell is capable of development so is the undifferentiated human being. If the need for an auxiliary unit should arise in one department, then even unskilled workers may be hired and trained for the job that has to be done. Numerous enterprises apply this method. In humans this process is carried out consciously and purposefully – and thus can lead to quick results. The multi-cell organisms, on the other hand, were dependent on appropriate changes in the genetic formula.

Another possibility to achieve an accumulation of auxiliary units – i.e. a bundling of functions – is the *transformation of environmental units into functional units*. This brings us to one of the central problems in evolution. How is it possible for something totally functionless to turn into something functional?

I call this process –for want of a better term – *birth of function* (Fig. 20 d). Such a process can take place in very different ways.

As already discussed, a functional unit can *eo ipso* be capable to of performing several functions (double function). Equally, also every functional expansion constitutes a birth of functions. In both cases, however, it is not that something really functionless acquires some sort of functionality, but an already functional unit is capable of performing further achievements.

Waste products, on the other hand, are absolutely functionless. They are handicaps, yes, even damage in the body and have to be excreted. Quite often organisms have succeeded in transforming such waste products into useful auxiliary units. Some single-cell algae retain the gasified products of metabolism in their body – they thus become an organ of buoyancy. The buoyancy of this gas levels out the weight of the cell in the water. Other algae form analogous functional units by producing fat drops. The method of using waste substances for this purpose seems to be significantly cheaper.

The dog uses its excreted urine for marking its territory. The urine thus becomes a quite important functional unit. In many companies waste is also used nowadays, if necessary after additional treatment.

In some cases these waste products later on even became the main product. 134

We see a further developmental stage when the remains of the prey which never entered the body of the predatory energon is turned into a functional unit. This is what the aphis lion (a predatory larva of a fly) does, for example, when it covers itself with the skins of the plant aphids that it has sucked out previously. It turns them into functional units of camouflage. From here it is only a small step to the transformation of environmental units into artificial organs –as applied by the amoeba *Difflugia* when it builds a protecting armour out of grains of sand.

Both in the algae as well as in the aphis lion and in this amoeba inherited formulas are the precondition for taking the respective functionless units into service. As regards the principle, it is irrelevant whether these functionless units are the final result of respiration (air bubbles), of a predatory process, (skins of dead aphids), or of any process in the environment (grains of sand). Here, too, we witness the direct transition from "natural" to "artificial" functional units. In any case, however, we see a *birth* of functions.

As long as such additional units could only be acquired via a change in the genetic formula, there were limits to this development. However, as soon as the human central nervous system acquired the ability to form and use artificial organs as a result of individual experience and direct passing on of information, a completely new path of development opened up.

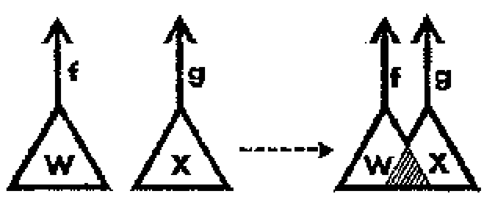
In his imagination human beings design ideas of how a functional unit suitable for a specific task has to look like. They then look for such a functional unit – if their search is successful we talk about *organ finding*. Or they produce a functional unit designed like that –in this case we speak of *organ forming*.

Primitive human beings learned what a stone has to look like in order for it to be used as a chisel – they created the celt. Today's industry giants are on the lookout for products or specialised people that they can integrate in their effect structure: for organisations or companies that they may influence and change in such a way that they enhance/further their own goals. A seemingly huge gap: here the celt, there the alteration of existing products or organisations. In principle, however, the process is the same. Both are about the ability to find an organ, to picture an organ, and to form an organ out of an external structure.

In fact, this ability exists even in the lowest organisms – yes, it is a basic function of the process of life as such.

For every plant and every animal takes up inorganic substances – and *assimilates* them. This means: transforms them into endogenous structure. Thus, however, external substances are turned into functional units. The hierarchical structure of the "useful" (in the sense of enhancing the acquisition of energy) carries on throughout the inner hierarchical structure of the energons right down to the smallest components. Every inorganic molecule and atom that is integrated in the effect structure of an energon thus turns into something functional – into a functional unit. The entire evolutionary process is eventually based on a transformation of the "inorganic" into the "organic".

By combining with already existing functional units and by activating functioning units (such as undifferentiated cells) or by integrating functionless "material" a functional unit of a higher stage of integration may arise. Furthermore, a "complex organ" formed in that way may take over additional functions in the course of evolution, become overburdened in the course of time, go through a new sharing of functions or a new change of functions, or take part in another bundling of functions.



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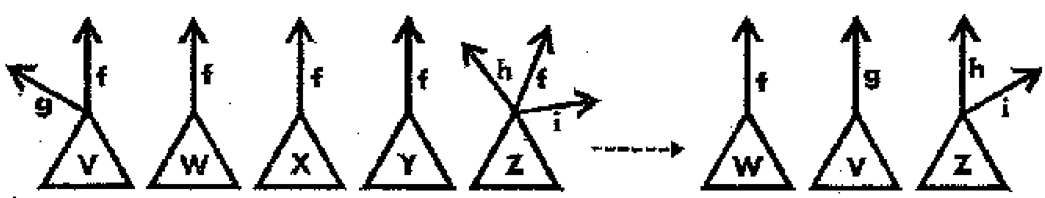

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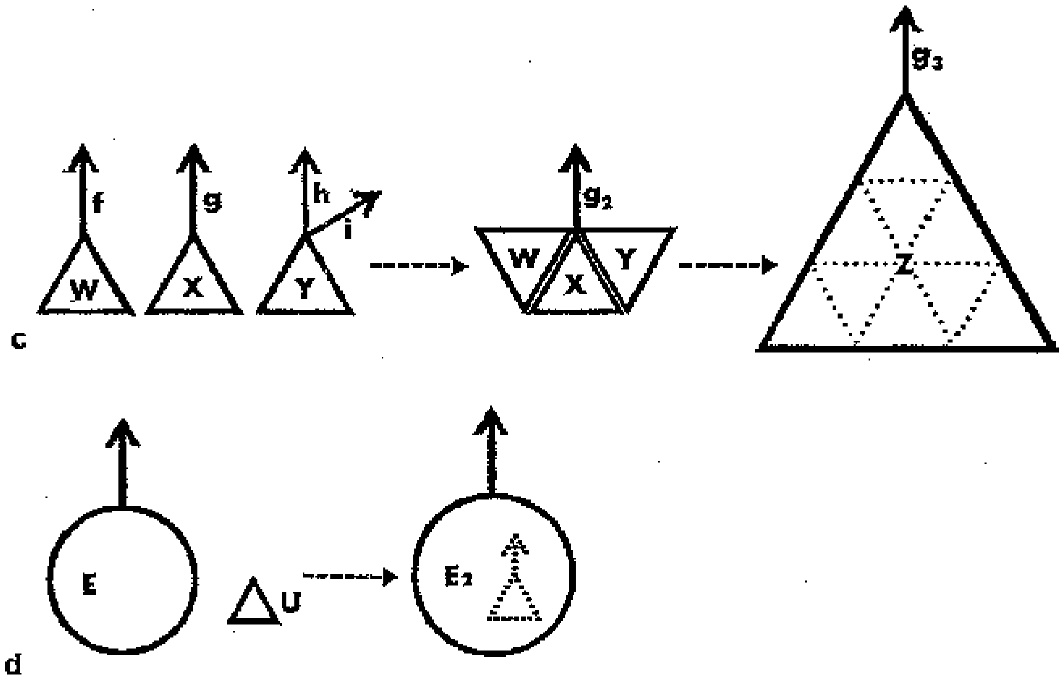


Figure 20: Forms of rationalisation of functions and birth of functions

Functional partnership. W and X are functional units in the same energon and have different functions (f, g). A partial merger of their structures leads to savings. Example: kidney and gonads share the same exit canal for excreting their products. Or: in an enterprise two departments replace their secretaries by a joint secretary.

Combining functions. Several functional units of an energon (V-Z) have the same function (f), two of them have additional ones (g, h, i). This double-track process is done away with by the fact that *one* functional unit takes over function f for all of them. This may be one of the already existing ones (W) but also a newly formed one. Example: establishing a central repair department in a company.

Bundling of functions. The functional power of the functional unit X is increased by combining of the functional units W and Y leading to a joint, improved function g_2. If further functional units are added, an organ of a higher integration stage can develop the function (g_3) of which is composed of numerous subordinated functions. This is most probably how most of the complex organs of animals and plants have developed, and equally, with humans, most of the machines.

Birth of functions. E is an energon, U is a unit of the environment that has no function. The energon integrates this unit in its effect body (E_2) and transforms it into a functional unit. Something functional is born of something functionless. For example: animals and plants take up substances, make functional structures out of them – thus turning them into functional units. Or: waste products are made utilisable – and thus transformed into functional units. The most important example: the entire production of "artificial organs" and their integration in human professional entities and business organisations.

By each of the paths mentioned above the respective energons acquire new functional units. These require care, repair work, and possible renewals – some even need energy supply and waste disposal. Altogether this may thus lead to one or the other *double-track process* – to energy expenses which could be avoided, or the reduction of which would increase competitiveness.

6

The first possibility for achieving a rationalisation effect is what I call *functional partnership* (Fig. 20 a).

This is when two functional units partly combine their structures, thus achieving an economising effect. One example would be the fact that in some animals (also in us human beings) the kidneys and gonads have the same exit canal – whereas this is not the case in other species. In companies it may occur that two departments have the same functional units (for example one secretary each) who is not fully occupied in either of the departments. By functional partnership economising effects may be achieved here. The function is combined – from now on the two departments share the functional unit.

This process is even more far-reaching in the *combination of functions* (Fig. 20 b) which constitutes a radical removal of the double-track situation. If the same function occurs in one energon at several places, competitiveness would increase if these individual functions are replaced by a *joint* specialised functional unit.

This is a process that can be frequently seen in companies. If they reach a certain size or achieve a certain number of units, a radical shift takes place. For instance, a joint car pool is formed, a construction department, a legal department, a research department, centralised places for logistics and repair, a test area, a department for energy supply, a department for co-ordinating appointments, and many more.

In the production process the combination of operations of a kind leads to "workshop manufacturing". Single production processes (I, II, III, and so on) are split up into sections (a, b, c, d). If, for instance, operation c in production process I is similar in kind to operation a in production process III, both will be carried out in a common "workshop". Practically speaking, this means, that, for example, all lathe work is carried out in a lathe shop, all casting work is done in a foundry, and so on.

The fact that there was only a very limited number of such combinations of functions in the evolution of animals and plants is very revealing. Every secondary re-ordering constitutes severe interference and shifting within the inner organisation: however, this rarely arises from changes of the hereditary formula occurring here or there. If a supernatural power aiming at some order had controlled evolution, such shifts within the structures could very well have occurred as well. Left to themselves and exposed to the manifold influences of strongly varying powers, the animal and plant organisms could not achieve any drastic changes, *even if their competitive value (selection value) would thereby have increased significantly*.

The multi-cell organisms have remained extremely federal organisations. Each of their cells is still largely an independent undertaking. Thus, each cell, for instance, produces its own ADP (adenosine-diphosphate) and charges the latter itself to turn it into ATP (adenosine-triphosphate). In human beings, this means a total production of substances of not less than 70 kilograms per day[3]. This process which constantly remains the same is carried out in every single cell – i.e. in human beings in billions of "undertakings"; everyone has special functional units designed for this purpose: the mitochondria. Considering the extent of such a multi-tracked character must be a hair-raising affair for a person thinking in commercial terms.

Furthermore, each cell keeps the difference of concentration difference vis-à-vis the surrounding environment constant level to itself. For this purpose, every single one of them has so-called "ion-pumps". Measurements in the blood cells show that they have counteract a thirty-fold gradient Here, too, the multi-cell organism shows a practically gigantic multi-tracked character which gives rise to extremely significant expenses for the body as a whole.

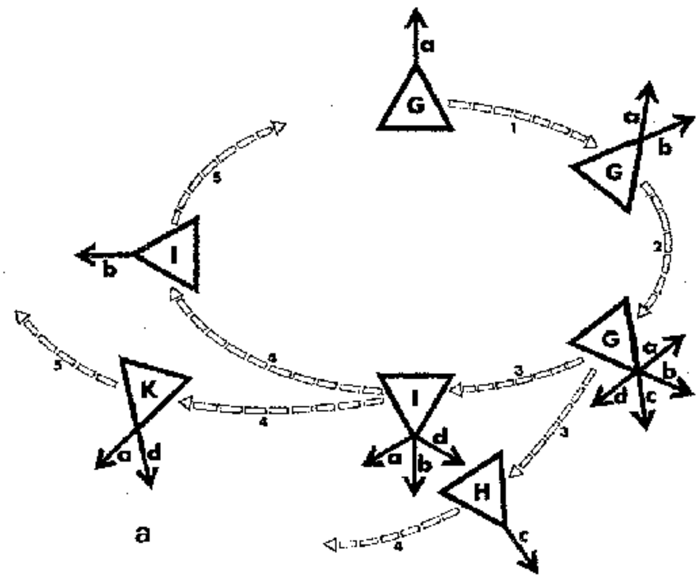
There is no doubt that the independence of their elements offers the multi-cell organisms many important advantages[4]. It is, however, important also to consider the deficiencies and constructional limits which result from this federative structure. Only at the developmental stage the "human species" could evolution free itself from this restriction. In the acquisitive structures as formed by human beings, no longer irrevocably intermeshed, and no longer emerging from a germ cell, any conceivable combination of functions became possible.

Here, the possibility arose that the even same functional unit could be active for totally different energons. Every bookkeeper working on an hourly basis who does the balances and files the tax return for different smaller enterprises illustrates this fact. This process has to be looked at from the point of the individual energon making use of such services.

The respective enterprises need this effect. They are, however, too small to hire a functional unit especially for this purpose – i.e. a bookkeeper or a tax consultant. This usually means that these energons have somehow to get along with the given situation. One of the employees – even if he may not be that perfect at this job – then has to carry out this function. Now, however, the possibility arises of *renting* a special organ. Practically, we are talking about *combination of functions here between totally different, yes even often competing energons*.

The same process can be seen in the EEC[5]. Each of the European states has a government of its own, its own customs and police body, its own jurisdiction, and its own research institutes. If it were possible to achieve a combination of functions here (as is partly the case within the EEC), each of the states would be spared significant expense.

In the economy this is the basic idea described by Servan-Schreiber in his book "The American Challenge": all the European large enterprises are individually too poor to be able to afford research expenses matching those of giant US companies. If it were possible to combine these efforts, the European economy would become much more competitive.



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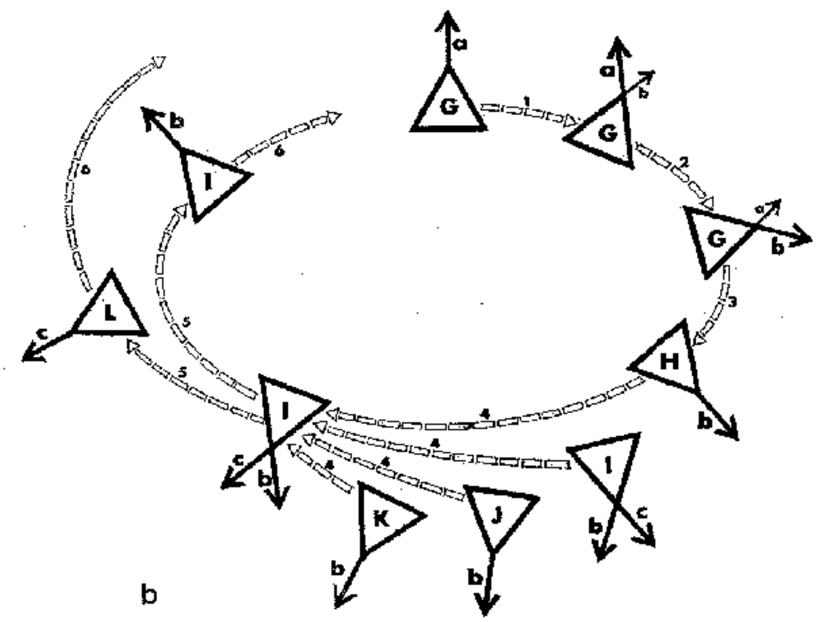

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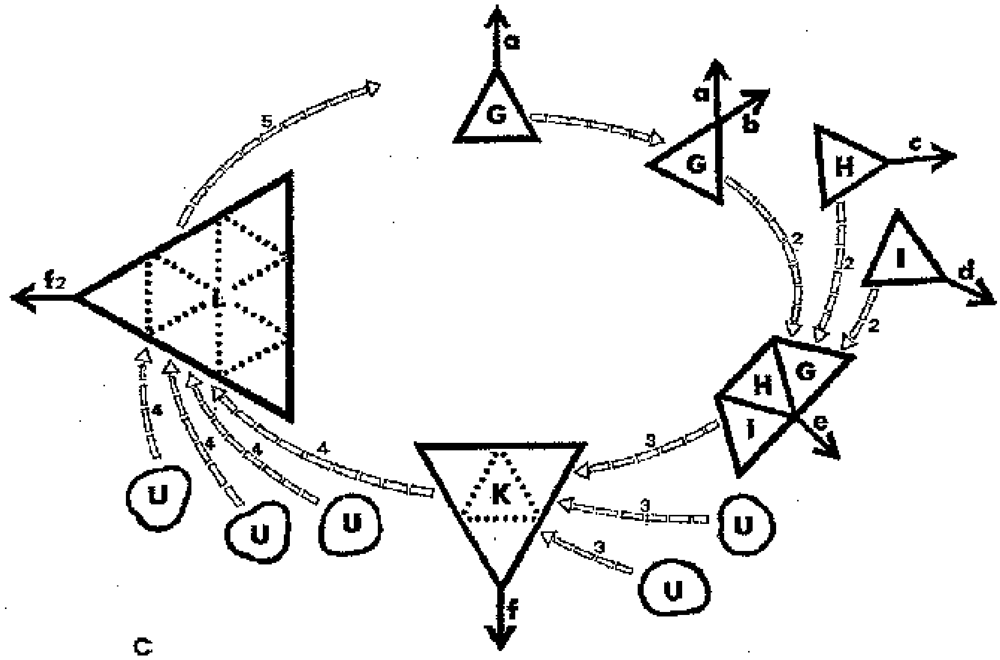

Figure 21: Examples for functional cyclic processes

a) The functional unit G initially only fulfils function a. Within the time interval 1 it – as a form of functional expansion – additionally takes on function b; within span 2 also functions c and d are added. This thus leads to overburdening, and within time span 3 functional sharing takes place: H takes over function c, I takes over functions a, b, and d. Within time span 4, another sharing of functions takes place. The functional unit I eventually has only *one* function again. There, as well as in H further cycle processes (analogous to C) may take place.

b) Within the time span 1 – 2 – 3 a functional change takes place: the original function a becomes less important, until eventually only the additional function b is left. Within the time span 4 a combination of functions takes place: the functional unit I takes over function b from H, I, and K. In time span 5 it passes on the additional function c to the new functional unit L by way of sharing of functions. Again we are left with two functional units (L and I) having only *one* function, in which further functional expansions and new cyclical processes may be possible.

c) Here, a functional expansion is followed by a bundling of functions. Functions a, b, c, and d taken together result in a new function e. By adding environmental units (U) that are functionless (as far as they are concerned), a complex organ (K) having only one function (f) is formed in time spans 3 and 4 which may integrate further units (L), thus increasing its function (f_2). Again, functional expansions and further cyclical processes may occur in this case.

After all, the combination of functions is the process by which several small energons can merge to become a larger unit – a larger energon – in human acquisitive bodies. This process was not possible – with a few exceptions (as, for instance, in insect empires) for animals and plants – for purely technical reasons.

The combination of functions, too, eventually leads to functional units with *one* function. There, too, the *cyclical processes* may continue.

7

The idea of cyclical processes has (re)-appeared on numerous occasions. According to the concept of the Buddhist religion, activities in one life lead to consequences in the next life, and the existence of one individual thus goes on in causal entanglement (karma) – up to the point when it finally has completely freed itself from these effects and reaches Nirvana.

Nietzsche calmed his mind in revolt by imagining "eternal recurrence". Everything has – necessarily – to recur in the end. A daring – but also quite improbable idea.

Quite a number of poets have made the continuous sequence of birth, maturing, and death the subject of their global philosophy. Oswald Spengler applied a similar idea to peoples. Their organisation is formed, becomes successful, consequently they drown in luxury, become weak, and are erased by others. Such a "decline" also threatened the West[6].

According to the energon theory, the truly significant cyclical processes have been overlooked so far. *Not the visible or the physical is what constitutes true reality*. Birth, maturing, and death are practically only pulse beats in life’s development; a rather slow pulse beat is the rise and fall of peoples.

A cross-section of the energons offers a unclear, interwoven, felted network. From the viewpoint of evolutionary development, however, they changed and developed in ever recurring cyclical processes. Just as in a continually reforming vortex, the stream of development continues to flow – groping its way forward. (Fig. 21).

This is the way how the controlling effects of environmental factors determine the form of the energons and their huge number of functional units. In each of their structures – via control causality – the shaping activity of the force fields that overlap in manifold ways takes place. As regards the energy balance – as regards the energon – these effects allow a classification based on functional similarities. We have already talked about the *sources of energy* and *sources of substances* as well as about t *interfering and hostile environmental forces*.

There are, however, still more environmental factors that are of significance for the energons.

Comments:

[1] Gutenberg uses the terms accumulation of functions and dispersion of functions. (“Grundlagen der Betriebswirtschaftslehre”, Berlin 1951, vol. I, p. 174.)
[2] „Die Metamorphose der Pflanzen“, in „Gott und Welt“, 1798.
[3] This, of course, has to be considered in relation to catabolism of the same extent. Charging each ADP molecule to ATP means substance build-up, discharging means substance breakdown. The comparison is merely supposed to illustrate vividly the scope of these processes in our body.
[4] Part of these may also be due to the fact that some chemical synthesis is generally only possible in “small undertakings”. Only in this dimension are there relatively huge surfaces occupying a minimum of space. According to observations made in the chemical industry, some processes taking place in the miniature laboratory of the “cell” are not possible at all in “major synthesis”.
[5] Now EC.
[6] “The Decline of the West”, Munich 1918

V

HORSE AND HORSEMAN

"perhaps a dolphin will take us on its back
or we will be saved by some other miracle"
Plato: Socrates to Glaukos (about 380 b.C.)

Only today are we looking systematically
for general aspects which evoke a long term
expansion in economy.
Jean-Jacques Servan-Schreiber (1967)

1

The picture that the energon theory gives of the organisms as cross-sections through a stream of evolution is self-evident with our conventional way of thinking. What is evident for us is the dog that greets us while it wags its tail and which we stroke. Also evident are the flowers attracting insects. So is our neighbour, who is just about to leave her house, carrying her shopping bag. What is not evident, on the other hand, is the network of effects of the energons that expand beyond the bodies that we are used to and in which humans, including the neighbour’s body, are also just a part.

It will not be easy to shake the basis of concepts in current biology that are nowadays taken for granted. I would, however, like to draw attention to the following: there is no disagreement of any kind regarding natural selection – it always determined what was to survive, to continue to live and what would not. Now, however, the "bodies" where this selection intervened are not necessarily identical with the genetically grown bodies. In many species, they still are, in others they no longer are; in man as we know him today they never are. This, however, means that it is not the genetically grown body that represents actual reality but rather the effective body – even though it is not something that is immediately obvious to our senses at first sight.

Goethe said, "The senses do not deceive but our judgement fools us." This is true – but also wrong. What the senses show us are true aspects of reality. Thus, it is up to our judgement to interpret these messages correctly. On the other hand, however, they provide our brain with a rather one-sided picture. What they show us is presented by them in convincing clarity; what they hide from us is eclipsed by this firework of presentations.

Despite all critical ability our judgement thus has a weak foothold if it turns against this "world of the senses". It is up to our judgement not to give in to deception, in this respect Goethe is right. But the fact that the senses deceive us is surely true as well.

In the field of business the way of looking at things as the energon theory does will most readily be understood. Here, one has always concentrated not so much on bodies that have grown together but rather on companies. The central concept that comprises all acquisitive efforts is – in this case – called "enterprise". This factor, that is so essential, cannot, however, actually be grasped by the hands, cannot be smelled, cannot be seen. It does not comprise merely the actual entrepreneurial means – premises, tools, goods – but apart from that also services, business contacts, and a good "reputation", location, licences, loans, experience, business ethics of the staff, and so on.

These, too, are concrete units that determine success or failure – just as those that can be touched. They are called "immaterial goods" – which again is not correct insofar as they are indeed of a material nature. They are functional units. In the whole structure of the acquisitive process they are the components that provide functions. But this is exactly the way how the energon theory looks at the effect structures in the world of animals and plants. Even supporting forces can become artificial organs – if the energon is capable of forcing them to render services to itself from time to time.

2

There are environmental forces that virtually carry the energon on their backs – just like a horse carrying a horseman. They support it, improve its energy balance. Sometimes this assistance occurs automatically, without any active help. This, however, is the exception to the rule. In most cases the energon itself has to make some effort in order to get the benefit of these favourable effects. It has to "mount the horse", has to "saddle" it. In concrete terms: it has to produce behavioural formulas and structures by which it forces the outside powers into its network of structures.

The shield/spear relationship, opposing interference and enemies, always presents a negative balance. An unfavourable effect has to be warded off, causing expenses. In the horse-horseman relationship, however, expenses are necessary as well – but there are accordingly higher energy gains (Fig. 22).

Spiders make use of the energy of the wind in order to perform long journeys through the air. They produce a longer spider's thread on an elevated place: this is the sail that carries them forward. The friction of the thread forces the wind to carry it along and the spider clings on to it as the passenger. Such spiders have been caught in nets from planes at heights up to 3,000 metres. This proves that they are carried over very long distances.

In many plants the seeds are able to take to the air. This, too, is an investment which leads to the utilisation of external energy. If the seeds happen to fall directly next to the plant, it thus creates competition for itself. It is, however, not able to transport the seeds all by itself. In this case, too, the wind is utilised.

A windmill is a far more complex structure, though it works according to the same principle. By means of an appropriate device the wind power is forced into the service of an energon (the miller). The decisive factor here – and that is an issue that has not been taken into consideration and left aside so far – is that in each such case energy works directly for the energon without being monopolised by it. The spider does not eat and digest the wind power but it works directly in favour of the spider. In plants the wind power is not monopolised by the plastids and subsequently invested in the flight process – it has a direct effect on the seeds. This also applies to the miller. The wind power is not obtained by means of the money he earns. It works directly for his professional entity – by powering an artificial organ, the windmill.

This is an extremely important principle, the meaning and significance of which one has to fully realise. No horse/horseman relationship has anything to do with the actual acquisitive process. It supports it but is separate from it. It is always based on some free energy prevailing in the environment that is made directly to operate an functional unit of the energon.

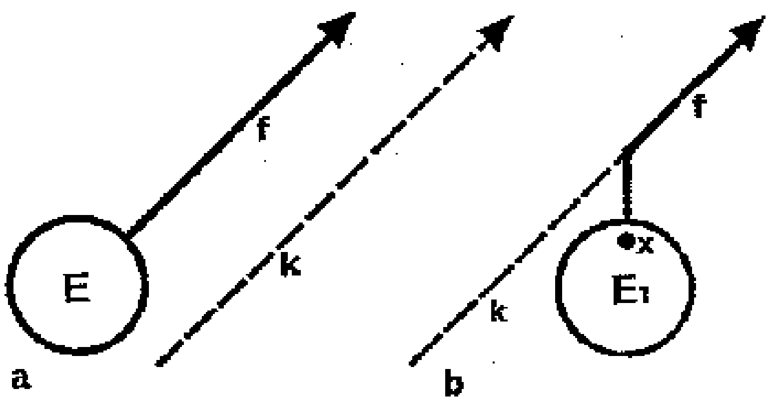

Figure 22: Utilisation of external energy

An energon (E) needs a function (f); k represents a force that exists in the environment and acts totally independent of E. Thanks to the additional functional unit x (structure, behavioural formula) the energon is capable of compelling this force to serve its purposes: it now performs either entirely or partly the function f. Example: utilisation of wind or water power, of heat, of the activities of other organisms, or a given and necessary resistance, of an economic trend, etc. Thus it saves its own energy expenses or structure.

This possibility for humans to increase their power has become of enormous significance. It has also played quite an important role in the energons of plants and animals.

The botanist Troll, too, realised this difference. The transport of water in land plants, he wrote, did not take place "with the help of an individual energy potential generated in the metabolism: the plant with its organs rather enters a potential gradient which it encounters in its surroundings and has this gradient work for it."[1] It has to be added, though, that only a special kind of formation in the plant may lead to this utilisation of environmental powers. The leaves' surface in connection with the tubular system leading down to the roots causes the water to be sucked via the evaporation that takes place. What also comes in is the active root pressure. The main work, however, when the water is pumped up is performed by the evaporation caused by the sun's heat.

The liana and ivy show another kind of energy saving. If these plants were to build a trunk all by their own, which would elevate them to a certain height above the ground, this would result in certain costs. A significant share of these expenses is saved by the formation of tendrils by means of which they can climb up other plants. Thus they exploit the energy expenses of another energon and increase their own energy potential.

The mistletoe even spares itself climbing up. Its fruits are sticky, adhere to the beaks of birds and are wiped off on branches. This is where the germ anchors its seed to the wood and thus gets access to the tree's sap channels. A precondition for this twofold utilisation of external energy was the formation of adequate formulas and structures. By means of the fruits and their stickiness the bird is made to carry the germ to its destination. This is where subsequently the sap channels of the other plant are utilised by the seed – i.e. external invasion – for its own acquisitive purposes.

3

Some "horses" are utilised simultaneously by several horsemen – like, for instance, in sponges.

Their acquisitive process runs as follows: waving their cilia causes a water stream to be led through their inner cavity. The micro-organisms therein are captured by the collar cells (choanocytes).

Maintaining the stream of water costs energy, and numerous other energons use this energy in order to facilitate their acquisitive process. Brittle stars (*Ophiotrix spec.)* position themselves in front of the suction openings and snatch the plankton that has been stirred up away from the sponges "right from their mouth". Others settle right inside these channels. A. S. Pearse, a British natural scientist, was patient enough to count all the "tenants" living in a large sponge. He ended up with 17,128. All of them benefited from the continuous water stream, and in addition also from the protection effect within the tubular system. Still, we have to consider the following here: these advantages gained have nothing to do with the acquisitive process itself. All these organisms are spared those expenses they would otherwise have to meet themselves, be it for the supplying of food, be it for the formation of a protective device. In this case, too, the energy gained does not take the troublesome way via the organisms' own stomach, via their own digestive system.

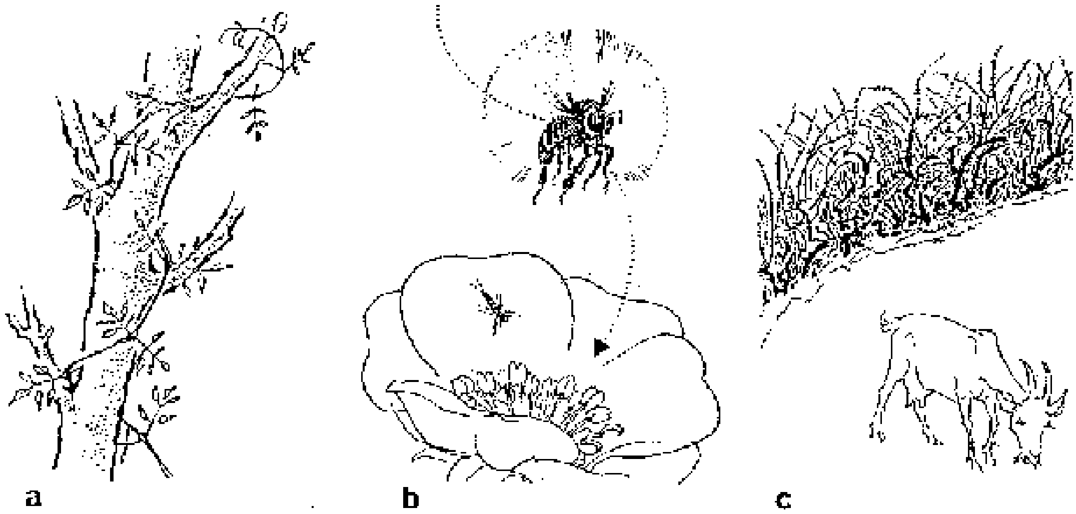

Figure 23: Examples for the acquisition of external energy by forcefully utilising other energons

a) The liana climbs up the trunk of a tree, thus brings its leaves closer to the light and spares itself the formation of an own supporting trunk.

b) The meloe beetle climbs on blossoms, where it waits for bees, clings on to their hairs, and has itself carried into the beehive. This is how it gets right to the nest unnoticed, where it subsequently feeds.

c) Human beings grow plants with thorns as hedges: for the purpose of fencing in their sphere of activity (protection against invaders, instrument for preventing the escape of pets).

In all three cases mentioned above utilisation is based on one behavioural formula: in a and b an innate, in c an acquired one. In a and c, resistance is required, in b, a movement is needed.

On land, as well as protection the gain of heat also represents a significant problem. Thousands of different species of small animals live in holes and nests of other animals. They thus achieve effects – by forming corresponding behavioural formulas – that cost them nothing.

Mites stick to dung beetles and are consequently carried from one cow pat to another. As the latter remains soft and usable only for a couple of days this is important to them. The larvae of the meloe climb up to the blossoms; this is where the bees alight, and they subsequently cling to them. Thus they reach – unnoticed and without great effort – the otherwise strictly guarded beehive – coming directly to the eggs, which are then eaten up, including the food resources kept for the larvae.

The vulture is said to carry turtles high up into the skies and drop them – thus shattering their shells. Only then it is able to eat the turtle. If this is true, one might say that the force of gravity is utilised here. In the Puszta, collared pratincoles fly back and forth between the legs of the cattle grazing there. The cattle stir up the insects for them, which the birds subsequently snatch.

In this case, special behavioural formulas are the "bridle" so to speak, by means of which external energy is used to render certain services to the energon.

This also applies to sea turtles. They crawl ashore on sandy coasts, where they dig a hole with their hind legs and put their eggs in it. They then close the hole and make it invisible. The heat of the sun hatches the eggs. 147
In the Malayan islands scrub hens build heaps which – soaked by the rain – start to decompose after 4 to 5 weeks. Then they dig a hole and put their eggs inside where the temperature rises to 41 - 45 degrees. In all these cases animals have arrived at behavioural formulas by which they channel external streams of energy into their own effect structure. In each of these cases the energon spares itself energy expenses.

In one Japanese reserve macaques were fed on seeds which were scattered on the sea-shore. One of the monkeys discovered – the term "discovery" is really suitable here – that the seeds were much easier to separate from the sand when it grabbed them together with the sand and threw the grains and the sand into the water. The sand sank, the seeds floated on the surface. The animal remembered this method, and others imitated this behaviour. In the course of 12 years this method was adopted by 18 members of the troop[2].

Here we already stand at the threshold to human progress. Using previous experiences a new behavioural formula was developed and passed on to others. By means of this formula the powers of nature are used to "separate the chaff from the wheat".

One form of energy that is hard to access for animals is the energy stored in wood. By way of fire humans became able to make use of it. At some point in time someone discovered how to unleash this process – and the method was subsequently passed on traditionally.

We force the energy contained in crude oil to run our artificial organ, the car. The functional unit necessary for it was the internal combustion engine. When we use water power it is the turbine. Neither petrol nor the waterfall pass via our mouth into our stomach – these powers rather operate artificial organs for us directly. By means of the functional unit we call an atomic reactor we can even access the amounts of energy restrained within atoms.

Wilhelm Ostwald saw "energy transformers" in every kinds of machine. The superiority of the human race was to be explained by "the amount of the energy organised by it, i.e. the energy brought under his dominance".[3]

This is a very similar point of view. In that sense the machine's very first predecessors can already be found in the spider's thread. There, too, external energy is already infiltrated into the individual effect structure. By the intermediary function of the thread the energy of the wind is being taken into service for the interests of an individual energon. This, too, constitutes a useful transformation of energy.

The entire human increase in power is based on this process in the end. Our stomach is able only to process food to a very limited extent, the performance of our muscles has absolute limits. Our central nervous system, however, not only succeeds in extending our genetic body by artificial organs – it also creates transformers which force external energies directly to operate such artificial organs. It is only thanks to that that humans were able continually to increase the power of the acquisitive body formed by them.

The topic "integration of external energy" alone is so extensive that it should be dealt with in a separate book. All I can do here is give a broad overview.

5

A particularly interesting method of utilising external energy consists in acting on the innate behavioural formulas of other organisms.

The cuckoo puts its eggs into other birds' nests and thus is relieved of the business of hatching them. It is a prerequisite that the young cuckoo triggers an even stronger breeding care behaviour than the bird's own offspring. Due to its particularly big and peculiar craw they feed the baby cuckoo preferentially. The young cuckoo then displaces the others and throws them out of the nest. Trumpet fish swim up close to the body of parrot fish and thus get close to their prey unnoticed: small fish. The peculiarly coloured and harmless parrot fish are thus used as camouflage shields. In this example, as well as in the cuckoo, the expense of a creature's own energy is saved by adapting to behavioural formulas innate to other animals.

Bacteria, worms, cancers, but most of all insects and mites trigger growth processes in plants by excreting special substances that promote their own energy balance. This is called the formation of "galls". In gall wasps and gall flies the eggs are laid in the interior of young leaves where the growth substances excreted by the larvae result in the leave’s tissue forming a sheltering home for them. Even suitable food is provided by the plants’ cells. The perfect nature of this manipulation goes so far as that some plant cells form lids which subsequently open up the way into the open to the insects. These processes used to be called – from the teleological point of view – "externally serving purposefulness". According to the energon theory, this term may just as well be retained. By excreting certain substances, the energons succeed in playing on the genetic genetic blueprints of other energons, like on a piano. The latter are stimulated to form structures that do not serve the plant itself, which are indeed "externally serving". Energons have here arrived at the point where they make foreign organisms work for them by influencing their genetic code.

The most extreme example of this process is demonstrated by the viruses (Ill. 24, 25). They consist of nothing but a genetic blueprint and a covering. If they reach the inside of the cells of animals or plants – in most cases by the externally serving transmission of biting or sucking insects – then the following process sets in: the virus formula – a DNA thread – displaces the genetic blueprint innate in the cell and the infested cells now start to produce viruses instead of a species-specific structure. The "assembly line" of the cell operating is virtually has another control formula foisted on it The substances for the development of new viruses (nucleotides) are provided by the cell, as is the necessary energy. Now it not only produces further such threads of formulas, it also covers them. In the process of this externally serving process it dies. Thus the virus multiplies.

In terms of "life-forms" as used to date, nobody was really sure how to classify viruses. On the one hand, they consist of organic molecules – on the other they do not have any inner metabolism at all and are able to crystallise as an anorganic substance.

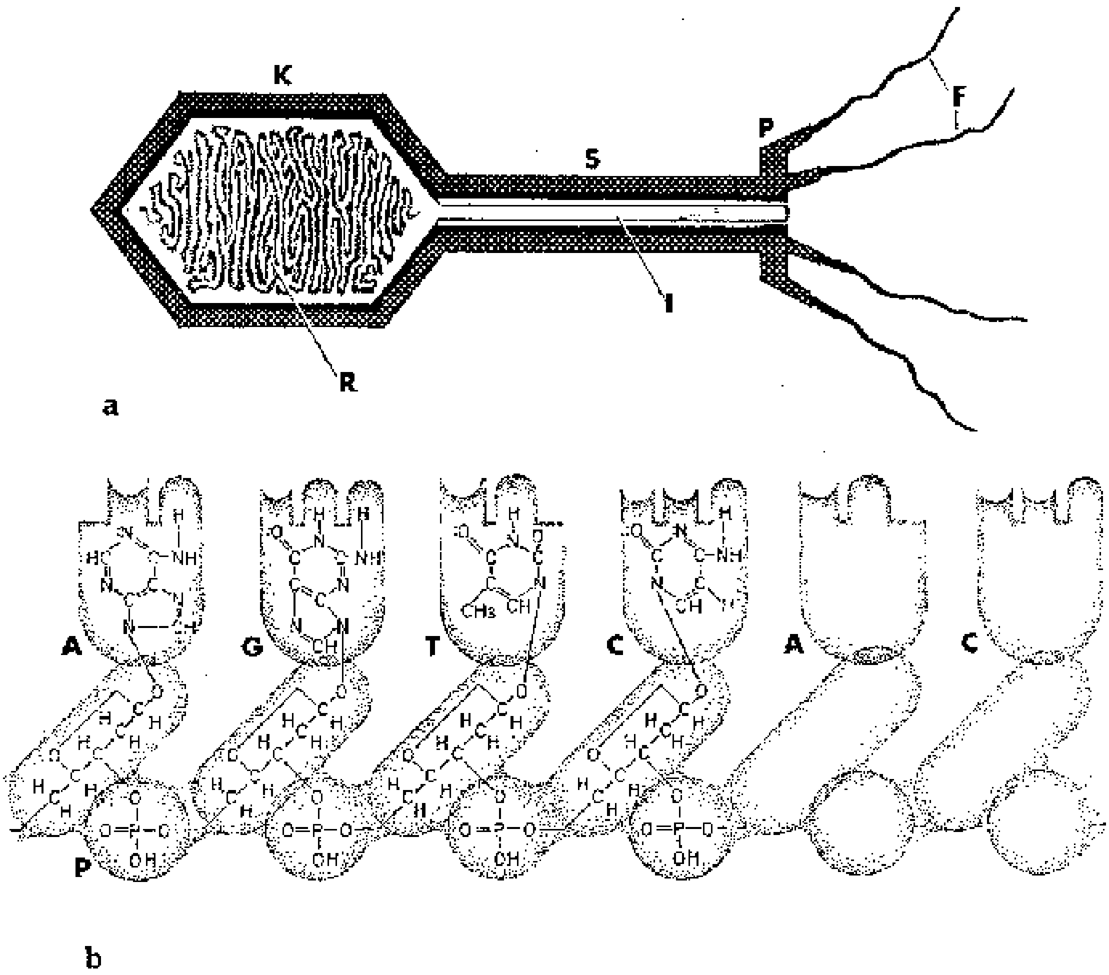

Figure 24: anatomy of a virus (T2 phage)

These smallest of all parasites consists of a "head" (K), a "tail" (S), a tailplate (P) and tail thread (F). This energon does not have any metabolism at all. By external energy it gets in contact with micro-organisms or cells, its tailplate adheres to the skin, and the inner tube (I) penetrates the cell. The DNA thread contained in the head, a single giant molecule (the genetic blueprint R), thus gets to the respective cell, where it functionally replaces the cell-specific formula threads and causes the cell to produce only such viruses instead of endogenous substance – until it dies. The formula threads of all animals and plants are constructed according to the same principle, their "code" is spelled with the same four "letters" (the bases adenine, guanine, thymine, and cytosine) which adhere to the thread in long rows (b).

Figure 25: A T2 phage with a broken up head

This picture taken with an electron microscope magnified 60,000 times was made by A. K. Kleinschmidt (Biochem. Biophysik. Acta, 61, Amsterdam 1962). The DNA thread (deoxynucleic acid thread) has entirely emerged and is visible as a long thread molecule with clearly visible ends (x and y). Whenever I talk about genetic blueprints in this book, I am primarily referring to structures like these).

According to the energon theory this is a clear-cut case. The viruses are energons which exist only through the acquisition of external energy. These are parasite hereditary formulas which became independent. The entire apparatus for acquiring own energy was omitted here. What was left is a formula protected by a wrapping that converts – upon penetration into other cells – their inner organisation to the production of viruses. W. Weidel called this "vagabonding genes", "parasites in the form of molecules". The existence of these structures is based on the fact that they are able to prompt living cells to a certain activity. This activity consists of the *multiplication of themselves*.

As the structure of the genetic blueprint – which remained the same up to the appearance of human beings – cannot be studied anywhere in a simpler and clearer way, genetics has made these objects a special object of study. For the principle of acquisition of external energy that is so important in genetics they represent a highly descriptive example. While in the cuckoo and the gall-producers the genetic blueprints of other energons are manipulated, but merely supporting the individual acquisition process, in viruses the entire structure focused on the individual acquisition of energy has been omitted– which certainly became what they are now by secondary retrogression – and what is left over is the formula that causes its multiplication[4].

6

I now arrive at something quite difficult. I am referring to the principle of sensitivity and of reaction. This mechanism developed in plants as well as in animals usually works in such a way that there is a potential gradient available in every organism that may trigger a process. Just as a gun can be fired by pulling/ the trigger, a certain reaction is triggered upon a certain stimulus. Troll put this very clearly: "Reaction is thus based on an energy potential that is ready and only hampered in creating a balance. Upon stimulation these inhibitions are removed." 152
Thus, a subsequent "re-installation of the potential gradient has to take place", in order to make further such reactions possible. Troll called this interaction "impulse causality".

The relation to the control causality as described in part 1, chapter VII is obvious. Here, too, the energy of the stimulus does not enter into the process triggered by it – just as little as releasing the trigger of the gun accelerates the bullet. Hassenstein, too, pointed out: "The term ‘control causality’ might just as well be understood as an analogy to the familiar term of ‘triggering causality’."

At this point let us recall the predatory bird which controls the formation of the white colour in rabbits. This process extends over many generations – and thus finally leads to the formation of a protective unit against this enemy. This would mean: the interfering factor itself causes the – evolutionary – reaction directed against it.

In the impulse causality (or "triggering causality") the same process takes place in the individual. If a defensive reaction is triggered in an animal or a plant by a stimulus, the interfering factor also turns into the trigger of the reaction already ready and directed against it.

In the field of external energy this process is of significance insofar as also in this case external energy is active on behalf of the energon. Here, structures have developed as a reaction to environmental influences which are of such a kind that the influence to be reacted to itself causes the defensive action. Figuratively speaking, this can be compared to a situation when an enemy attacking me triggers the shot which hits himself.

It is exactly this process that characterises on the one hand the formation of defensive structures within natural selection, and on the other the triggering of individual reactions. *In any case, the flow of evolution turns the interfering factors themselves into the cause of the processes warding them off*.

7

In humans the ability to force external activity into their own effective structure amounted to virtuosity. Let us first look at our manipulation of the genetic codes of animals and plants.

What we understand under the peaceful term "breeding", is nothing more or nothing less than an purposeful modification of hereditary formulas to our advantage. While the virus and the gall-producer always exert nothing but their self-serving effect individually, we went a bit further in this respect. The breeder – it was Darwin who first pointed this out – replaces natural selection by "artificial breeding choice". Practically speaking this means that we deliberately select those hereditary varieties which suit our needs best. This is how domestic animals came into existence, how useful plants developed which we feed on. They would not be competitive in the natural struggle for existence. The fruit trees produce much bigger and sweeter fruits than they normally could afford. Cattle and pigs produce much more meat and fat than usually. And this suits us because we want to eat them. Just by shielding and protecting them against natural selection they can continue to exist.

In these cases, we caused the formation of genetic blueprints by intentional selection which facilitates the improvement and enlargement of the respective yield and thus makes it possible to increase our energy potential. Thus, we control the development of organisms that act in accordance with our ideas.

Humans showed a similar tendency towards their own fellow-beings. Those who gained power over territory in one way or another had power for a long time over anyone who lived in this region. For food is provided only by the soil in the end. "Serfdom" and "subjection" are commonly used expressions for the method of forcing other persons into operating foreign-serving professional entities. Direct violence is another one. In this case we speak of "slavery" and "subjugation". We find the analogous process in robber ants. They intrude on other ant states, rob them of their pupae and the young ants emerging then become servants of their community. The Amazon ants of the species *Polyergus* are no longer capable of feeding themselves. They have to be fed by the captive workers. The fact that in the case of the ants the process of forming is based on innate behavioural formulas, in the case of human beings on acquired ones, is of no fundamental significance. In both cases we see the same functional principle, namely to turn foreign energons or members of the same species forcefully into one’s own functional units.

The beginning of industrial development was also characterised by this tendency. The entrepreneur had a monopoly of distributing jobs in certain areas and used it to his advantage. He enforced the formation of professional entities useful to him. This constitutes the basis of Marx's criticism, and for the whole avalanche of the development of communism resulting from it.

8

What was most important for the development of mankind was the utilisation of results of the work of others *done in the past*.

Here, too, we can trace the very beginnings back to the animals. The hermit crab acquires an additional functional unit: an empty snail shell. The snail has long been dead. The shell – which now serves the crab – thus is the result of previous work.

Animals that use holes or lodges which others have produced before serve as further examples. The beehives are used by several generations. The macaques mentioned earlier, living in the Japanese reserve, also benefit from the work of a member of the species that does not exist anymore. The formula discovered by it to separate seeds from sand has been passed on to them by way of imitation. All in all, however, there are only a few pre-stages.

This changed only when the human species appeared on the surface of the Earth. Many artificial organs still serve other humans beings long after the death of their original producer. This applies to tools and utensils, but even more to houses, streets, and public institutions. If a new company is found, it plays an important role in its balance whether there are already roads leading to the premises, whether there are water supplies, whether there is a sewage system, electricity and other communal institutions. If this is the case, the energons that form make use of the work previously done by others. It then integrates external services that already exist into its own network of effects.

This process is even more important when it comes to the development of all such formulas that are necessary for the production of artificial organs and for their reasonable use. Here, human beings almost always rely on what we call the "intellectual heritage" of mankind. The internal investment necessary for it is what we call knowledge – or education.

If it were possible to split up every single daily activity – let us stick to the professional world – into each of the individual performances it is based on and to trace these back to their origins, we would arrive at times past ages and ages ago where some of them are concerned. Each activity that aims at something special is based on the co-ordination of actions and reactions – behavioural formulas which were once produced by human beings for the first time and subsequently passed on to others. Of course, our intellect itself creates new formulas on an everyday basis, but the major part is still based on the efforts and earlier work if other men. By means of imitation, language, writing and schools they thus proliferated, and branched out into an unforeseeable network.

At this point we have arrived at the most telling part of the picture which outlines the image of the energon theory of the human species and the acquisitive bodies developed by it. To an incredible extent – which the average person is hardly aware of – we integrate the work performed with external energy in times long past into our network of effects.

If we look at the development of energons from the very outset – as far as we still can trace them back – we see a series of formations that became increasingly less obvious. At first, the individual effect bodies – with their visible and tangible body – which we to this day call "creature" – were still largely identical. As time went by, however, additional units were turned into own functional units. The *real* body, which dealt with natural selection, was augmented. Up to the human race, this process was kept within narrow limits. But then, with the ever increasing capabilities of one of our functional units – our brain – and its significant functional expansion and its taking over of new functions, the energons practically burst the chains that had existed until then. Suddenly the part of the effect body that was not part of the grown-together structure, that was no longer tangible in its entirety, started to expand beyond all measure.

The energons formed by humans which spread in gigantic dimensions all around him – very much like the multi-cell bodies around the germ cells producing them – consist of a constantly pulsating, extremely complex network of effects. Hundreds and thousands of additional units are integrated into this body – some often just for short moments. And most of these additional units are no longer operated by energy which the central structure, the human species, personally sets free in its stomach. Rather, hundreds and thousands of external streams of energy are made to run these additional functional units directly.

The connections, however, are even more complicated. The most important form, to integrate external energy into the horse/horseman relationship has not been discussed yet.

Comments:

[1] W. Troll, “Allgemeine Botanik”, Stuttgart 1948, p. 352
[2] M. Kawai, “Newly Acquired Pre-Cultural Behavior of the Natural Troop of Japanese Monkeys on Koshima Island” (“Primates 6”, 1965), pp. 1-30.
[3] W. Ostwald, „Die energetischen Grundlagen der Kulturwissenschaft“, Leipzig 1909, p. 55, 73 f
[4] In biology “metabolism (including “change of energy” is considered to be a fundamental criterium of life forms. Its existence can be proved in nearly all organisms, but there are functional units which are also functional without any change (for example the thorns of a rose bush whose functions even improve after they have died. Viruses have no metabolism or change of energy whatsoever. L. von Bertalanffy considers it as a characteristic of beings that the are in a “flowting equilibrium”, that they are open systems. That is right, but this does not distinguish them from the anorganic phenomena. Also a lake in the forest which flows into a creek and from which another creek flows off is an open system, it is also in a “flowing equilibrium”. Metabolism and change of energy are – viewed from the perspective of the energon theory – only aids which under particular circumstances also can become superfluous. The only characteristic element of vehicles of life is only the on average active balance of useful energy.

VI

HORSES THAT ARE FED

What need we have any friends
if we should ne'er have need of 'em?
W.Shakespeare ("Timon of Atens, 1607)

"My Criton, we owe Asklepios a rooster,
pay it to him and do not neglect it."
Socrates' last words (399 b.C.)

1

There is a process going on in the USA turning the local giant enterprises more and more into parts of the state structure.

The classical enterprises could no longer cope with their work. The same applies to the shareholders, who lost their influence on this powerful acquisitive structure. The tasks of control are nowadays so complicated that the management has become the highest authority of the company. But this, too, is not the actual head. The true decisions within this hierarchical system lie "a bit further down": in those who make the plans, the technicians, and other specialists. In these gigantic enterprises (of which there are about 300, whose turnover accounts for more than half of all business within the USA) a backbone that has the actual control. Galbraith called this "techno-structure"[1].

This structure – I am following his description here – freed itself from the control existing previously, became an oligarchy controlling itself. Its interests are no longer identical with those of the shareholders. The dividends are kept within reasonable limits, the actual goal, however, is the increase in the acquisitive structure. The growth rate is what matters. It means for every member of the techno-structure more responsibility, more scope for advancement. Technological progress is being promoted, the market is controlled, risks are avoided.

The most important and largest client is the state itself. 55 to 60 % of the national product in the USA is spent for the defence budget alone – accounting for more than US$ 60 billion today. The state regulates the total demand. *It is the interests of the state with which the techno-structure identifies itself*.

For the national authorities, these energons inspire confidence. They are not controlled by the interests of entrepreneurs or shareholders. They work with foresight, carefully, profitably and wisely. The management does not directly benefit from the earnings. The revenues are allocated primarily to growth and progress.

Thus a natural *partnership* is created. The state units have a good understanding with the techno-structure. A collegial combination between this and the individual categories of arms comes about. With the same kind of dedication the representatives of the state and of private economy work together. The result is a perfectly natural symbiosis – whereby each part supports and strengthens the other. This thus leads to these private-enterprise giants more and more turning into components of the state giant. Several types of energons here combine to form interest/pressure groups/lobbies. The process is highly complicated as these enterprises themselves are part of the US. Components of a larger energon that had so far been widely independent thus merge more and more with the latter. They become parts of the state's bureaucracy.

I am rather sceptical about whether this book will succeed in inciting the interest of the modern economist in snails and juniper bushes. Animals and plants seem extremely unimportant from the point of view of economic difficulties – as far as they are not supposed to be served on our plates. But still they throw some light on what takes place at the highest level of power nowadays.

2

There are two things in plants that make them particularly dear to us. Firstly, it is the blossoms, secondly the fruits. Regarding these, many people have assumed that they were created by divine providence just for the delight of human beings. For the purpose of enjoying them. I will now try to demonstrate that precisely these may provide information on those processes to which we owe the power network of our existence today. General Motors and Dow Chemical seem to be light-years away from the pelargonium on the windowsill and from the pumpkin in the kitchen garden. And this is true – but only in our imagination.

The first possibility for the plants growing on land to have their seed proliferation financed by external power, was by taking the wind into their service. There was, however, another possibility by means of which the seeds could even be carried many times further away from the mother plant. In this case, too, it was the utilisation of external energy; here, too, some expenses were necessary. Special structures had to be developed. They looked slightly different from the one which forces wind energy into the plant's service. They mainly consisted of sugar, which was arranged around the seeds. Furthermore, they had a skin tightened around it. It had a favourable effect if this skin was as colourful as possible.

This formation is what we call "fruits". They are nothing but a means of payment to the birds, which eat them up and thus spread the seeds. The seed enters the bird's stomach and is later on evacuated at some other place. In most cases even with excrement sticking to it, welcome as a fertiliser in the process of germinating.

The drastic difference to the spreading of seeds by the wind is the fact that in this case one energon makes another energon render services useful for it. While the expense of energy in connection with the flying facility is of no use to the wind at all, the fruit pulp surrounding the seed is of direct advantage to the bird. It represents valuable food for it. Its services are thus paid for accordingly. The fact that neither of the partners is aware of this business deal does not change anything in the process of trading that takes place: it is based on the development of behavioural blueprints which – in this case – are formed not merely in the energon acquiring external support. The behavioural structure of the birds adapted to this welcome provision of sugar.

Things, however, did not work just like that. The birds must – as they fly – economise particularly as regards their energy and thus have an extremely fast, even dynamic digestion. To them it is an advantage if the food does not weigh on the body for too long. This, however, means danger for the seed. For if they are digested themselves in this very efficient process, this does not promote the cause of spreading the seed.

The stone of the cherry – well known to all of us – illustrates the additional expense that was necessary here. The seed itself has to be surrounded in a way that the acid gastric fluid cannot harm it. A solid outer skin around the fruit was important, too. It was not to be so solid that it might have irritated the birds but if smaller animals (which could not fly and thus transport the seeds) were kept away from this sugar depot, this was an advantage.

The "problems" of the plant, however, were still by far not solved by all these factors. The germs did cover wide distances but precisely this fact led to another problem. In evolution the organisms could not make progress if the mechanism of sexual merging of the germ cells did not work. We will refer to that later. Now, however – with the help of the birds – the daughter plant is moved far away. How were its germ cells supposed to unite with others?[2]

The quiet plants are much more dynamic than they appear to be. They succeeded – for the purpose of transporting the germ cells – in taking insects (and also some birds) into their service. This auxiliary service, too, requires a corresponding gift, an expense, a lure, a reward. It is again sugar, which is easy for the animals to digest. Apart from that, in order to lure insects which do not have very good vision to this present designed for them, the development of scent and leaves as colourful as possible were useful.

We call this functional unit for the utilisation of the insects’ energy – this "energy transformer", after Ostwald – "blossom". The "pollination" constitutes a clear business transaction here – which the partners themselves are not aware of at all. It developed – and as it worked it survived and was continually improved and refined.

Those parts which we consider particularly pleasant and which are dear to us (fruits and blossoms) have not very much to do with the "nature" of the plant itself. They are additional organs which are imposed on it to make up for its immovability. If the cherry tree were able to walk, neither would the Japanese take pleasure in its blossoms, nor would we take pleasure in its fruit.

Development, however, went still a little bit further. It is not the intention of this book to explain why human beings like blossoms. The reason why we like the taste of the fruits is selfexplanatory. Both reasons, however, lead to the fact that here again manipulation of genetic blueprints by human beings set in, which we call "cultivation".

By means of this process humans made it possible that today we have plant energons which develop large and colourful blossoms for no purpose at all, or grow fruits of a size and containing such an amount of sugar that nature itself would never have allowed within the framework of natural balance. We promote them. We fertilise them, defend, protect and pamper them. For what purpose? In one case, we get food that tastes so delicious. In the other case, we gain the effect, so hard to grasp and to express in figures, which we call our "pleasure". The fact that we have these splendid ornamental flowers today again represents a devious way making external energy work for us. It creates something for us that we consider "beautiful" – i.e. advantages in the "sphere of luxury". We made the powers of nature do even this.

3

Let us come back to our hermit crab. Some species can do just with the protective shell, which was created by the snail before they used it – for their own needs – some cannot. It protects them from many rapacious enemies, but not from the octopus. One possibility to ward these off, too, would be to plant water lilies on their shell. This, too, was achieved – as we all know – by some of the hermit crabs.

If their acquisitive business runs well, and they become bigger, the snail shell becomes too small. Controlled by innate behavioural patterns, they subsequently seek a bigger one. They move into it as soon as they found it and also take along the water lilies to the new home. They stroke the foot of the lilies with their pincers whereupon the lilies can be peeled off. Using its pincers the crab then transfers the water lilies to the new shell. This does not constitute an act of intelligence, this, too, had to be preceded by the development of special behavioural formulas in the course of evolution – on the one hand in the crab, on the other, however, also in the water lilies, which also benefit from this symbiosis.

To the crab, the water lily is an functional unit of protection. To the water lily, the crab is an functional unit of movement. Thus, the water lily is carried around and is more likely to be able to get hold of food. The principle of any such relationship of two energons becomes very obvious here. The partners use each other as artificial organs, *which have the special advantage of running themselves*. Thus, each of them acquires a share of foreign efforts. Each of the two parts integrates organs run on foreign energy into its effective structure.

This also applies to the relation between plants, and birds and insects. The plant acquires functional units of locomotion. The birds and insects acquire sugar. This gives the impression of the plants turning into their source of energy in this business transaction. This, however, is not the whole truth. Here, too, it is not actually the sugar that is traded – but rather external energy. The plants turn into *producers and suppliers* of this dose of sugar to the birds and insects. They thus become functional units of the *acquisition* of food. Here again, one achievement is acquired by another achievement.

This difference is significant in order to see similar acts of barter between human beings in the right light. Let us assume the simple case of one person building a fence for another person, and as a counter-performance getting five hens from him. The object that the person who built the fence traded is not food as such but the *job performance which was necessary for the acquisition of this food*. The other person had fed and bred these hens: this is the performance which is offered for barter in this case.

As an intermediate factor in this act of barter, money may also play a part. This makes the process more complicated, though it does not make any difference at all as regards the basic context.

Even if food is purchased by means of money, the effort necessary for the *acquisition* of this food is paid for by the appropriate amount of money. This is highly significant insofar as it explains the extremely inconsistent value relation between money and raw energy.

Whenever I buy meat, vegetables, coal or electricity – i.e. energy in any form usable by humans – then the same amount may cost twice as much somewhere else, or it may cost twice as much at a certain point time as at some time previously. If money were an allocation for raw energy, it would be incomprehensible why there is no constant relation. Money, however, is not like that. Money is always and exclusively an a cheque for human output – the value of which fluctuates depending on supply and demand as well as on other circumstances[3].

Speaking in terms of the energon theory, money is thus a cheque accepted/ by society for the result of human work. Or, to put it even more generally: a functional auxiliary unit enabling the integration of a huge number of artificial organs which operate independently within one's own effect structure from time to time. *At no time* is anything but human work acquired – e.g. if I buy a pencil, or if I have a roast at a restaurant.

This basic principle that in acts of barter among energons it is never objects that are traded but always the work of other energons is generally valid – from the first symbiotic relationship organisms ever developed to the interlacements of General Motors with the US State Department. It is always an exchange of *work* – even in cases when *objects* changed hands. In the giant US companies which – according to Galbraith's studies – gradually become organs of the state the situation is even more complicated as here, energons are incorporated into another energon. Each company within a state is – even if only loosely affiliated – part of the same. Thus, one energon unites with another which, in some respect, was already part of itself.

This process, too, - and this is where we get very close to the basic principle of the formation/development of all energons – becomes clearer, when we look at its very beginnings.

4

Let us come back to the often-quoted hermit crabs. In the *Eupagurus prideauxi* – a species living in the Mediterranean – the only partner is always one single water lily, an *Adamsia palliata*. For the crab it is not only a protective organ but it also renders another service. With its foot it grows around the snail shell and excretes a keratin substance at the rim – in such a way that the shell is thus enlarged (Fig. 26 b, c). The snail that created it in the first place could not have enlarged it any better. Thus, the hermit crab does not have to move on to a larger snail shell when it grows bigger. This constitutes an advantage to both partners. The artificial organ, the water lily, improves the artificial organ, the snail shell. I mention this complication for the mere purpose of transition to the following one.

In the hermit crab *Eupagurus constans* – which lives in the North Sea – the same auxiliary service is rendered by a whole colony of hydroid polyps (*Hydractinia sodalis)* (Fig. 26 d, e). Here, it is an entire lawn of polyps that overgrows the snail shell and also augments it by excreting substances. This community also does something else: it forms specially developed protective polyps at the rim of the opening – i.e. an increased protective function against enemies the crab can benefit from. In this case, the barter partner is no longer a single energon but already an organised multitude of several hundreds of energons.

A similar relationship can be seen in the homes constructed by ants and termites in the already mentioned symphiles. It is larvae of insects of very different orders and families that are protected, fed and carried around by the ants as the larvae excrete a fluid through glands that is much appreciated by the ants. Just as the plants turn birds and insects into functional units by offering their fruits and blossoms, these larvae – by excreting these substances – turn an entire animal state into their ally. Here, too, - just as in the *Eupagurus constans* – one energon faces an organised multitude of energons as a partner. In this case, it is much larger: the symphile is just a tiny object in their community. This, however, would not change much in the basic relationship as such. A change, however, can be seen insofar as the termite state has to be regarded as a loosely integrated energon already.

For each symphile the entire ant or termite state that it lives in represents a protective organ.

For these states every symphile, in turn, is the donor of desired excretions.

Let us move one integration step downwards. I would like to draw attention to the digestive assistants of the termites. They are protozoa living in their digestive system and make the wooden food digestible for them. Here again we are confronted with a reciprocal relationship involving very dissimilar partners. To each digestive assistant the huge body of the termite is an functional unit of protection and of food acquisition. For the fact that they see to the breaking up of the wood is not just a favour for the host; they also gain energy and substances for themselves. To the large body of the termite, in turn, each digestive assistant is an organ for the maceration of food. In this case, a protozoon has a multi-cell body as a partner.

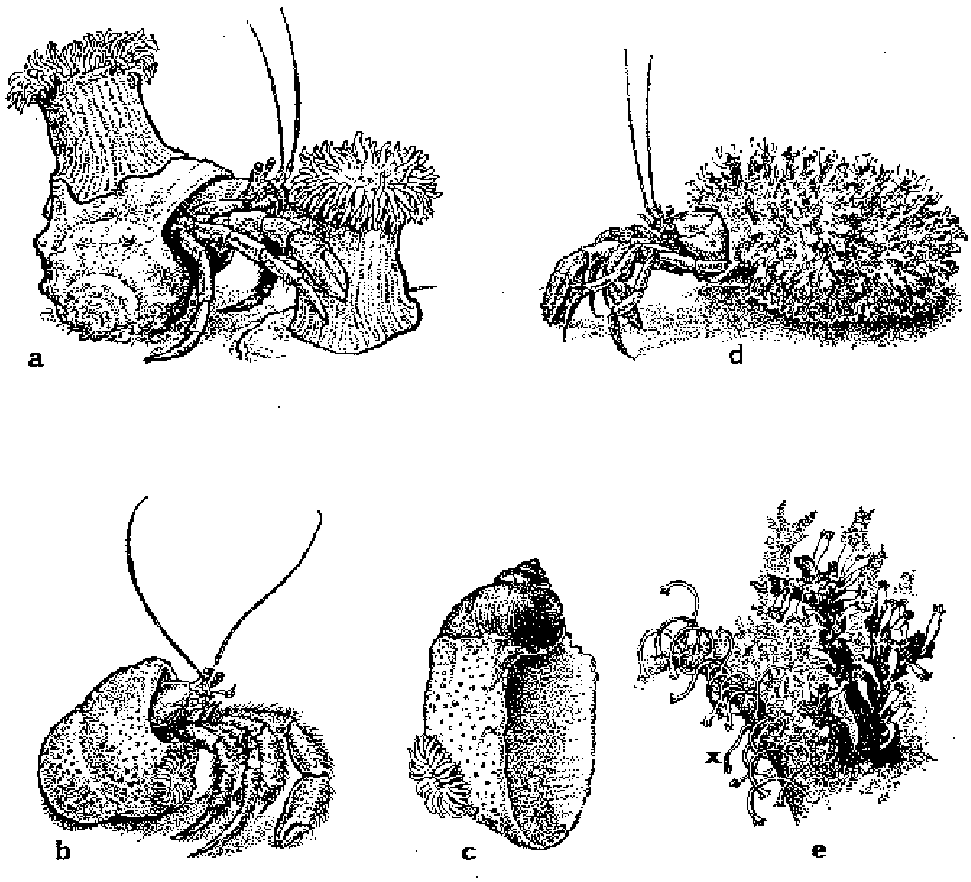

Figure 26: Examples for the utilisation of other energons in mutual interest (symbiosis)

a) The hermit crab *Pagurus arrosor,* which plants sea anemones on its snail shell. The protective effect of the artificial organ, the snail shell, is thus even increased: particularly against its main , the octopus. When the hermit crab grows bigger and is forced to move on to another, larger house, it also takes along the sea anemones. By strokes of its pincers the anemones can be peeled off. The advantage arising to the water lily from this partnership (which is based on innate behavioural patterns in both species) is the following: they are carried around for free and thus can get access to food more easily.

b) In the hermit crab *Eupagurus prideauxi* the sea anemone *Adamsia* renders another "service": by excreting chalk it enlarges the snail shell (c) rendering it unnecessary for the hermit crab to move on. This constitutes an advantages for *both* partners.

d) In the hermit crab *Eupagurus constans* a colony of polyps belonging to the species *Hydractinia* grows all over the snail shell. This multitude of polyps adhering to each other continues to form the opening of the shell: it is active as an artificial organ which improves another (snail shell). At the rim of the opening (e) the colony of polyps forms specially developed protective polyps (x) – an additional function serving the hermit crab (and thus in turn also the partnership).

In ruminants, in whose stomach bacteria further the digestive process, the difference in size becomes even more extreme. In the goat's stomach, there live millions of bacteria. This, however, does not make any difference as far as the principle is concerned. Every bacterium is a barter partner with the goat's body.

And going beyond that: as the entirety of the multi-cellular body becomes an auxiliary organ of protection and food acquisition, the goat is not only of use as a whole but so is *each of its organs*.

Only through the combination of all these units can the bacterium acquire this foreign energy. If the heart of the goat fails, the output of this multi-cellular body comes to an end.

Let us finally consider the symbiotic algae which replace the kidneys in the body of the worm *Convoluta*. As they are tightly embedded in the tissue of the other cells the collegial relationship to the other organs becomes even more obvious here. This, however, eventually brings us to the point that there is a barter relationship between any organ – any functional unit – of a multi-cellular body and this body itself. In this book I will not develop this line of thought any further; I will only shortly refer to it in the epilogue. What I am trying to prove *here* is merely that even between an energon embedded in another one, and itself a barter relationship is possible. Seen from the larger body's perspective, the smaller body becomes more and more part of it, of its organ. Conversely, however, the large body thus also becomes more and more part of the smaller one – i.e. an organ of this element of its very own. We are all familiar with the practical effects: the whole becomes just as dependent on its individual parts as the single part becomes on the whole.

Here our imagination is confronted with an obstacle that can hardly be overcome. We can only hardly think of a larger body as an organ of a smaller one that is part of itself.

Anyway, what commonly applies is that: no matter what the size and locational relationships of energons look like: they can establish contacts with each other – in such a way that each becomes the functional unit of the other.

5

In the main section at the beginning dealing with the environmental influences *hampering* the energons, we distinguished between two sections: the predatory animals and the disturbances. The conceptual distinction is based on the fact that the predators are always energons to which the energon threatened represents the energy source. Thus, there is a key-keyhole relationship between them and the threatened energon. The disturbances, on the other hand, may be energons as well as inorganic powers. They impede and harm the energon in question, and thus worsen its energy balance, without gaining free energy from it themselves, though[4].

In the front section – which is no less extensive – dealing with *enhancing* environmental factors, it seems justifiable to make distinctions along the same lines. Again we have here inorganic powers and energons that can be turned into subservient horses without any interdependence. The "disturbances" can directly be opposed to the "enhancements". In the second group the horse is not only taken into service – but is also "fed". This group always comprises energons only. They are paid for their performance by counter-performances. One could put them opposite the "predators" by calling them "assistants", but this term has strong connotations referring to the human world. This is why the term "symbionts" which is widely used in biology is more appropriate.

As regards the competitive value, however, all expenses serving the utilisation of external energy can be summed up in the same column – just as we summarised the expense of all defensive measures in the front section "disturbances and predators". Here, too, we see a close functional relationship. Whether one expenditure of energy serves the purpose of making a horse an functional unit *by force,* or whether it is taken into service *with the provision of any sort of counter-performance,* is totally irrelevant as regards the balance. There, the difference does not even show.

In all efforts to acquire energy, too, be it by producing additional units (such as fruits in the plants, or sales products in professional entities) or by services (enlarging the snail shell, or the activity of a servant or a doctor) it is again, in my view, the criteria of cost, precision, and speed that are most relevant. And here, too, in order to determine the competitive value, each of these criteria has to be looked at separately during the development phase as well as during the acquisitive stages, during the non-acquisitive phases as well as during resting phases. The arguments that support this approach are basically the same as those I used in connection with the environmental frontiers. Thus we arrive at 12 further values measurable in principle which have to be taken into account.

The control mechanisms that are exercised by the promoting environmental conditions and by the symbionts are also characterised by control causality. If an energon acquires a certain formation which involves using foreign energy, it gains a competitive advantage – and if this advantage is significant enough, this particularity will survive. It is again the promoting factor that determines what the time-space structure leading to its development has to look like – it thus *controls* its formation. Here we have again a key-keyhole relationship in principle. The only difference lies in the fact that in this case the energon does not acquire universally useable free energy but assistance which is the *directly* driven by one of its functional units.

Let me add: the same environmental factor can very well be at one time enhancing, and at another time harmful. The simplest example is provided by the force of gravity. If an animal climbs a mountain, this power has inhibiting effects – causing greater expenses than moving on even ground. If the animal moves downhill, the same power suddenly becomes a willing horse. Now, external energy makes motion easier – it becomes cheaper than on even ground. In this case, profit and loss are balanced, but with other environmental forces (such as wind or water power) many energons have both protective adaptations towards the *same* factor as well as other adaptations which can force them into their service. The same factor may, thus, very well be found in the front section among the impeding environmental factors as well as among the promoting factors.

I thus have illustrated four conceptually clearly distinguishable groups of environmental factors which influence the formation of the energons each in their own way and control their evolutionary development. The relative adaptation to each of these groups – *energy sources, substance sources, predators and disturbances, enhancing forces and symbionts* – has an impact on the competitive value.

This, however, still does not explain all the "parts" the energons are composed of, the causes which eventually determine their structure. A lot of energons do not show any *immediate* adjustment to the environment. The energons not only have outer frontiers – they also have *inner frontiers*.

Comments:

[1] J. K. Galbraith, „Die moderne Industriegesellschaft“.
[2] Here, the development is described in a slightly „historizing“ way. In practical terms/reality, it proceeded along quite parallel lines in small steps on both developmental tracks.
[3] Joseph Schumpeter compared the function of money with the function of an “admission ticket”. Friedrich Bendixen called it an “order/check/letter of credit/claim” to a share corresponding to one’s own contribution to the national product/GDP?. Here again money is seen as an equivalent of human output/performance where it allows to/we can “enter into”, a “share” of which it offers. Karl Marx shared this view, too. The value of money was determined by “the labour time required for its production” and was expressed by “the amount of any other good into the production of which the same amount of time has been invested,”
[4] If an elephant tramples on an ant, it kills it, though it gains nothing of its energy accumulated in the ants’ molecules. Thus, the elephant – even though it kills the ant – constitutes merely a disturbing/interfering environmental influence.

I

TIES

A person who may not acquire any property
cannot have any other interest than
eating as much as possible and working
as little as possible.
Adam Smith (1776)

Friendship brought about by wine
lasts, like the effect of wine, only for one night.
Friedrich Logau (about 1638)

1

The idea that structures, a lizard or a goldsmith's shop, for example, are in principle not comparable, is so deeply rooted in human thinking that it can only – if at all – be shaken by a considerable number of arguments. It is equally difficult to shake the conviction anchored, so to speak, in the core of our self-estimation, that we represent a culmination and are God's darlings.

Up to now we have been speaking of the "outer fronts" which all energons – in whatever form they present themselves to our senses – are confronted with, which they "have to deal with". They are the ones which primarily direct the energons' evolutionary formation. Every energon, however, also has "inner fronts" which it has to deal with and which likewise impose vehicles of effect and burdens on it. Thus in the bodies of the higher animals, the vascular system can be understood neither as an adaptation to energy and material sources nor as an adaptation to disturbing or favourable environmental conditions. The reason which necessitates this functional unit, this expense, is to be found elsewhere: in the energons themselves. In enterprises, the same holds for the canteen, the accounting department, the repair department. These units also are not the direct and immediate results arising from the type of income sources or from other environmental conditions – rather, such functional units can be found with energons with highly different methods of acquisition and in highly different environmental situations. They are, so to speak, functional responses to problems occurring – *secondarily* – inside a large number of energons.

Already at this point it should be stressed that a clear dividing line between the expense which the outer fronts cause and that arising from the inner fronts cannot always be drawn. Because of double functions and extensions of function there are also multifarious overlaps. Functionally – and conceptually – the inner fronts are nevertheless clearly distinguishable and independent phenomena. With every measurable formulation of competitiveness, the values they supply have to be taken account of separately.

The first "inner front section" appears – according to conventional thinking – as extremely irrelevant and trivial, hardly worth considering or mentioning. In textbooks of zoology and botany it is hardly mentioned. It is, nevertheless, of far-reaching importance. If today our world is on the brink of possible self-destruction, its ultimate root is in this factor, which up to now has been largely ignored.

I call this factor "bonding". It is an internal requirement which has to be fulfilled in every energon. Every functional unit must somehow be bound to the energon to which it belongs. The general principle is: Whatever is not tied or bonded to an energon can only in special circumstances be a functional unit of that energon.

With plants and animals, from the outset no part exists by itself, everything firmly coalesces with the other parts. That leads us to believe that there is no problem here.

However, it is not at all self-evident that every cell sticks to the others – on the contrary, this is an effort which runs up costs. With animal cells, it is the tonofibrils which bond the cell walls to one another, with the vegetable cells this is effected by intermediate lamellae which consist of pectin. If one could calculate the total cost of these devices in the Metazoa, it surely would come to a considerable figure. In addition, there are connective tissues, ligaments and skins which hold the various organs together. With animals, the bones and the external loricae, with plants, the lignified stem and branch parts not only have a supporting function but also a binding function. Due to the fact that individual tissues and organs are chained to them, these are also more tightly connected. How strong in each individual case the tying devices have to be depends on the method of acquisition and the environmental conditions. The more strains a body has to put up with, the stronger must – necessarily – be the bonds preventing it from being torn apart. 167

In tissue cultures, heart cells, kidney cells or neurons can be kept alive in isolation. Consequently, they behave like independent protozoans idly moving around like amoebae. One may observe how they form ties, renounce their motility again and grow stiff in a tissue. This process shows up even more clearly with the myxamoebae. These protozoans first live fully independently and then unite into a metazoic body: into a fungus spore capsule which serves to propagate the species. Every such process presupposes bonds as a special feature of the cells concerned.

However, that a purely mechanical bond does not suffice is illustrated by cancer cells. They are still firmly connected with the body – in fact, however, they are not really parts of it, not really its functional units or vehicles of effect, any more. They behave like independent organisms, in much the same way as parasites invading the body. In addition to the mechanical bond there is thus – with all cell aggregates – another more complicated form of bonding. What ultimately constitutes the bond is the associated willingness to act[1]. This can also be observed with energons established by human beings. The accounting clerk embezzling money, the traitor secretly working for the enemy may formally appear to be tightly bound with their associations. De facto, however, they are not their vehicles of effect.

Finally we have to be aware of the fact that not only all vehicles of effect must be tied to their energons – but that they themselves also consist of parts between which bonds are necessary. Also, inside a cell or an organelle (cell organ) not everything always remain in its proper place.

What fundamental types of bonding are there, what do they look like? This can be observed best with the artificial organs of humans. In this case the parts are manufactured separately and only then they are connected with one another. Also, we can precisely indicate the costs run up by the factor "bonding".

3

What the specific nature of the vehicles of effect functioning as bond s has to be, depends above all on the type of units to be tied to one another.

Textiles cannot be connected by a weld, ropes hardly by a screw, metal sheets never by a knot. The material, form and size of every tie thus depend on the material, form and size of the functional units that are to be tied to one another. Stones are bound by mortar, wooden parts by screws or glue, wires by clamps or solder. Likewise, the function of the units to be tied determines the necessary shape of the binders. Poles movable against one another, or bones, must be held together by means of elastic ligaments or springs. With funcitonal units which rotate or move in and out of one another, appropriate joints or bearings are necessary.

With professional entities, optional ties which can temporarily be dissolved play an important role. The functional unit par excellence for that purpose is the human hand. With its help we temporarily bind tools to ourselves, we operate machines by means of levers and switches. All tool handles and push-buttons but also handles and bolts on windows and doors are adaptations to this organ made available to us by nature. In extension of function it also performs a tying function.

An important question is how the artificial organs remain tied to their functional unit at the time when the human is not using them. As explained above (p. 49) "keeping things tidy" is a function serving that purpose. *Only that which is actually available, is really tied to us*. Accordingly, the central nervous 168
system – more precisely: the brain and its sub-unit memory – exercise a function of tying as well.

To prevent parts getting lost via the action of predatory energons or disturbing environmental impacts is the responsibility of the front "defence" already discussed above. At this point, it should be pointed out that in many cases this function is realised through a *strengthening* of the tying vehicles of effect.

The sanctioning of ownership and property through the social organ of the state (i.e. the legal system) likewise protects the bonds existing between humans and their artificial organs. A law already enacted in 1790 BC by King Hammurabi in Babylon even goes one step further: "If a robber cannot be caught, the robbed person shall solemnly swear by God what he has lost. The town and the governor in whose area the robbery took place shall then compensate the person for the stolen property." The state here becomes – similarly to today's insurance companies – a social organ which in the case of a violently torn up bond establishes a new one with a functional unit exercising the same function.

This process is a new one in the history of evolution – apart from auxiliary measures of metazoic bodies for damaged tissues and cells – however, the *inheritance* of property sanctioned by the state constitutes even more significant progress. The germ cell, human being, thereby has the possibility to determine what should happen after its death to the artificial organs tied to it – to which other people or other energons they should be bound after its own decease. A fairly large part of civil legislation deals with questions of bonding. By means of special formalities bonds are established, protected – and transferred. Also every purchase constitutes a transference of a bond sanctioned by the state.

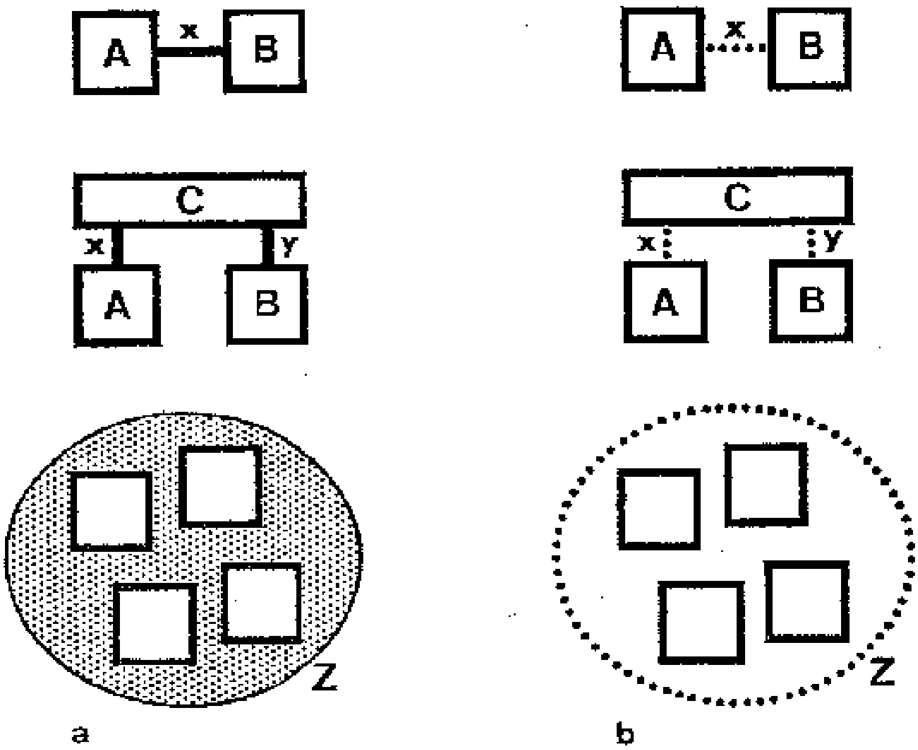

Figure 27: Main stages of tying and of co-ordination

a) *Simple tying* of two units (A, B) by means of a binding functional unit (x). Examples: nail, glue, weld, contract. – *Indirect tying* through a third unit (C) to which the units to be tied are bound. Thereby they are tied to one another as well. Examples: tying of parts of the body to the spinal column, fixing of machines on a common basis, tying of the soldiers to the commander. – Within a spatial-temporal area, a *sphere of tying* is created which comprises the units to be bound. Examples: the cell components held together by the cell skin, parcels in a shopping bag, citizens within the state borders (in this case it is the constitution and laws which are creating a limited sphere of tying).

b) *Simple co-ordination* of the activities of two units (A and B) by means of a co-ordinated signal. Example: two workers co-ordinating their common activity through acoustic or visual signals. – *Indirect co-ordination* through a third unit (C) giving the units to be co-ordinated appropriate signals (x, y). Thereby their activity is co-ordinated. Example: the brain giving orders to different muscles, co-ordination of workers by a foreman, co-ordination of machine activities by means of a computer. – Within a spatial-temporal area, a *sphere of co-ordination* is created. Examples: the regulation of co-ordination by the genetic commanding points contained in every cell which is distributed over the body of a metazoan, co-ordination of persons by radio, co-ordination of sequences of operations by means of a printed co-ordination programme, co-ordination of domestic processes by laws which are published everywhere.

We have to be aware of the close relationship between spatial problems (tying) and temporal problems (co-ordination). In extension of function and function partnership, vehicles of effect related to tying can assume a function of co-ordinating as well, and vice versa. Examples: the wire connecting the receiver with the telephone set serves both for tying and for co-ordinating. The binding of the citizens to the territory of the state as well as, e.g. in the event of war, to the commanding points is effected, if necessary, by the police: thus by means of co-ordinated *processes*.

If a person lives completely alone, he can manage the bonding of his artificial organs by means of his hands and memory as well as by "keeping things tidy" and defence against forces of nature alone. In the vicinity of other people, however, he needs an additional functional unit for that function: the social organ "state".

4

Special problems of bonding arise, if human beings make other living beings their artificial organs.

Here we come across well-known phenomena: domestic animals are put in harness in order to attach them to a carriage. They are prevented from fleeing by stables and fences. They are fixed to a post by means of a rope. Guards keep watch over herds. In all cases these are vehicles of effect related to tying.

Similarly, guards watched over human slaves, too. In addition, almost every state authority protected its property – it protected the tying to the "master", it prevented an escape. When whole states were subjected, from which tribute was then extorted, the occupying forces saw to it that the bond was not destroyed, that is, they ensured the maintenance of willingness to act. The subjected state thus became a sort of milch cow, an acquisitive organ which had to be tied up by force.

In the military state, too, guards – army, political police – ensure the maintenance of the willingness of its citizens to act. At this point we are already getting very close to the problem area of cancer cells. Likewise in the body of metazoic organisms there need not only be an authority prescribing the functions of the individual parts but also guards which ensure maintenance of their willingness to function. The authority prescribing behaviour is known today: it is the genetic rule which is contained in every cell. About the guards and controls, however, much remains unknown. If we knew more about them, the phenomenon of cancer cells – which can shake off that bond – probably would already have been solved.

Much more interesting, however, than these violent bonds are others which can be observed in the development of animals. Here we are getting to the phenomena of the bonding of the young to their parents, of sexual attachment, of group cohesion. We are thus also getting to the phenomena of "love", "friendship" and "patriotism" which are so important to us[2].

The bonding of the young to their parents is only to be found with species with brood care: it is based on innate behavioural rules. In ducklings – experiments have proved – from the thirteenth to the sixteenth hour after their hatching, the "following response" is fixed[3]. If they see their mother during that time, they will continue to follow her, but if they see a person or a balloon instead, they will continue to follow – irreversibly – only persons or balloons. These animals thus have an innate instinct for "bond forming". With whom, however, the "bond " is formed, is decided by the sense impressions during a specific developmental phase.

Sexual bond forming – with species which brood living together in pairs – is based on innate behaviour, too. With grey geese, which form especially long and strong ties, it is effected by means of a special courtship ceremony[4]. The animals have then, as it is called in ethology, "fixated" on one another. They are tied to one another as if by an invisible rubber band.

Likewise there is much evidence today that with animal species which form groups, cohesion between individual animals is effected by means of innate reactions. Termites, rats, wolfs, chimpanzees fight for their respective community; they even sacrifice themselves for it.

There are important reasons to believe that also some forms of human "bond forming" are controlled by instincts. As everybody knows, the phenomenon of falling in love is not the result of our intelligence. Ethical ideals, too, are probably imprinted on us during puberty. Ideals which a child forms during that time substantially influence its later philosophy of life[5]. The reaction of patriotic enthusiasm which can be observed especially before outbreaks of war also seems – in much the same way as with some animal species – to be influenced by innate "mechanisms" in our central nervous system.

In addition, human beings have bonds effected by habits, common interests and the like.

Thus there are "bonds" which are created by innate or acquired behavioural reactions. Let us try to assess these according to the energon concept, too.

5

In the case of the bonding of the duckling with its mother – and similar types of bond forming – living beings are not yet fully developed at birth and therefore are dependent on breeding protection. For the respective period, their parents become their "protective organ": the protecting functional unit. For the young it is very important not to lose this organ, that is that the bond is maintained. This is ensured by means of instinctive processes. If the duckling loses its mother, it will cheep very audibly owing to an innate reaction. In the protective organ (that is, the mother) that will likewise cause the innate reaction of independently looking for the duckling – that is, for the energon to be protected. If the duckling runs after its mother, it hence follows its own protective organ.

Human bonds appear even stranger from this perspective: e.g. sexual attachment. It is important – regarding wage-earning – especially for the woman.

If the man is the only wage-earner, he is for the woman her acquisitive organ. Not to lose it is thus at the centre of her interests. This functional unit must somehow – unless another one can be found – remain tied up. More precisely: its willingness to act must not be lost. What means does a woman employ in order to achieve that?

Every women's magazine – and also novels, minutes of lawsuits, etc. – provides detailed accounts of partly drastic, partly very subtle methods applied to that end. These include: scenes, threats, cooking well, spoiling, rousing jealousy, showing understanding, waywardness and impenetrability, stirring up fear, a suicide attempt, etc. To some extent such behaviour stems from education and a woman's own intelligence – it is thus *acquired*. A great deal, however, is instinctively employed – such controls of behaviour are thus a woman's innate weapons. According to the energon theory, all rules responsible for that are functional units related to the *bonding* – namely the tying of an acquisitive organ to its energon.

The cultivation of pleasant feelings and thus also of our loves and friendships is largely part of the "area of luxury" (cultural area) and cannot be measured by economic standards. Where these behavioural reactions, however, play a functional role within professional entities, such an evaluation is nevertheless justified, and even appropriate. It is easier with the similar relationship between a pimp and a prostitute, which is less strained by emotions.

In this case the woman becomes the acquisitive organ of the man. How does he bond this functional unit to himself?

In practice we can see that both innate and acquired behavioural rules play a role. Frequently the pimp first makes his girl fall in love with him. Thus he creates a bond as firm as possible which is controlled by instincts. Then resistance to the work as prostitute is broken one way or another: by persuasion, threats, reward, affection, alcohol, beating. The willingness to function is created. Brute force then continues to remain an important binder. It is also possible that a prostitute joins a pimp of her own free will in order to be protected by him. All these different kinds of processes and the expense they cause come – in the respective energon – under the category "ties" regarding the balance as well. These are functions which are necessitated by this inner front section.

Another example of tying: that of a band of thieves to its chief or of a people to its dictator. In both cases it is human beings who make an appropriate number of others elements of their acquisitive structure and of their pursuit of power. These other persons somehow have to be bound to one another and to the leader, otherwise the entity falls apart and the robber chief and the dictator lose their acquisitive organs and power structure respectively.

Financial bonds – which will be discussed below – play an important role. In this case, too, innate or acquired behavioural rules are very important binders.

With the robber chief, it can be physical or intellectual superiority or charismatic leadership which help him obtain "unconditional loyalty". Similar qualities sare needed by the dictator. He certainly can bind 172
many subordinates by force or through payment but a certain number must actually be loyal to him. The innate reaction to subordinate oneself to the stronger, the superior – which is also the case with animals forming herds – plays an important role. If the acquisitive entity is in danger of falling apart, the bonds loosen. Then there is a proven means to strengthen them: the common enemy, a common danger. This is also a form of behaviour found in animals: the "social defensive reaction". With humans, the enemy need not be real at all, it may be sufficient to conjure one up in one's imagination. Since there have been human languages, there have been demagogues employing this trick. In this way, too, bonds can be reinforced (or established) by the activation of instincts.

Further means for the strengthening of loyalty – for the boosting of "patriotism" and "national sentiments" are ceremonies, national anthems, parades, honours. The effect of their "pathos" has a binding character just like the common language, customs, art, ideals and national successes. Especially strong religious bonds have also fairly often been used for the strengthening of the bond sof peoples to their monarchs.

A huge variety of phenomena hence produce the same functional effect: to bind functional units to their energons, *to generate willingness to act*.

With human acquisitive entities, especially with enterprises, money – more precisely: payment – became the main bonding agent. Of that, too, the preliminary stages are also to be seen in plants and animals.

In connection with the problem of tying, the relation cherry tree–bird presents itself as follows: Through the gift of the fruit the cherry tree temporarily makes the bird its functional unit. By a quantum of energy it binds that unit to itself for a short time. Neither the bird nor the cherry tree knows this. But de facto – concerning energy, as regards balance – the bird belongs to the plant's body of effect for a certain period of time.

Similarly the entrepreneur hires the services of his employees temporarily or "until notice". The hire charge – we speak of fee, salary, etc., but in fact it is a hire charge – "money" is in this case the universal instruction for human performance. Thereby money gains the function of a binding agent.

The basis of every hire of human labour is a contract – either oral or written. In the case of written or otherwise formally (e.g. in the presence of witnesses) concluded agreements, the guarantee of compliance is assumed by the state with the help of the coercive means of the legal system. In this case, money is the actual binder. The state becomes, in addition, the organ of safeguarding that the agreed willingness to act is maintained.

With all other fucntional units of a company (tools, machines, systems) money indirectly plays an important role as a binding agent, too. The state which is protecting property safeguards only that which was acquired through regular acts of barter – usually by means of money. Viewed in this light, every property and every hire charge is based – no matter whether it is an object or a person – on a contract[6].

Even further means to reinforce such bonds effected by money and contracts are known to every economist. With the help of periods of notice, contract penalties, wage advances, loans or investment wages, enterprises try to prevent losing vehicles of effect. The human acquisitive structures are in this case in a much worse situation than the organisms in which every organ is necessarily congruous with the overall entity. Both with plants and animals, it is impossible for an organ to "switch over" to another organism. With the acquisitive entities human beings build up, which are not coalesced, this is, however, quite possible. Employees can be hired away, important vehicles of effect can (provided that the social will, i.e. laws , does not prevent it) in no time at all become agents of a competitor. The question of bonding is in that case even more critical.

At the beginning of industrial development, enterprises fairly often had a monopoly concerning the allocation of jobs. Therefore they could select the best workers, and could keep wages very low. The lack of alternative wage-earning possibilities locally thus became a guarantee for a strong bond. Today the boot is on the other foot. Most enterprises have to make great efforts in order to bind competent employees to themselves *and to retain them*.

The employees are wooed. One tries to bind them by a pleasant "organisation atmosphere". A good and inexpensive canteen is offered as well as clean and friendly working conditions, company leisure activities, constant exposure to background music, special offers, time off, care for the family, legal advice, old-age pension schemes and other benefits. As regards the energon, these expenses also have to be largely charged to the account of expenditure on "ties". In the same way as in every government budget, costs are contained which ultimately help the government to maintain the willingness of its citizens to act, today most enterprises also have to do substantially more than just guarantee their employees an income.

Galbraith distinguishes four motives which cause people to put their own interests last and to carry out disciplined work within the framework of a community. The first is fear of punishment, the second is aspiration to money. The third is called "identification" by Galbraith: the individual can get – apart from the acquisitive advantage – satisfaction out of becoming a functional unit, out of being taken up with a task. The fourth is called "adaptation" by him. In this case – this concerns especially managerial positions – the individual does not serve the organisation "because he values its objectives more highly than his own but because he hopes to be able to bring them more in line with his own targets in this way". Thus he makes the organisation the sphere of activity of his own will.

This subdivision, which is rooted in functional aspects, is justified. The first two forms of subjection are effected on the one hand by force, on the other hand by a gift of barter ("payment"). The two other motives already have their roots in the human aspiration to luxury. In cases three and four, work, in addition, becomes even a source of pleasure. With "identification" it is the social drive to become integrated into a community which is responding. From praise and recognition human beings gain positive feelings. With "adaptation" another mechanism is activated: the aggressive impulse, which is strongly developed within humans. It presses for the reaching of managerial positions and rewards likewise by giving the pleasure of exercising individual authority and displaying power.

The enterprise – like the state – thus has different possibilities to strengthen the bond screated by money and contracts, in addition, by gifts of pleasure. These additional expenses certainly debit the balance but by creating correspondingly stronger bonds they lead to an increase of competitiveness.

The severe reduction of "fair wages" – due to monopolies within the capitalist states – led to the countermovement of communism. According to the energon theory, the background presents itself as follows: power and privation were taken advantage of – that is, a "favourable environmental situation" – in order to spend less for ties than normally would be necessary.

Marx could not think of any better remedy than to condemn the entrepreneur's private ownership of the means of production. The worker, he explained, would have to take a share in the ownership of the operating resources himself. Thus – logically –forcible expropriation followed. The systems, machines, etc. – the artificial organs – came under the ownership of the state representing the interests of both sides of industry. It thereby became a gigantic commercial enterprise. What Marx did not realise – and that has put a strain on the communist countries to this day – was the functional significance of the entrepreneur and that of competitive struggle as a free instrument for maintaining performance.

By not allowing the tying of operating resources to individuals, the communist states prevented the forming of energons by force. Thus within the normal system of integration, a whole class was eradicated: private firms which in the industrialised countries are intermediate between the professional entities and the state. The factor of bonds is thus the real pivot for the "ideological" gap that divides our world into two big political blocs.

In the communist state, enterprises become organs – functional units. As a consequence of this, however, the state has to provide for them and control them – a very considerable additional charge on the balance. Furthermore, the stimuli thus emerging from the natural acquisitive urge and the free regulation of selection of the more competent through competitive struggle are lost. In the meantime, it has become clear that the solution suggested by Marx was neither the only possible one nor the best. The exploitation of "advantageous environmental situations" for inexpensive bonds is similarly achieved today by the workers' representatives (trade unions, state control) – at less expense to the national economy.

Undoubtedly, much progress can be accelerated more strongly and more rapidly by a violent central government than in free-enterprise democracies. But by prohibiting the bond swhich we call "private ownership of the means of production" an essential force which is important for every national economy is suppressed. If the natural pursuit of profit is prevented, the individual has largely to derive satisfaction just from "identification" and "adaptations" – as defined by Galbraith. With some people this may be successful; with a great many, however, it does not succeed. Of all human stimuli the one for the individual forming of energons – on which the second stage of the evolution is based – is thus largely declared a public enemy.

7

That is, however, only a rough outline of the phenomena and problems of bonding. There are many more.

For instance, as regards competitive value there is an important relation between the size of the energon and the costs of the necessary ties. In industry, it was observed that the function of tying became more difficult with increasing organisational size – i.e. that the associated costs grew disproportionately. The more subordinates, the bigger the necessary control apparatus to hold them together[7]. Similar connections also play a role with animal and vegetable entities.

Frequently the costs of tying are reduced by double function, extension of function and utilisation of outside energy. In that case, the units are carrying out this function are seemingly under the command of completely different functions or do not appear in the balance at all.

An example of a double function is the skull capsule of humans and other vertebrates, which is generally assumed to protect the vital brain against disturbances and threats. This is doubtless its function but the function of tying is in this case no less important. As the brain cells have to be in especially close contact with one another due to their function and the necessary strong bonding of these units may not be possible in any other way, the capsule firmly enclosing it is technically the only possible means to prevent the brain from being torn apart – for instance, even in case of quick body movements.

An example for the use of outside energy for the function of bonding is the utilisation of the force of gravity on our planet by almost every human acquisitive structure. Many of our devices are locally stationary due to their "dead weight" so that they need not be specially fixed there. That seems to be a matter of course but in fact it is not – which today astronauts are well aware of. In space there is no "weight" and associated ground friction providing a counterbalance. What is not fixed, can easily start wandering off when pushed.

The creation or strengthening of bonds within animal and human communities due to the appearance of *enemies* is as "unintended" as that due to the force of gravity. For the enemy – e.g. the robber – the effect he causes is even extremely unfavourable to him. The fact is, however, that he causes it. And the politician who today – as throughout history – conjures up an imagined threat in the minds of others, utilises outside action in the same way as everybody who relies on the "dead weight" of an entity to keep it in place.

Regarding the energy balance, all expenses which are caused by the function of bonding can be subsumed under a common category since they are influence the inner framework of values in much the same way. That the costs and precision of these effects are also in this case important criteria surely requires no proof. However, the criterion of speed loses some of its significance. Only with the optional bonds of artificial organs, does speed – possibly – become important for the competitive value.

The critic may argue at this point that especially with the factor "bonding" the practical impossibility of calculating the competitive value is evident. He may say: if phenomena such as instincts, habits, friendship, etc. are involved, concrete measurement cannot be possible. That is true in the isolated case but it does not hold on a large scale.

It is similar to the inorganic area. The thermal movement (Brownian motion?) of an individual atom is not determinable – but for a huge number of atoms a fairly exact statistical value can be calculated. In enterprises, the same can be observed. For example, it is perfectly possible to assess the value of a better canteen, better care of employees, friendly business relations empirically. To ourselves, our reactions and feelings may seem to be free and variable. Over longer periods, however, they become a fairly precisely definable quantity.

All functional units related to bonding are evolutionarily controlled as well, in fact there is a double control. How *strong* the bonds between two functional units have to be always depends upon the total environmental impacts. More precisely: it depends upon the environmental impact whereby the energon is exposed to the greatest strain. With trees this might take the form of storms or weight of snow, with animals it is frequently the way in which they captures prey or the attacking method of their enemies. With enterprises it is in many cases the effectiveness of their competitors. *Form, size and material*, however, depend on the units to be bonded together. These thus cause secondary effects. If, for instance, in different enterprises the same function is carried out here by a person and there by a machine, we may see how diverse the appropriate binding agents are.

Both outer and inner controls are effected by means of natural or intelligence-controlled selection. If bonds are too weak, the type will not be able to assert itself. If they are too strong or too expensive, this will involve superfluous expenditure which – in the competitive struggle – likewise may harm the species or sooner or later may lead to its demise.

The second "inner front" is in some ways similar to the one discussed above. Whereas every tying has to do with the holding together of material, that is spatial units, the next factor deals with combining sequences of motion, *that is with temporal processes*.

Comments:

[1] "A legal relationship between an individual person and his/her limbs or organs is unthinkable", wrote Otto von Gierke. ("Das Wesen der menschlichen Verbände", 1902, p. 30.) In fact, however, the genetic blueprint contained in the cells establishes a "constitution" which is absolutely comparable with human legal systems. It does not exist between the "human being" and his organs but between the carriers of action which together make up what we call "human being". In the same way as Kelsen saw the legal system ("a system of standards") as being that which constitutes the state, the "legal system" hereditary rule is also what constitutes the individual body of an animal or vegetable organism.
[2] An interesting overview on forms of bond forming occurring with animals and the question to what extent human bond sare based on similar or equal mechanisms is given by I. Eibl-Eibesfeldt in his informative book "Liebe und Haß – Zur Naturgeschichte elementarer Verhaltensweisen", Munich 1970.
[3] E. H. Hess"Imprinting an Effect of Early Experience". "Science" 130, 1959, pp. 133-141.

[4] Details are given by Konrad Lorenz in his book worth reading “Das sogenannte Böse”, Vienna 1966.
[5] Details on human compulsive behaviour will be given in part 4, chapter II.
[6] That is also how Sombart saw the connections. He wrote, “Within the framework of the capitalist undertaking, every technical problem must be able to be solved in the form of the conclusion of a contract to the advantageous draft of which every thought and wish of the capitalist entrepreneur is directed”. (“Der moderne Kapitalismus”, Munich 1921, p. 321.)
[7] M. Haire, “Modern Organization Theory”, New York 1959, p. 302.

II

THE ORIGIN OF THE "I"

The I is the prince of the universe, the king of creatures, the patron of beings. It is the dam that separates the worlds from each other so that they cannot merge.
Bridadarajanka-Upanishad (c. 1000 BC)

And wherever I go my dog follows me, it is called "I".
Friedrich Nietzsche (c. 1904)

Cogito ergo sumus.
Johann Plenge (1919)

1

In business the importance of a function is expressed by the size of the remuneration that it brings in. By far the highest salaries (plus additional benefits) are for the top achievements – today they are those of managers. Within a state it is just the same. The most highly paid posts are held by the most senior management.

If one asks what is the most important function in the body of an animal or of a plant, the answer is far more difficult. Here the single organs and tissues are not acquired on the market and what is more, almost every part is vital. At any rate, the genetic blueprint of the nucleus – with higher animals – and in the central nervous system are of particular importance. The genetic blueprint is responsible for the construction of the body while the central nervous system is responsible for its effective movement. Even if the term "value" can only be used in the sense of more or less minor replacing, there is no doubt that the directing units have special significance for organisms also. What is more, they are by far the most complicated and the most subtly differentiated functional units.

If we look at ourselves there can hardly be any doubt – according to our subjective feeling – about our most important unit. The phenomenon that is central and significant for us is our "I": our thinking and feeling. It is practically the true precondition for our real existence. Our bodies may well be present without us being – just as with somebody who is mentally completely deranged – but an actual "I" does not exist in that case.

According to old, traditional ideas the "I" coincides to a large degree with the "soul" (or with the "spirit" in a metaphysical sense) and many people see in that something that is immaterial or only partly material[1]. In numerous religious concepts the "I" is immortal, so that everything apart from it is some sort of skin into which the "I" temporarily slips. According to the concept of Buddhism the "I" even successively gives a soul to a number of such bodily skins and is furthermore able to retain individual memories in the course of the "transmigration of souls". From the scientific point of view the awareness of the self is a function of our cerebral cortex. Yet, here too, there has hardly been any doubt that this function constitutes the actual centre of the phenomenon "human being".

The theory of the energon, in contrast, relentlessly comes to the conclusion (which for many people appears to be the most absurd aspect of this theory) that also every directing structure – thus also our "I" – is merely a functional unit like the rest, hence by no means centre and lord but instead also only a servant. The true "lord" always is and remains the structure that is 178
aligned to the acquisition of energy. That structure can – at least in some cases – perform its work without a central management. However, there are never any processes of control without an expenditure of power: no matter whether this consists of a process of movement or of resistance. Without energy nothing exists eventually: neither matter nor movement – according to Einstein’s theory not even time and space could exist.

The theory of the energon draws a highly curious picture of the human "I": the germ cell human being has attained such a superiority and has liberated himself/herself from all bounds that had previously been restricting the process of life so that the acquisition of energy – the central phenomenon – became self-evident, as it were. A completely different problem came into the foreground: what is supposed to happen with the surpluses? Here the unit in control – used to controlling – seized the reins. It considered itself as end in itself and makes vile energy seemingly into a servant. Everything has to follow its dictates, it becomes the king. It glorifies itself, pities itself, enraptures itself or despairs – a servant who all of a sudden has gained the riches of the master and now hardly knows how to make use of them.

Has such a development actually taken place? Furthermore, how did it take such a course?

The second "inner front" constitutes the sole subject area of a young science, very much in the sense of the energon theory. Cybernetics as it was founded by the mathematician and technician Norbert Wiener investigates the phenomena of steering from the viewpoint of their functions. It is deemed to be secondary whether nerves or wires, ganglion cells, humans or electronic units are involved; the essence is to be seen in the effect and the question to be asked rather generally is: what do the units have to be like in order to achieve a steering effect?

From the point of view of the energon theory the term "steering" ("cybernetics" is derived from the Greek word for "helmsman") is not quite appropriate for the totality of this problem. This circle of functions is principally concerned with the linking of sequences of movements, with their "co-ordination". In the most simple case that is not yet any "steering" in the actual sense of the word. Therefore I call the second inner front "coordination"

In contrast to the "bond" this inner demand does not concern all functional units – but only those that have processes of movements as their functions. The thorns of a rosebush or the stack of a factory for instance do their "duties" in an entirely *passive* way. The thorns prevent herbivores in their activity, the stack directs the smoke in one particular direction. Movements of their own are not necessary for these functions – therefore nor is any co-ordination with other movements.

However, neither does every *actively* working functional unit have to be co-ordinated with the activity of another one. This for instance can be seen with the nematocystes of the coral polyps that have already been discussed. If they are touched by an alien element, they shoot off their arrows – no matter how the rest of the body is occupied just then.

With the six legs of an insect the situation is different. For those functional units it is not sufficient to carry out isolated movements. In order to produce the required function – namely to move the insect's body – a certain defined linking with the movements of the other legs is required – furthermore also with the sensory perception of the eyes.

What follows is that whilst every functional unit has to be connected to its energon, not every functional unit has to be *co-ordinated* with the others. Thus, the second inner front only affects some functional units – but it is no less significant, though. On the contrary: no other factor has imposed more complicated equipment on the energons that this one in particular[2].

3

How is it actually possible – in general terms – that two functional units are *co-ordinated* with each other concerning their movements? What additional equipment is required?

Without doubt, there has to be a signal flowing from one functional unit to the other, a command by which joint action is obtained. This results in the necessity of at least four fundamentally different functional structures.

First, there has to be a mediating something in order to convey the signal. *Secondly,* the signal itself is necessary. *Thirdly*, one of the functional units has to possess a transmitting installation that can send out the signal. *Fourthly*, the other functional unit needs to have a "recipient" who "understands" it. The latter gains special significance if there are different signals flowing across from one functional unit to the other one.

First: *the mediating something*. In cybernetics this is called "transmission channel". This expression is appropriate if we think of the signals produced by the hormones in the bloodstream. These messenger substances are secreted by a gland in one place and trigger off a certain effect in a different place. In that case the signal appears as a chemical substance and moves, together with the bloodstream inside the tube system of the blood circulation – in fact, they really move in a "transmission channel". If, however, the signals have the form of electric impulses which are transmitted via a wire, the notion of the "channel" does not seem to be quite as appropriate any more. A wire is not hollow. If the signal is a word that is spoken by one person and heard by another one, then "transmission" is even more inappropriate. In that case the mediating something is the air. The most inappropriate use of that term occurs if the transmission of the signal – for instance with a machine – is carried out via a lever. Such a lever does not have anything in common with a "channel". Therefore, in the energon theory I am going to call that transmitting, mediating something the "transmission medium".

Let us stay with the air in which the sound waves of the voice travel (in a vacuum no sound can travel). It does not cost anything for the energons operating on earth, for it is simply there. Thus, in that case the air – for the time of the transmission of the sound – becomes a device aiding the communicating persons. Here a favourable environmental condition is temporarily roped to the effect-structure of the energon.

If chemical signals travel inside the cell through the cell-liquid, then the cell-liquid – in extension of its function – becomes the "transmission medium". Here, too, no additional effort is required – a unit that already exists takes on another duty. With the transmission of signals through nerves or telephone wires, however, additional units are the prerequisites: precisely those nerves and wires. Consequently, in that case a corresponding burden for the energy balance exists[3].

Secondly: *the signals*. In cybernetics they are called "vehicles of communication" or "vehicles of information". One could not choose better expressions. According to the theory of the energon they are also *vehicles of effect* (or functional units). With verbal communication they appear in the shape of sounds, words and sentences. With written communication they appear in characters that are ordered correspondingly. As for telegraphic transmission only three units (long impulse, short impulse, pause) are needed to convey the content of what is to be transmitted. It was the achievement of cybernetics to make that content – called "information" – mathematically ascertainable. Today information is measured in "bits".[4]

The development of simple signals can easily be followed in animals. If a peacock, for instance, opens its fan, it transmits a certain "statement" to others of the same species and triggers off certain reactions (with males it is intimidation, with females the willingness for a sexual approach). With such signals – which above all play an important role as identifying features between beings of the same species and between sexual partners – it can be determined what features a signal must have in order to be effective.

There are two of these: every signal has to be as striking as possible – in order to be well perceptible. Secondly, it also should be as unusual as possible – so that it cannot be mistaken for other sensory impressions. If we find very complicated and unusual signals (you may for instance think of the body colours, the ceremonies of performing the courtship display or of threatening) of animals – especially in areas where many different species can be found – then this is explained by the importance of avoiding misunderstandings. Here also we recognise an evolutionary steering mechanism at work. Animals with signals easy to misunderstand became disadvantaged, on the other hand those with succinct and precise signals made their way in life more successfully.

Thirdly: *the transmitting vehicle of effect*. It has to be capable of sending signals on their way via the transmission medium. In some cases it is possible that such a transmitter is unnecessary as it can simply be an extension of the function of another functional unit. An example would be the male robin whose coloured throat has a threatening effect on competing males. The special colouring of the throat – by extension of its function – becomes a signal. A special transmitter is not necessary any more: instead, outside energy is utilised. The rays of light that are travelling through space anyway are reflected by the throat and reach – completely independently – the eyes, that is the receivers of other males. For the sending of sound signals, on the other hand, special sound-transmitting functional units are necessary: with grasshoppers it is a special shaping of the hind legs and the wings, with us humans it is the vocal chords. For the transmission of written messages (for instance through a letter) the additional units needed here are a vehicle for writing (e. g. paper) and writing utensils. Transmission via telegraph or radio requires a channel.

Now we already have very differing structures (red throat, vocal chords, pencil, radio channel) which have to be seen as belonging to the same group, according to their functions. A cybernetician is interested in the joint fundamental *technical* principle underlying them. From the viewpoint of the energon theory, on the other hand, what is of interest is the burden of the balance that is caused by the same functions – thus the "expenditure", the costs.

Double functions and extension of functions complicate functional assessment. Accordingly, the robin’s red throat is both signal and transmitter – two very different functions coincide in one and the same functional unit. With the peacock the feathers not only have a special colouring but they are also correspondingly enlarged: this is an extension of the feathers covering the roots of the tail by which both the transmission and the signal effects are intensified. What is more, that garland of feathers can be folded up – this is a consequence of the conflicting functions of the signalling effect on the one hand and the activity of acquisition on the other hand. The open fan would be a hindrance for the catching of prey and would also be too clear a sign of recognition for enemies. Furthermore it is conducive to the signalling effect if the signal is only sent out at the very moment when it should be transmitted. Thus it becomes more striking for the recipient. This shows how manifold correlations contribute to the evolutionary forming of physical units and their ways of moving.

With human communication via technical aids "interference" become an important factor. If electric impulses run along a wire, they weaken with the growing distance. Then the disruptions that occur in the conductor become more crucial and the discernibility of the signal gradually declines. The solution for that problem is called a "relay" and "amplifier-chain". The signal is forced to imprint the same information on a new and stronger flow of electricity. That trick in particular drew the technicians' attention to the causality of steering. In this process not the slightest part of the signal's energy goes into the continuing flow of electricity. It merely steers the latter's impulses.

As regards the transmitting unit what is interesting in that process is that for the intensification of the effect further signals – co-operative ones so to speak – are switched in as the signal proceeds.

4

Fourthly: *the receiver*.

Here, too, it is possible that one functional unit is unnecessary – that is, if the signal itself directly becomes the stimulus which triggers of a corresponding reaction with the receiving unit. With chemical messenger substances which are at work inside the cells and between cells (especially with hereditary processes and developmental processes) mostly there exist such immediate effects. There the vehicle of the signal itself is the trigger of a chemical 182
reaction.

If, however, the receiver has sense organs which respond to more than one stimulus, then the problem is the following one: how does the receiver manage to recognise one certain signal (or even several) among different stimuli? The receiving unit then functionally takes the part of a "filter" which each time only "lets through" certain combinations of stimuli – which then trigger off one or the other form of behaviour.

Such mechanisms of "recognition" were experimentally proven in numerous types of animals. If they are innate (thus if they are constructed by the genetic blueprint), they are called ITM – "innate triggering mechanisms".[5] They are units that are specialised in the receiving of signals – more precisely: in data processing – training of animals shows that similar mechanisms of "recognition" can be constructed in the process of learning and practising. In that case inside the central nervous system there are such "fillers" artificially constructed which select certain sensory impressions from the abundance of the ones that are perceived – whereupon there follows a reaction that is also trained.

With humans the "comprehension" of sentences builds a comparable achievement of the brain. Words and sentences are also signals. They also have to be selected from the variety of other perceptions and have to be recognised in their meanings. They also trigger off – inside our brains – certain defined reactions: the "comprehension of the meaning", the "understanding". Our intelligent action is constructed by a number of those single achievements involving data processing which is to a degree extremely complicated.

5

The more important the communication (information, report, order) inside the body of effect of an energon is, the more important it is that the respective signal is "understood" in the right way, namely that it leads to the appropriate reaction. This results in another functional problem, that is that of control.

Practically this means that the whole process is reversed. If for instance an order goes from A to B, the control report has to go back from B to A. That requires – in principle – four further necessary units: a sender on the end of the receiver, a receiver on the end of the sender, a transmitting medium (it may be the same one or not) and corresponding signals. This laborious process opened up a significant constructive possibility. Such reports back, as you will see, can be used for the direct correction of the orders that are sent out (in biology this is called the "reafferential principle").

Just as with the relay, the signal can imprint its impulse on another stream of energy, so the report back to the commander can be used in order to "steer" the placing of orders accordingly. The principle of the causality of steering also appears in this context. Nothing of the back-report’s energy is transferred to the stream of energy of the command. It only steers it.

A concrete example for such a "control circuit" is the thermostat in a refrigerator. In the simplest case the commanding unit is a thermometer. If its mercury scale goes up (approximately to + 4 C), it closes an electrical circuit – and the cooling machine starts to work. Consequently, the temperature inside the refrigerator drops, the mercury scale drops – and the electrical circuit is interrupted. The cooling machine stops. Now the temperature goes up again, the mercury scale goes up ... closes the electrical circuit: the cooling machine works again. By that the temperature "automatically" stays constant within narrow limits.

In that case the report back to the commander is carried out by the air in the fridge. The heat – also for free – functions as the signal. The air makes the mercury scale go up; the cooling machine is turned on. This is how the feedback steers the commander. If the temperature drops, this forms a different report back – which causes the turning off of the cooling machine. This correlation of effects is called "feedback". Thus the commander becomes a sort of jumping jack which merely reacts according to the back-report’s way of pulling the strings. This is also an extension of the function: the back-report additionally takes over the task of steering.

Both in technology and in the bodies of organisms such self-regulating steering plays an important role.

Within the human body this is the way the body temperature is kept within narrow limits – also the blood pressure and the blood sugar level. With breathing a "control circuit" entering intrudes on our consciousness: if it goes up, then the commander "centre of respiration" is activated and the latter triggers off respiratory reactions. Thereupon – as a result of the breathing process – the CO_2-content of the blood drops and for several seconds no order is placed by the centre of respiration. As we are able to influence the respiration movements at will, everybody is able to observe the effectiveness of the back-report themselves. If we stop breathing deliberately, we feel how the urge to breathe becomes more and more intense, how the steering effect of the back-reports increasingly urges us to a breathing movement.

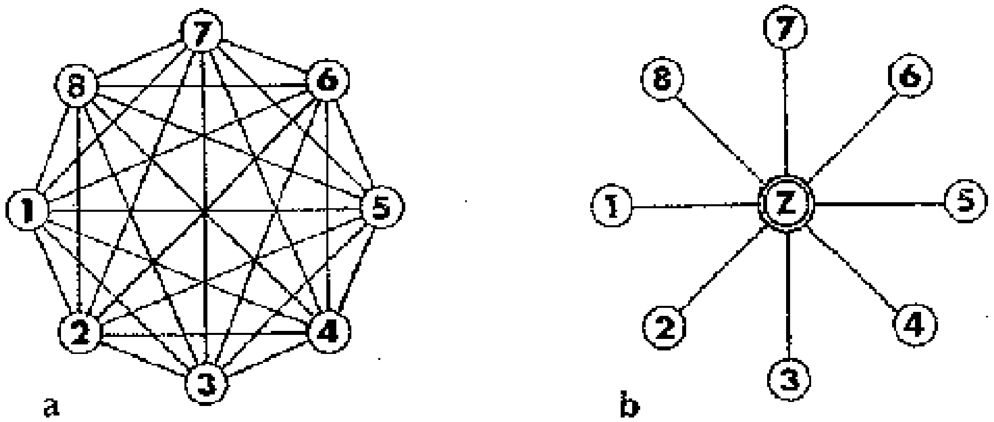

Figure 28: Preference for a centre of co-ordination

a) If for example eight functional units should be co-ordinated (1-8), each of them has to be connected to every other.

b) Through the mediating functional unit C (centre) the necessary "lines" are diminished considerably. (According to Stefanic-Allmayer.)

Within businesses and inside state organisations control circuits also play important roles. There we do not find cells or switching elements which are joined in a self-acting correlation of effects, but instead we find human beings who think and feel. The principle, however, is not changed. There are also controlling back-reports that result in a changing of the orders. If those orders are given by a human being, he becomes a jumping jack just like the thermometer in the refrigerator or as the commanding respiration centre inside our spinal cord. A human is also not really responsible for the orders it gives. It is the respective back-report which triggers off one or the other command – and by which the human is thus steered.

Figure 28 shows the functional advantage of a centre for instance with the telephone network. Already with merely 50 or 100 subscribers it would require an enormous wire mesh if every subscriber had to be connected to every other one directly. If on the contrary a mediating unit is inserted, then *one* wire to every subscriber suffices.

In lower animals – for example medusas – we find diffuse nets of nerves running through the body. In the course of higher development increasingly stronger centralisation sets in (Fig. 29). The reasons for that, however, are not as simple as with centralisation in the telephone system.

From the beginning onwards the centre in construction (the "brain") had to achieve more than merely to mediate. It took over – in a merging of functions – the assessment of the reports arriving from the senses on the one hand, on the other hand it took over the placing of co-ordinated orders for working organs (limbs, feeding organs, glands, etc.). For each of these two achievements additional units (secondary functional units) were necessary: the behavioural blueprints that have already been mentioned frequently in this book. On the one hand the central nervous system needed patterns of recognition: that is, appropriate guidelines for the combinations of stimuli which the individual has to look for among the variety of sensory impressions streaming in. On the other hand it needed blueprints for the giving of orders: instructions for appropriately co-ordinated orders to the working organs, especially to the "muscles".

The actual activity of mediating consists in the appropriate combining of "sensory" and "motor" achievements. If the brain perceives a certain combination of stimuli ("key stimuli", "trigger"), then this has to bring about a certain defined "reaction", a certain defined series of movements, that is, the activation of a certain defined motor blueprint.

If such behaviour blueprints are innate, then the joining is genetically determined and the reaction takes place "automatically". The simplest example are "direct reflexes" – which still exist in humans, too. Accordingly, with the perception of bright light for instance our pupils close "of their own accord". Here a certain sensory perception is strictly coupled to the placing of orders to the respective muscles (namely those which cause the changing of the pupil). We find something similar also with by far more complicated "behaviour".

A certain defined stimulating situation – which can also be provided for animals in an experiment – then triggers off a certain specific behaviour in the animal. With many animals for instance the perception of the highly complicated performing of the courtship display (and only precisely then) triggers off a no less highly complicated series of movements of the animal, which results in copulation[6].

A further achievement of the central nervous system appears, if the innate behaviour blueprints are changed or refined through individual experience. This additional ability can for instance be seen in the young toad.

Instinctively this animal first of all snaps at every small body in quick movement. A blueprint of recognition responds to that rather general "key stimulus" and triggers off the motor order of pouncing and snapping (thus co-ordinated orders to numerous different muscle groups). If, however, the young toad gets to an insect which stings it, then this sensory impression is associated with the innate behaviour. Practically this means: the young toad remembers the unpleasant experience and if it again meets a "small, quickly moving body" with similar features, then it does not pounce at it and snap at it any more. The "switchboard" of innate reactions is then extended by an additional unit, it changes, improves, becomes "more differentiated". The great advantage of this ability is obvious. The behaviour becomes less mechanical. The energon (in this case the toad) is thus able to "adjust" its innate behaviour to the individual environmental conditions in a better way.

That increase in achievement goes still further, if experiences can be saved *very generally* without already having determined how they should serve the energon in the future. It is only the ability to go beyond mere "association" that is called the "power of recollection". The precondition for this is a new functional unit (inside the central nervous system): a "registration of experiences", a "depository of "memories". Generally we call that unit "memory".[7]

That functional unit has to perform two not exactly simple tasks: first, the variety of incoming sensory reports has to be "processed" appropriately, has to be classified in respective "categories", or figuratively: it has to be put into the respective intellectual drawers. Secondly, that stored empirical treasure, that "knowledge", also has to remain accessible – this means that if the requirement, that is the corresponding situation, arises, those experiences have to be available to the central nervous system, *it has to be able to find them again*.

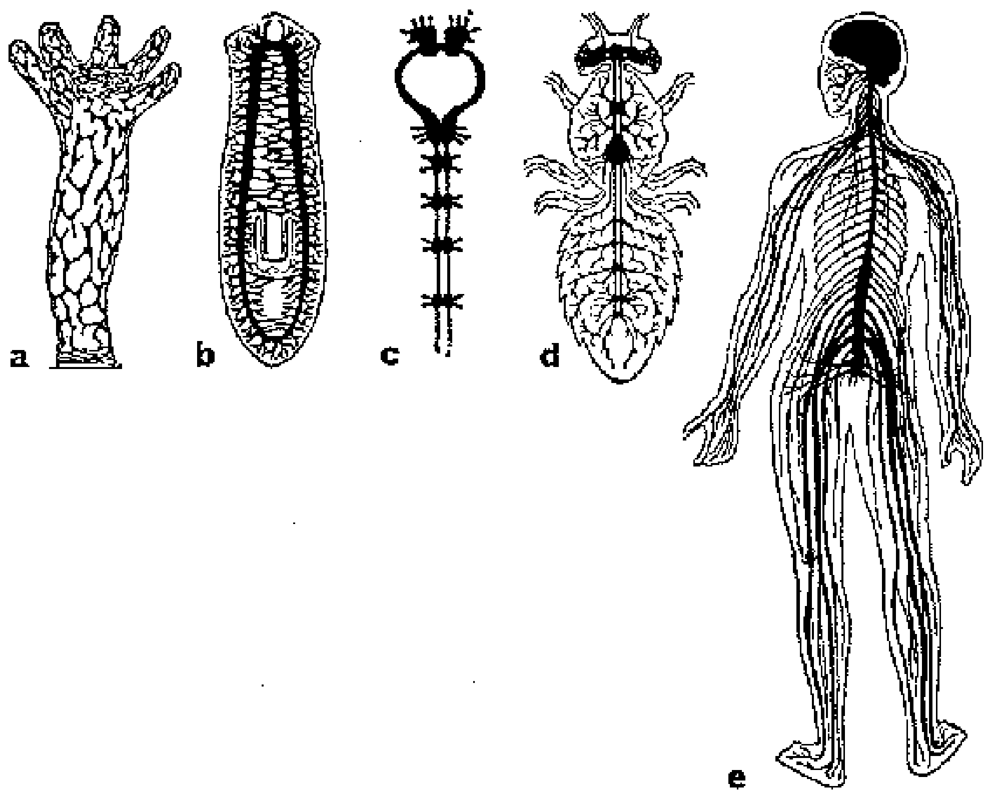

Figure 29: Examples for the growing centralisation in the course of the higher development of animals.

a) Freshwater polyp (Hydra), b) swirl-worm (Planaria), c) palolo-worm (eunice), d) honey-bee, c) human being

With the hydra, which is fixed to one place, the single parts of the body are connected to each other through a diffuse net of co-ordinating units (nerve fibres). – With the swirl-worm a centralisation of the vehicles of co-ordination is already discernible. Four longitudinal stems are connected to each other by ring-like links. The two which are situated ventrally (drawn in the picture) are more strongly developed and end in an accumulation of nerve cells at their front ends which forms a still rather simple "brain". – With the palolo-worm the longitudinal stems are closer together and where they are connected by crosswise links ("comissures") further accumulations of nerve cells ("ganglia") have developed. – With the honey-bee the ganglia cells are concentrated at two points. – With humans the brain and the spinal cord are the steering centres for the conscious and unconscious outputs of the nerves.

With higher animals both abilities are already provable. With humans they were increased to the extent that we can label the single "drawers of concepts" with words. An animal is only able to form "non-verbal" concepts. Our thought processes, however, are to a large degree based on the far clearer subdivision which is constituted by words.

That new unit – the memory – not only enables higher developed animals to *alter* the innate blueprints correspondingly but also to supplement and to refine them. Moreover, they can assemble individual blueprints out of the innate basic units – or create completely new ones ("learning animals"). 187

The particular significance of the human "imagination" has already been stressed (see Part one, chapter 7). Similar to an inner projection screen our brain compares the contents of our consciousness and the central nervous system is thus able to construct "plans" – they could be called *theoretical behavioural blueprints*. What is more – since humans form communities and communicate verbally –by no means only one's own experiences are at the disposal of the combinatory game of "thoughts". In the course of our upbringing an enormous amount of experience gained by others leaves its mark on us – and that, too, becomes "building material" for such experiments in combination.

7

More than that:

Since the functional unit "imagination" is able to combine every content of an experience with any other, it can also include the concept of one's own person in that combinatory game. In my opinion it is precisely which constitutes the phenomenon called "I-consciousness". So humans have the possibility – by means of a special functional unit – to distance themselves from themselves, that is to "objectivate" themselves – thus to see themselves as an "object". According to that concept our "I" is just the activity of that projection screen, the function of that special functional unit. It is the sum total of our thoughts and of the feelings which we are "made aware of" by them. That coincides with Descartes' "Cogito ergo sum" – I think, therefore I am[8].

Even the highest animals lack that projection screen(or at least one that is as efficient). We possess it, on the contrary – and thus also a "consciousness" and an "I". That "I" however – how could it be otherwise? – is a centre of its own and views everything from that centre. It builds – necessarily – the notion that the rest of the body is like a skin which surrounds that "I" and which is possessed by that "I". So in this sense we say *my* body, *my* eyes, *my* hands.

According to the energon theory this is a set thought pattern and maybe the first one that humans acquired. Our "I" is according to that point of view only one among numerous functions – the activity of *one* functional unit inside the germ cell human being.

8

With all professional bodies build by that "I" it is still the central nervous system of the human
being in question which steers all functional units: also the artificial organs. Whether it is a
pick or a pencil, a draught animal or for payment, appropriate behavioural blueprints are 188
always necessary in order to build those additional units into the body of effect and to enable
their efficient use. The "handling" of the whole professional body, of all its units has to be
"trained".

Even more: also the use of collective organs – more precisely: their temporary installation into one's own structure of effects – requires acquired behavioural blueprints as a precondition. We also have to learn how to "use" the courts, the post office or a circus. We are used to looking at the relationship differently. Yet, from the viewpoint of the energon it has to be assessed in this way. Very generally it is true that for every additional functional unit which is not inbuilt and even if it is a million times larger than we ourselves and we only enlist it occasionally there are appropriate behavioural blueprints (of recognition, of movement and of a combination of the two) required which are artificially built into our brains. Only if we have them are they "potentially" at our disposal[9].

However, already with professional entities some functions of the central nervous system leave the genetic body. The working person takes notes – thus the storage of memories is shifted to the artificial organ of paper. Within the framework of our planning activities we make sketches, count, write – these are functions aiding the making of a plan where the vehicles are already separated from our bodies.

With businesses that process is carried even further. The steering unit here is not only *one* person any more but consists of many people. In bookkeeping memory is stored systematically. With statistical methods it is processed. Computers – purely technical constructions – carry that on and take over control mechanisms.

Here, too, particular departments became specialised in the "building of blueprints". The results of their activities are the respective business-blueprints. From the "I"s that cause their performances an "I" of a higher level of integration is produced, as it were. It is a collective "I" which cannot be explained as the total of all single "I's" automatically. Even the "I" of the entrepreneur is not one of free decision in that bigger unit but only a part of it. With decisions it not seldom occurs that the "collective I" appears completely autonomous.

It is just the same with state bodies that have representative bodies of people. There, too, the *steering structure* consists of a multiplicity of thinking and plan-making people where the devised concepts partly originate in the "general opinion", partly in personal beliefs or interests and not least in the power of habits of the community that go far back: tradition. Here, too, a rather abstract "super-ego" arises, which, however, still represents a very efficient reality. Similar to the single "I", this "I" also tends to consider itself as the centre, as the most important unit around which everything else revolves. Not rarely a very complex structure becomes the actual "spirit", the actual "soul" of those energons thereby – and then not rarely rules over the ones who have created it.

9

In the co-ordination structures of all energons there occurs one and the same problem. The question is: centralisation or decentralisation? In the end it is always rooted in the same problem: how many active functional units can one unit control?

If one day humans shift the control of their biggest organisations of acquisition to computers – which is not even unlikely – then this problem might go away. For computers work so much faster so that they can control an incomparably higher number of units. Both the cell and humans, however, have to face narrow limits here.

That is the actual reason for hierarchically graded control structures which we see at work in states, businesses and also in the bodies of organisms. They are – in the inner sector "co-ordination" – a functional necessity. They are the consequence of a necessary division of labour, the consequence of the limited capability of the functional units that are available for their control. Additionally, inside those hierarchies another problem – a secondary problem – arises: what can be steered by the highest leadership – and what can be handed over to the "competence" of subordinate functional units?

An example of extreme decentralisation is the genetic blueprint of all multicellular organisms. With each cell division the blueprint is divided also – so that (also with humans) each of the millions and thousands of millions of cells has the whole "genotype" in its nucleus. The "differentiation" of single tissues and organs is based – as it is known today – on a process that is rather curious as regards construction. In each of the manifold specialised cells a part of the genetic make-up is "closed down" as it were. Within the nerve cells only that part works that which is simply aimed at nerve cells. Inside a muscle or a bone the only part that works is the one simply aimed at muscles or bones.

Roughly compared, this amounts to what happens in the construction of a business where everybody involved gets a general plan with all the instructions but where all orders not aimed at them specifically are crossed out.

The most amazing thing is that that obstruction also – necessarily – has to be controlled by the genetic blueprint. Those endless threads of molecules which have the double-functions of both blueprint and steering authority produce – where their orders are not appropriate – their own obstructions.

With all organisms that do not need movements of their own (mainly plants) the solution of extreme decentralisation suffices. Each of the parts – if differentiated – works independently to a large degree. About the plant Goethe said that it was "only an individual in the moment it detaches itself as seed from the mother-plant." Already in the course of putting out shoots it is "a multiplicity". This might seem a bit too extreme in terms of today's research results – because a slow system of communication via transport of substances and diffusion might tie together all parts loosely. With regard to the difference from the typical animal, however, it hits the essential mark.

Yet, also the central nervous systems of animals are less centralised than many people believe they are. Every innate behavioural steering ("instinct") has some sort of life of its own – Lorenz compared their acting in combination with a "parliament". There the different vehicles of steering "ask to speak", compete to take over the steering of the body alternately or together. Very informative experiments (and not lastly due to artificial stimulation of the brain) succeeded in identifying that highly federalistic situation quite precisely. A "climax of achievement" does not exist in the highest animals either.

Only with humans did such a climax occur – in my opinion through the formation (or stronger unfolding) of our functional unit "imagination". Only the self-aware person has a central authority that is based on experience and thinking. Everybody knows from experience, however, that their power is not all that great.

Innate steering structures in us still have an important position in the parliament of our decisions. The "drives" and also innate norms of reaction exert a strong influence. Far less than one would probably admit to oneself is our "will" really free – in the sense of decisions that are emotionally independent and are based on sober experience.

Yet, also with regard to something else our control is decentralised. If we learn an activity – writing, driving a car, playing the piano – then first this happens with full "attention" (of which we only have *one*). That means: the inner projection screen is used for that learning process. Once we have acquired the new skill, subordinate centres (on the basis of the blueprints built) take over that task. An adult person by no means has to direct each of his steps consciously. "Completely autonomously" our legs move in such a way that we make way for others in the street, surmount obstacles, climb up stairs. The proficient car driver does not think of stepping on the gas, of braking, of shifting the gears – he can think of something completely different and talk about something completely different at the same time. The pianist plays hundreds of keys per minute – but his/her attention is not aimed at each single finger.

On the inner part of the front "co-ordination" with humans quite a complex picture presents itself. Not the least bit of the steering though our genetic blueprint which is at work in every cell penetrates our consciousness – our "I". In the same way, in our behavioural steering happen many things also happen below the border of consciousness – are carried out decentralised, "autonomously". What is more, even in the actual control centre many decisions come about that are not really controlled by the "I". As in a parliament there are – in the "subconscious" – innate and acquired control mechanisms (the latter are the "habits" in the first place which can urge us as powerfully as the drives) endeavouring to speak. They influence and often really direct the head "will" and prevent a "reason" that is based on experience.

In businesses perfect centralisation has become possible but has proven damaging since it paralyses the initiative of the employees. A certain amount of "freedom of disposition" has proved to be convenient. With particularly successful enterprises in the USA the principle is: "Centralise aims, decentralise decisions." Especially if there are branches spread all over the world it has turned out to be better "if the power of decision-making is as close as possible to the scene of the events".[10]

Within a state all too strong centralisation also leads to stagnation and to a burgeoning of bureaucracy. An authoritarian state needs centralisation since it has to rely on continuous control. Just as in times of war or need every state has to be ruled more tightly and in more centralised fashion. In periods of peace and with true democracy, on the contrary, decentralisation has several advantages. Within their more flexible frames various endeavours can develop there – this sometimes creates a danger for the community, yet at the same time it is an important source for progress. 191

10

Also the additional units which the inner front-section "co-ordination" imposes on the energons are very diverse in appearance. The most complicated and the most differentiated structures that have ever been produced by energons also belong to them.

In the period of acquisition only some functional units need the movements to be controlled – contrastingly, in the period of construction they all do. This is shown by the construction of every artificial organ and of every organism.

If we build a house, then the laying of every brick, of every pipe, of all wainscoting requires co-ordination just as every cut of the spade does, every transport of material, every installation. It is just the same with the "construction" of organisms, of their "ontogenesis".

Only by appropriate co-ordination of the single cell divisions and differentiations can bones, leaves, blood vessels and a central nervous system come into existence.

As we know today there are two different "techniques" in the development of animals. Those with "mosaic-germs" – for instance insects, molluscs – have a tightly centralised process of construction. The structures growing out of the germ cell are very limited already from the beginning onwards and can only build certain defined organs. With animals with "regulation-germs" – for instance animals with spines and amphibians – the cellular sections maintain more independence, more "potential". Similar to plants here, too, single cells – if one separates them out– can form the whole body. Their way of construction is thus more "federalisic".

The fact that with functional units the co-ordination of both the construction and the activity have to be as cheap as possible and has to be as precise and as fast as possible goes without saying. Here the standard of speed again has a stronger influence on competitiveness. Here, too, the situation in phases of acquisition, in phases of rest and in phases of standstill is a fundamentally different one – so they have to be assessed separately. This "sector" also thus supplies us – just like the sector "ties" – with twelve further values that are relevant for the assessment of competitiveness.

Every functional unit has to be tied to its energon, many functional units have to be co-ordinated in the active fulfilment of their functions. Furthermore, another, by far more complex interaction is of utmost significance.

Comments:

1 I will give an overview of the definitions of the term “soul” in Appendix 1.

2 I am avoiding the term “connection” on purpose. In a very inaccurate linguistic usage it describes two groups of phenomenons which have to be separated according to the theory of the energon. If one says that two bricks are “connected” by mortar – then one means that material bodies are tied up to each other. However, if one says that a telephonic “connection” has been established, then what happens here is the linking of energetic processes: words that hurry to and fro – thus it concerns phenomenons that manifest themselves in the dimension time. They, however, are functionally completely different tasks. Therefore I use the term “bond” for the first problem, and “coordination” (as there is no appropriate German word) for the second problem.

3 To consider the air that is in a business as a “means of production” because it is required for the communication might seem futile and erroneous to an economist. However, that opinion will change, it the first business is set up on the moon. As she does not have an atmosphere it is impossible to communicate via sound signals. An additional effort – for instance for communicating via electromagnetic waves – then becomes necessary in order to replace a means of production that is missing.

4 The term “information” as it is used for what is measured with “bit” is rightly controversial as the cybernetic term differs fundamentally from the linguistic usage of the word “information”. The use of that term without an exact knowledge of the mathematically formulated basis by C. Shannon is therefore dangerous and has already led to many misunderstandings. A comprehensible critic can be

found in B. Hassenstein's work "Was ist Information?" in "Naturwissenschaft und Medizin", Mannheim 1966.
[5] It would be more exact to call them IRM – "innate recognising mechanisms" because it is not the "triggering" but the "recognition" which is the peculiar and difficult achievement of those functional units. "Recognition" is certainly not supposed to be understood in the sense of conscious processes but rather generally in the sense of a data-processing (data-integrating) achievement. It is that neutral meaning that is also meant with "innate recognition" in ethnology.
[6] I will come back to the significance of the "impetus-mechanisms" (drives) which also influence that interplay by creating different "moods" in part 4, chapter II.
[7] According to today's state of research there exists a short-term memory ("fluorescence memory") and a long-term memory. Here the latter is discussed.
[8] When Plenge makes an alteration of the motto Cogito ergo sumus – I think, therefore we are – he states more precisely the position of humans. Plenge adds: "For I could not think if not We, the human society had created the language and the way of thinking." ("Drei Vorlesungen über die allgemeine Organisationslehre", Essen 1919, p. 39.)
[9] I have already gone into that topic in "We Humans". Vienna 1968, S. 125f.
[10] O. G. d'Estaing, "La décentralisation des pouvoirs dans l'enterprise".

III

MATCHING

Organisation without inner friction
is a more impossible impossibility
than squaring the circle.
Johann Plenge (1919)

Somebody who alters one part of
a whole alters all the other parts also.
Othmar Spann (1939)

1

The third "inner front" ensues from the further demand that the functional units should really not hinder each other but instead support each other whenever possible. With regard to their positions, their shapes, their sizes and so on – and also concerning the whole – they have to be well-suited to each other. Within the course of evolution, this internal requirement led to massive problems.

We are now actually getting to what is usually described as organism, organisation, harmony, entirety and alike. Every functional unit within a structure based on the division of labour is merely one force among numerous others[1]. Only if all those forces – those effects – are suited to each other can the whole become a unity. A lot has been written on this topic already – most of the time, however, in very general terms. Here my intention is to look for the concrete basic principles of that harmony – to look for measurable interrelations.

If the previous sections have not yet convinced you that there is a real and deep relationship between organisms and the human professional bodies, you will not find that relation expressed more strongly and more distinctly than at this "inner front". I call this "matching".

Here, too, we are confronted with certain interrelations which appear to be rather "self-evident", even banal according to the conventional way of thinking. For instance, the fact that the eyes of an animal have to be "in front" seems to be self-evident. Additionally, the fact that within a factory the machine room is not supposed to be located above the president's office also seems to be self-evident. From the viewpoint of the energon theory, however, "self-evident" does not exist. Everything that constitutes, diminishes or increases the capability of acquisition and competitive capacity of an energon has to be determined, measured and investigated in its causal interactions.

So how is it possible to determine the inner front "matching"? How can we measure the additional efforts that it "imposes" on the energons practically?

2

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First, it is important to what degree a functional unit is "fixed in its location" or "variable in its location".

With most animals, for instance, the organs of visual perception are very much fixed in their locations. If the animal has a front and a back regarding the direction in which it moves, then they have to be at the front. They have to be close to the mouth (in order to control the process of eating), however, they should not be too close to it (so that they are not disturbed or endangered by it). The best place for them is above the mouth – on the one hand because there they have the best view, on the other hand because there they are less disturbed by left-overs of food and by growth from underneath.

In this case there is an interaction between different functions: the kind of food-acquisition dictates a certain location for the functional unit of visual perception. Environmental conditions and the process of eating determine it even more precisely.

Protective shields are very fixed in their locations. In order to serve their energons appropriately – in order to produce the required protection effect – they necessarily have to be on the *outside*.

Less fixed in their location are – with animals – the heart and the kidneys. The function of the heart is to keep the bloodstream circulating, the function of the kidneys is to extract waste-products from the blood and to excrete them to the outside. Whether those organs are affiliated to the blood circulation in the front or back third is not essential. The effectiveness of the organism is hardly affected by that.

With higher animals the organs that build the red blood corpuscles and the deposition places for stored fat are even less fixed in location. Everywhere along the bloodstream those functional units can perform their functions. Within the total structure of effect they can *adjust themselves to circumstances* and can fit in where they disturb least. Their effectiveness is not tied to a certain location.

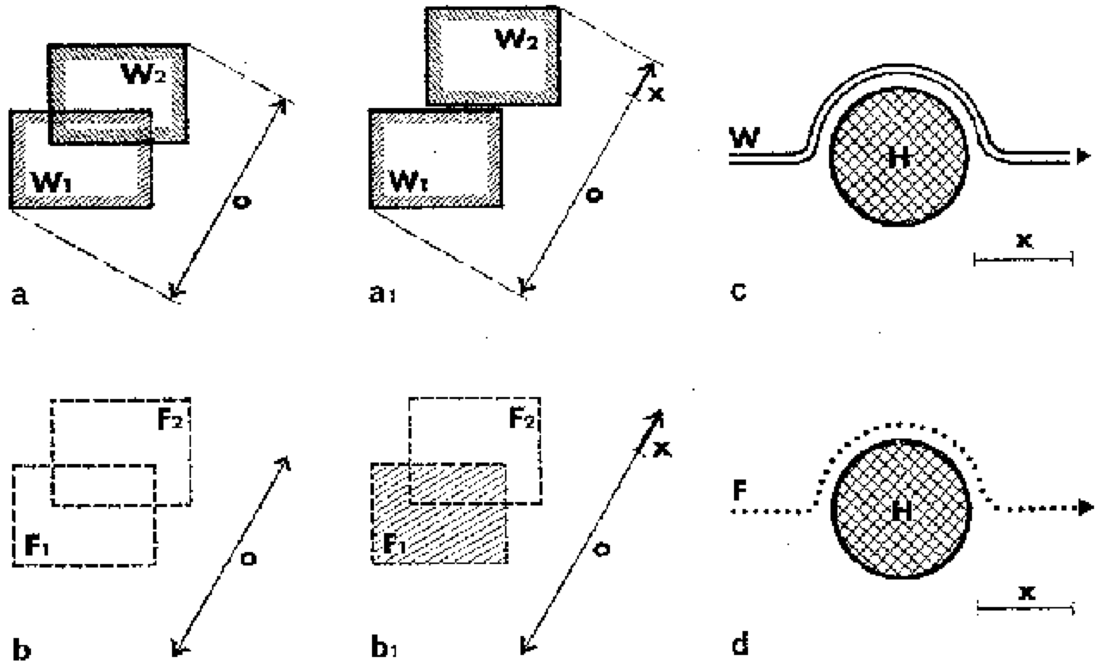

Figure 30: Matching in space and time

a) The locations inside an energon which are optimal for two functional units (V1 and V2) overlap: a compromise becomes necessary (a). Both functional units distance themselves from their optimum locations. Thus the optimum expanse o is exceeded by the space-unit x. More space has thus be controlled: that means (as a rule) an additional expenditure, a burden for the balance of the energon. x is in principle a measurable, energetic item of debit.

b) Here two functions (F1 and F2) are graphically depicted as areas where two activities take place. The two functions hinder each other (one may for instance think of two work-processes where the two performing functional units temporary collide). b1: Here, too, the result is a compromise – now in the time dimension. The two functions are adapted to each other in such a way that they cannot take place *simultaneously*. Function F2 only sets in later and consequently the collision is avoided. However, this results in a longer execution time for the two functions. The optimum time o cannot be achieved but it is prolonged by the unit x which again burdens the balance as item of additional expenditure and which can be expressed in terms of energy.

c) A functional unit V (for instance a nerve) collides with a functional unit H (for instance a bone). Here a compromise is not possible: H has functional priority, V has to give way. That results in additional expenditure x, which can be measured in terms of energy.

d) The course of a function, that is, an activity is disturbed by an obstacle. Example: a messenger is disturbed by a rock or a house. The course then is prolonged corresponding to the forced detour and this costs the additional energy x, which is again measurable.

What has to be noted here – just as in Fig. 28. – is the highly similar situation with spatial and temporal problems.

With businesses the roofs of buildings are closely fixed to their locations. They only serve those energons if they are located *on* the buildings in question. A porter, too, can only perform his function at the entrance. In assembly line production, for many different units the required point of their activities is determined by the production plan. The fleet of vehicles, on the contrary, can be arranged at very different points[2].

What is also important is the difference between "shaped fixedly" and "shaped variably". If we again consider the eyes of animals, we will see that they are fixed in their shapes. Regarding their function their shape is fixed to a large degree (*steered* to a large degree). The same is true for a needle, for a ship’s propeller, for a rock-drill used in the winning of crude oil. Already minor alterations of the optimum shape can greatly impair performance. In contrast, the liver of a fish can to a large degree fit itself into the space between the intestines. Even with a highly peculiar shape it can still carry out its function almost in the same way. With functional units belonging to human professional entities and business organisations that have not coalesced the shape of one is much less often influenced by the shape of another. Here, too there are priorities, whereby a non-optimum shape may be imposed upon one or the other functional unit – for example the arrangement of rooms and buildings.

Within the framework of such interactions, on the other hand, it is decisive how "valuable" (construction-costs, procuring-costs, replaceability) and how "important" (functional justifiability, centre and extent of the requirement) a functional unit is. If the brain of an animal or the energy equipment of a production company is impaired, then the energons affected are disturbed severely. If, in contrast, a muscle-cord or a lorry fails or breaks down, the energon is certainly handicapped, however, it can still – with an insignificant decline of its energy balance – continue its activity.

What results from that is that some functional units have priority over others. Some of them are tied to a certain local point as otherwise there would be a severe deterioration of performance, others are not. Some of them can adjust themselves to very different situations, others cannot. Some of them are more expensive and more difficult to replace or are required more constantly than others. Every energon thus has an internal structure of priorities which is very important for its competition value. What logically follows from that is that in the competition the energon whose functional units lose the fewest optimum capabilities has advantage in comparison to all (otherwise equal) competitors.

The frequently quoted sentence "The whole is more than the total of its parts" is a true but superficial conclusion which does not mean a lot. The arm of a smith cannot work at all if it is just on its own. In combination with the smith's body, a hammer, a hearth and so on, however, it can achieve a lot. A kidney taken as such hardly has the ability to survive; inside the body of an animal it is assigned an important place. As the parts of a structure with division of labour taken as such usually do not have any capabilities it truly does not mean a lot if the whole is more than the total of its parts.

It is much more important that with every energon – without exception – the total of the effects is *less* than the total of the individual effects: simply because some effects interfere with others. In every structure of achievement manifold compromises are necessary. What is crucial for the competition value is that they result in an optimum "matching", thus a minimum of achievement losses.

3

The consequence of that "inner front" can be seen very clearly with the example of the limbs of vertebrates. Here we find a matching of four very differing functional units: the bones, the muscles, the blood vessels and the nerves.

The most fixed in shape and location are the bones. From the effect that they have to produce results their necessary shape, from the material their dimensioning. Already small deviations concerning their shape and their location can lead to major losses of performance. 197

Muscles and ligaments are considerably more adaptable but, according to the functions that are required of them and to the shape of the bones, their shapes and locations also are fixed to a large degree. The blood vessels have to attach themselves to those functional units that have priority. They make way in a conflict – that is go round the bones and muscles. That results in higher costs for the energon – but the loss of achievement is smaller than with the vessels going right through muscles and bones. Finally, on the lowest rank there are the nerves. In a conflict they not only make way for the bones and the muscles but also for the blood vessels. This is more favourable for the total balance. A slightly longer nerve means a smaller loss of achievements and costs than a longer or a curved blood vessel.

The extent to which those components adapted to each other inside the body can be seen in a comparison with the skull capsule. There the bones only have the function to protect and to tie which, however, is not much disturbed by small holes. Here some of the blood vessels and nerves have priority. They do not take their course around the bone but instead go through it directly[3].

On a corporations humans already try to suit all necessary functional units to each other before construction and they also try to minimise losses of achievement. It is known that this nevertheless does not always succeed. The extend of such internal disturbances within the corporation ("inner frictions") can here be traced clearly and can also be measured in money terms. As organisms so far have been thought of as perfect constructions, their structures of effect have rarely been assessed with such standards.

Apart from the matchings of shape and location – that is in the dimension of space – matchings of locomotion processes are also important: that is matchings in the dimension of time. While the "co-ordination" is concerned with relating different locomotion activities to one collective achievement, the "matching" has to make sure that no process impairs another one. Not infrequently active functions disturb each other – or even exclude each other.

A very striking example: when we swallow we are not able to breathe. Or: when we eat, we are not (or only in a very restricted manner) able to to speak. Here the mouth (by extension of its function) gained the functions of gas-exchange and of speaking in addition to its original function of the ingestion of food. This results – inevitably – in a functional conflict. Either we swallow or we breathe and speak.

The same principle of solution is significant for the instinctive behaviour of animals. Here, too, we find patterns of behaviour which exclude others. In businesses that problem appears when an employee "can only manage one thing at a time". Then the solution is: what is more important at the moment is carried out first, what is less important has to wait. The functions that are colliding here are, as it were, queuing up at the functional unit[4].

However, it can also happen that functional units disturb *courses of locomotion* – or the other way round. In that case then there exists a collision between spatial and temporal phenomena.

The first case exists with all animals which build a protective shell. Such a shell, for instance, disturbs the gas-exchange – thus an active function. Accordingly, shells also worsen the reception of sensory reports – especially those coming from tactile sensations Within businesses, on the other hand, buildings or walls often become the reasons for *detours*. They can lead to very considerable losses of effectiveness and therefore efforts are made to keep them – already from the planning stage onwards – as small as possible. This is expressed in the arrangement of rooms, doors and stairs but also in the interior furnishings and the order of the tools on the workbench. In the state territory the same problem exists with highways, with the sewage system and on on. Here, too, the minimisation of "inner frictions" by avoiding hindrances is emphasised.

The opposite case – that active functions impair a functional unit, that is a *spatial construction* – can be found for instance if the employees in a nuclear reactor fall ill through radiation injuries or if bearings come to a stop because of an overheating of the engine. With that connection of effects there is not a spatial construction disturbing a process but an active function disturbing a physical structure.

Each of those hindrances leads to losses of performance and thus to a burdening of the energy balance. Simply on the basis of different importance, replaceability, and definitions of shape and location not all functional units can be working optimally and simultaneously. Losses – with effects that are perfectly measurable – have to be accepted. For the competition value it is important that they are as small as possible. Who and what it is that has the priority is decided by – the balance.

4

Yet, compromises are not always sufficient in order to make functional conflicts bearable. Quite frequently specialised special functional units that function as "buffers" are necessary. Thus, the inner front "matching" not only leads to a burdening of the energy balance through *compromises* – but also dictates additional functional units which also constitute an expense, a burdening effort.

This for example in our bodies is shown by the heart. On the basis of its permanent motion – which is unavoidable due to its function – it would disturb the neighbouring organs, especially the lungs. Additionally, it would also damage itself through the friction arising. A transfer would not suffice because wherever the heart was, disturbing side-effects would arise. In this case an additional *shielding* functional unit is necessary: the pericardium, which is filled with liquid where the functional unit, the heart, can throb without causing any harm. Within businesses there are sound-absorbing devices with a similar function. With a nuclear reactor we find the central unit shielded by means of a very costly lead-jacket – it would be superfluous, if there were no humans around, sensitive to radiation. Here the blame for a good and proper item of expense for an additional functional unit is on account of the "matching".

Within an explosives factory such a shielding appears in yet another form. There exists the danger that if one unit explodes it will affect others. Therefore individual complexes have to be kept small and have to be as far apart from each other as possible – the management expert calls them companies which "consume plenty of space". According to the theory of the energon the blame here for the additional costs for acquiring land is to be laid on the factor of matching. The spatial distance – which also costs money – becomes the shielding unit.

With connected functional units that perform movements, appropriate joints, bearings and lubrication become necessary. We find such equipment both with the bones of animals and the linkages and wheels of machines. By the merging of functions the lubrication can become an independently performing system taking the form of "central-lubrication". For all those units, too, the "matching" is responsible because they are also additional expenditures required by that inner front sequence.

What is even more complicated is the matching with organic functional units, especially within corporations and states. There the functional unit, human beings, causes considerable "frictions". They have drives and moods and tend to antipathies and to arguing. Their striving for appreciation and rank leads to thousand and one conflicts. Most of the time that has nothing to do with the actual fulfilling of the function; instead, those are negative side-effects of that otherwise so immensely versatile and highly talented unit. What are the shielding devices like in order to avoid such "inner frictions"?

They appear shaped as company rules that function as units settling arguments and in appropriate methods of leadership. That expense has outwardly very little in common with ball-bearings and sound-isolating panels and yet – according to the energon theory – it has to be assessed together with them. With regard to the energy balance those additional expenditures belong together. Whether it is a human being or a technical device fulfilling a certain function is – as has been stressed several times – secondary for the energons. What is always primarily important, however, is that functional units that impair each other are appropriately shielded.

Within the animal kingdom there are various parallels for that too. For instance, within ant colonies the single individuals recognise each other by their smell. This is important because unknown ants trigger off hostile reactions. If an ant is thrown into water, it loses its "smell of the nest" and is not recognised by its fellow citizens but instead is fought fiercely. Thus, the communal smell brings about a *shielding* against the inherent reaction of aggressive behaviour. As it develops on its own it does not produce costs worth mentioning for the energon "ant colony" – nevertheless it becomes a very important functional unit. It causes the elimination of the otherwise occurring "inner friction".

The inner factor "matching", however, not only expresses itself in the necessary avoidance of conflicts. Also the opposite process is significant. Single functional units can also *support* each other.

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5

Inside energons there exists the opposite of the already discussed relation horse-rider. Also, functional units can make outside energy utilisable – that is, the performance of other functional units.

All forms of taking up functions and of merging functions (see Part Two, chapter 4, paragraph 6) belong there. The focus is always on functional units improving their energy balances by merging physically or in the performance of active functions. These are, as it were, internal alliances. Double tracks are avoided by that.

In that case – and actually only in that one – the whole is in fact "more than the total of its parts" as the total costs are lower than the total of the individual costs. In comparison to the additional costs that for every energon grow out of the mutual hindrances of their functional units, however, such savings might rather move into the background.

Let us summarise: the energy balances or energons are burdened on the one hand through "inner friction", on the other hand through additional functional units designed to avoid such frictions (or to eliminate them). Again the criteria costs, precision and speediness are valid because inner friction expresses itself in additional costs, in the loss of precision and in the slowing down of processes. Furthermore, with all functional units that serve the reduction or the elimination of such frictions those standards become all the more valid: with them, too, it is important that they cause the lowest costs possible and that they work as precisely as possible. What can be seen for example with the settling of arguments is that also the speediness is of considerable significance.

6

The "matchings" that have been discussed do not affect every functional unit. Not every one has disturbing side-effects on others. However, there is another especially significant matching which affects *every single functional unit of each energon*. It is the matching of the parts to the whole.

A lot has also been written about that – not least in political science and political economy. There the following dispute has long existed: should one assess the whole from the viewpoint of the parts ("atomistic" point of view) or the parts from the viewpoint of the whole ("universal" point of view). Practically this means: what has priority? Do the parts have to comply with the whole – or do the parts determine the whole?

The energon theory agrees with O. Hertwig's opinion that each of those ways of looking at it is incomplete and thus leads to an incorrect assessment of the reality[5]. Both with organisms and the energons created by humans the reciprocal influence manifests itself clearly. Frequently individual functional units impose – through the demands they make on account of their functions – considerable burdens on the whole. On the other hand, each part has to be in a certain relation to the whole in order to have an optimum effect.

Goethe spoke of a "subordination of the parts". Today we have the far better term "integration". With regard to the energy balance this is especially easy to grasp. The criteria costs, precision and time appear again.

If a functional unit's dimension is bigger or smaller than would be necessary for the whole, then this constitutes a disadvantage in the competition. If it is too big and too costly, it is a superfluous expense. If it is too small, it can become the "weakest link of the chain" and thus "dominance of the minimum sector" in business management. If that exists and if it is unavoidable, then all planning has to "level off" with regard to that weakest section.

With organisms, natural selection has the same effect. Wholly inevitably it always starts with the weakest link of the chain.

Many varieties of animals and plants, however, have the special abilities of a "functional" or "regular" adaptation. The proportions of the single functional units are in that case not strictly determined by their genetic blueprints. Depending on the way they are used they can increase their sizes and working force[6]. If the use declines, then regression takes place. Thus, such organisms have special mechanisms for the improvement of the integration inside their bodies.

With human acquisition structures intelligence and controls bring about the same achievement. If it is found in a business that one department is under too great a strain, then – if no other solution is found – it is enlarged correspondingly. If in another department the employees sit around idly, then– with a rational management – it will be made smaller sooner or later[7].

Gutenberg points out that in enterprises also the quality of the means of production has to be integrated. In places where for instance top performance engines are not necessarily required, they become disadvantaged because their "optimum ranges" are mostly restricted. The "optimum matching" possible for a business can only be achieved if the "optimum capacities" of all means of the business correspond to actual demands.

The same relationship is also valid for organisms. Where for instance delicate sensory abilities – for a certain form of acquisition or for the repulse of enemies – are not required, their formation is a superfluous expenditure. Both in the animal and in the plant kingdom many examples clearly show how in those cases natural selection leads to appropriate savings.

What is termed "quality" with the means of a business covers the term "precision" and how it is used in the energon theory to a large degree. Generally it is held that it is an advantage for *every* energon that also the precision of its functional units is integrated.

Furthermore, also the *speediness* of single functional units in the fulfilling of their functions has to be suited to the total activities of the energon. Too high a speed becomes a disadvantage if it causes increased costs and if it is not necessary. Accordingly, on a production line none of the work sequences has to be carried out faster than is permitted by the overall schedule. If on the other hand the functions are performed too slowly, it can reduce the total productivity of the energon.

Thus the subordination of the parts to the whole happens according to various standpoints. Inside the total structure of effect they have to "level off" the single effects, as it were. To determine the respective optimum "inner balance" of a perfect integration probably belongs to the most difficult arithmetical tasks. The achievements of all functional units have to be considered here – and furthermore all environmental factors which influence the energon.

If they change, then also the optimum inner balance changes automatically.

7

This is an extremely important point. Every integration is only valid with a constant form of acquisition and in a constant environmental situation. Yet, this means that every "entirety" is a completely relative value. If the environmental conditions change, then also the demands on individual functional units change. The "force fields" that work from the outside change and overlap differently. The values for a perfect integration correspondingly are different then.

That knowledge leads to a dynamic assessment of energons. Their necessary parts and their priorities concerning location, dimensioning, shape and function, are by no means constant. The more the environmental conditions – especially the conditions of acquisition – change, the more also the demands put on their inner matching change. With organisms the parts, since they have coalesced, can only to a limited degree adapt themselves to such changes by "regulation" and all *genetically* determined structures were only able to change very slowly and gradually with the evolution. Only with acquisition structure built by humans did those limitations cease to apply, only with them did faster and fundamental changes and restructurings become possible.

That particular ability nowhere appears more clearly than with military units. Depending on the positions of the hostile forces and on the state of the territory the individual units and other means of fighting can be arranged in one way or another. That especially is where the art of every "strategy" lies. However, in this respect, too, it is not ultimately the commander who decides about the best deployment and the best tactics possible (where there can be more than good choice*), but the enemy and the respective environmental condition*. Here, too, those factors exert – without even having the slightest intention of doing so – a *steering* effect.

What is the best entirety at a given time is always determined by the environment – and only by that. The environment dictates the necessary size, location and form of achievement of the individual functional units and their demands then beam on into the inside of the energons and there dictate secondary, tertiary and quaternary matchings.

That problem also appears very clearly with *growth* – every manager knows that. If a business is expanded, then almost all matchings change – and by no means always proportionally. Every existing building, every existing organisational connection again becomes a problem: some basically new assessments become necessary. If with animals and plants growth proceeds smoothly, then this is no doubt one of the most amazing phenomena. Every process of construction has to happen in such a way that the functional units which are in the process of formation or are growing do not hinder others which are in the process of change. Here the achievements of the genetic blueprints necessary for the inner front "matching" alone are really extraordinary.

If energons built by humans get their required functional units from "workshops" which do not interfere with each other in any way, that advantage cannot be overestimated. Up to the evolutionary stage of humankind the flow of development flow was extraordinarily burdened with the processes of construction and growth.

Gutenberg pointed out that the instalment of every new unit into a business influences the whole system. Exactly the same is true for the development of every new functional unit in the course of evolution. As the developmental physiologist Roux emphasised quite rightly, at first every new unit has to "fight" for its place[8]. Its relative importance has to be proved and it must compete in this respect with others, especially neighbouring energons. Here some functional units bring a whole range of additional demands in their wake: energy supply, refuse disposal, care, repair, controls, necessary auxiliary units and more. The newly joining functional unit's effect can thereby beam into the remotest parts of an energon and there make necessary modifications and changes. If one considers all that, the particular significance of functional extensions in the course of evolution becomes clear. Only by that process has it often been possible, in small steps – and via various detours – to obtain new effects and additional matchings hence resulting.

8

With human acquisition structures another matching became significant which beams from the field of luxury into the field of acquisition, as it were. Its origin is the human sense of beauty and we will come back to the latter's roots later on (part 4, chapter II).

Actually, every body of acquisition has to be aligned with *economic* standpoints. Its abilities of acquisition and competition form the basis of its existence. By the time humans gained appropriate surpluses they did not only construct luxury items but also started to "improve the appearance" of their acquisition structures correspondingly.

The problem deriving from those often widely diverging criteria is well-known to every designer and to every architect. Today not only means of representation – cars and buildings, for instance – but also machines and tools are shaped so as to both be productive and also "pleasing" to our senses. Apart from paint and polish that practically means various changes which even reduce the effectiveness of those artificial organs. This becomes particularly obvious in architecture. If for example the windows of buildings are arranged regularly and symmetrically, this is only the impression that they give from the outside. From the point of view of the respective apartment or accommodation a completely different arrangement would often prove more suitable.

Various "holistic standards" overlap here. The one aims at an improvement of the balance: the economic one. The other attempts to do justice to our sense of beauty (plus the influences of fashion): the aesthetic one.

Similar overlappings appear if in a free market economy politico-economic thoughts gain acceptance. While in countries with a completely free market economy the state with all institutions is a community organ, with an organised national economy the state is increasingly turned into an energon. This results in different evaluations which often collide violently. At one time the state is a servant, at another time it becomes the master. Since usually neither of the two directions is fully accepted, this leads to matchings in this respect also – similar to those between economic and aesthetic evaluations.

If businesses merge or an employee has more than one occupation different standards collide also – different "entireties". Here, too, appropriate matchings – appropriate compromises – become necessary.

To date the term "entirety" has had a mystical and supernatural flavour to it. This is founded in the fact that many researchers who use it who believe in the effectiveness of a supernatural force which leads the evolution to higher forms of order and entirety.

The most logical of such world views comes from the Viennese philosopher and economist Othmar Spann. While other thinkers who were "oriented integrally" (Driesch, Üxküll, Gurwisch, Bertalanffy and others) only demanded the supernatural force postulated by them as a hypothesis (without dealing with it in more detail), Spann devised – in taking up Plato's "ideas" – a sort of religion.

For Spann God himself – the "original centre" – was the centre of all entirety. God himself would "subdivide" himself into organs. From them further entireties would emerge and again others subordinated to those ... and so on. Each higher shape would thus mould the appearance of the ones growing out of it. The whole would thus be "given", it would *exist before its parts*. It would be *born in its parts*.

This – pantheistic – thought reveals many weaknesses if one looks at it practically. Spann was logical enough to recognise them in all their clarity.

The first difficulty is the following: why then do those parts that come out of the divine entirety change? Here Spann wrote: "The reason why an entirety does not take pleasure in the eternal glory of a radiant and eternally determined construction and why it does not enjoy itself in blessed calmness, why it rather restructures itself in a ceaseless change, will certainly never be discovered rationally."[9]

There is a second, even more serious contradiction: if it is God himself who subdivides and manifests himself in so many entireties: how can it be understood that those parts compete with each other and even fight each other most bitterly? Here Spann wrote: "Somebody who would understand the relation of the entireties to each other would understand the world, not only with regard to its manner but to its nature. Therefore this question exceeds the power of human cognition ..."[10]

I am quoting these thoughts because they have influenced the universalistic thought-direction within economics – especially in the case of W. Heinrich, in Vienna – not insignificantly. Yet, in the first place I am quoting him because Spann, despite his so utterly different point of view, arrived at many conclusions which perfectly well agree with those of the energon theory.

For instance, Spann coined the sentences "Achievement comes before the vehicle of achievement" and "The achievement creates the organ for itself". He spoke of a "field of achievement", of a "location sensitivity" and a "relative quality value". He spoke of "achievement structures" and explained that vehicles of achievement were "not realities as such". He also spoke of "achievement deputising".

The energon theory also ultimately views "the whole as coming before its parts" – namely in that the environmental situation determines *in advance as it were* what the energon has to look like in order to be productive and competitive at a certain point in space and time.

Practically, of course, my theory relies on the "atomistic" basis which was very much contested by Spann. It views evolution as a perfectly causal process which grew out of the inorganic phenomena. Furthermore, it claims that this peculiar development could not take on any shape. Rather, the shapes were – and will be for all future time – determined by the necessity to achieve an active energy balance. That led – completely automatically – to steering effects on the part of the sources of acquisition and also on the part of adverse and supporting environmental conditions. Further effects were then produced – secondary, tertiary, quaternary – in the inner structure. Every energon thus, as it were, grows into a value-structure which has been mapped out for it – the energon theory then is concerned with the revealing and the ascertaining in measurable terms of that value structure[11].

Apart from bonding, co-ordination and matching, every energon still has to face another very important "inner front". It, too, is a category that has not been considered as a unity to date.

Comments:

[1] It also builds a "force" to offer organised resistance, even if there is no continuous expense of energy connected to it. On the basis of both a particular shape and mass, functional units are able to alter locomotor processes – this is also an achievement, perhaps even a highly differentiated function. Examples: an armour plate stops the cannonball; the negative of a photo in the process of copying only allows the light to penetrate in certain places.

[2] K. Mellerowiez set up ten principles for the "internal company-choice of site" which biologists could profitably study also. Some of the points given there – course of the process, effective control, central position of busy departments, isolation of sources of danger and so on – have also influenced the evolutionary "shaping" of organisms. ("Betriebswirtschaftslehre der Industrie", Freiburg 1958, pp. 253)
[3] For instance with our temple-bone (Os temporale) the "wart-hole" (Foramen mastoideum) forms a passage for one vein and the Canalis caroticus forms the passage for an artery: the inner artery. A passage for a nerve (the 12th cranial nerve) is the head-bone (Os occipitale) and is called Canalis nervi hyperglossi.
[4] In the framework of "operations research", where problems of optimisation are in the foreground, a special "theory of queues" was developed.
[5] "Der Staat als Organismus", Jena 1922, p. 12. In the first three chapters of that book Hertwig provides a detailed overall view of both ways of looking at it.
[6] Our muscles are an example. With constant use they become stronger.
[7] According to Parkinson it is different in a state, most of the time. There the departments offer resistance to a possible reduction by exaggerating their importance. That leads to an excessive inflating of the apparatus of the state ("Parkinsons Gesetz und andere Untersuchungen über die Verwaltung", Düsseldorf 1957).
[8] W. Roux, "Der Kampf der Teile im Organismus", Leipzig 1881.
[9] "Kategorienlehre", Jena, p. 209.
[10] p. 365
[11] The dispute which has existed since the time of Plato and Aristotle about whether the general or the individual, the "idea" or the concrete object constitutes actual reality is touched upon by those

considerations. Measuring is only possible with an individual and concrete object – here the energon theory agrees with Aristotle. However, the actually significant values which determine the appearances of individuals are derived from connections that cannot be perceived with the senses. According to the type of their influence they can be combined in categories ... perhaps in the sense of platonic "ideas".

IV

PRESERVATION

All radical terms or categories have to be ones that ensue from the achieving, the performing (functioning) of the means.
Othmar Spann (1929)

Everything that comes into existence eventually fades and what is growing ages.
Sallust ("Bellum Jugurthinum", 40 v. Chr.)

1

An individual energon does not actually consist of vehicles of effect (or functional units) but taken together, they consist of effects. These are what matters. What the individual vehicles of effect look like is irrelevant - provided that, with some division of labour, they produce the effects that are required from them as an entirety. That fourth "inner front" ensues from the demand that all those effects have to be *maintained*. It is not sufficient that suitable vehicles of effect are available - they also have to be attended to and renewed, many of them need a regular supply of energy and substances; the waste that occurs has to be disposed of in order to avoid hindrances.

I call that fourth inner front "preservation". Basically it is all about the preservation of effects. Practically it is about the preservation of vehicles of effect and their productivity.

What are the "demands" that the vehicles of effect make? This is the problem of the fourth inner front. Here, there exist enormous differences. Completely undemanding vehicles of effect are rather an exception.

An example is presented by the foundations of buildings and the dead elements of consolidation (wooden bodies) with plants. Once they are created, as a rule, they bring forth their services and their effects without needing any further attention or care. A similar situation is found with the skeletons of corals that build reefs as a sort of seating, a large base previously built in the water by polyps. Here everyone uses the work of past generations so that their energy balances do not show any items of expense for the maintenance of those supporting structures – more precisely: for the maintenance of their supporting effects. In contrast, the bones of animals have to be nourished, controlled and regenerated continuously. Still higher demands are made by all *active* vehicles of effect that consist of living cells. Similarly - in businesses – by all employees and machines.

2

Every active vehicle of effect needs appropriate amounts of free energy and in addition also often substances in order to fulfil its function. The energon to which they belong acquires both in the form of a central output - that is on average more than it has to spend for the acquisition. Now the problem is: how can those "goods" be supplied for all the units that are in constant need of them?

Within the bodies of unicellular organisms we do not find special organs such purposes. The protoplasm is in a ceaseless flow and the quantities of energy and substances taken in spread themselves in it and are seized by the places needing them. After all, there already exist vehicles of effect which influence and order the allocation – for instance the endoplasmatic reticule, the bordering layers of the organelles and also the "compartmentalisation" of the inner structure mentioned.

With simple multi-cellular organisms (both plants and animals) substances move from one cell to the next by way of diffusion – via appropriate openings (pores). Thus, they are already additional units which have to be charged to the account of "preservation". If we close them, the effectiveness of certain cells cannot be maintained. With sponges, enidaria and other primitive multi-cellular organisms the additional units specialised in the transport of energy and substances we find there are "itinerant cells". They take over the vehicles of energy and building substances from the acquisitive organs (for instance the intestine-cells) and creep to other tissues in order to "supply" them. It goes without saying that those activities inside such cells require particular behavioural blueprints. Both those cells and their recipes become necessary through the inner front "preservation". If the functional units that are supplied by them had no such requirement, they would be superfluous. They burden the energy balance of their energon.

In the further course of evolution the formation of extended systems of output occurred: with higher plants it was the development of the sieve tubes, with higher animals it was the development of the blood vessel system. This is common knowledge – what is not so common, however, is to consider those extended structures as adjuncts and servants of other functional units, as it were. Yet, this is what they are. If the units of acquisitive activities, of the protection from disturbances, of the inner co-ordination, etc., had no need for them - they would be a superfluous expense. Our hearts, too, in this case would be unnecessary functional units.

With the energons that have not coalesced, built by humans, a lot has changed – however, that principle stays the same.

Machines, too, have to be supplied with energy and for that additional devices are required. They have various shapes but serve the same functions. Crude oil reaches consumers via pipes or tankers, coal gets there in wagons or trucks and electricity travels via highly organised cable-systems. Also, the allocation of substances is often necessary, especially within businesses of production. All units that produce the acquisition organs (sales products) receive substances. From there, too, there ensue the necessary additional devices.

Today, people working in businesses (and in the state) usually are not provided with food *directly* any more. They receive money which enables them to buy food and goods. After all, that process of allocation also results in the necessity for additional vehicles of effect: for instance wages accounting[1]. If the extent of that necessary process of allocation is reduced - through automation – then it shrinks correspondingly (as does the item of expense connected to it).

Another expenditure belonging here is that on canteens. The exchange process money for food is made easier by them. Losses of time are avoided and the degree of satisfaction is increased. This is a double function. Canteens are basically aid units for the "preservation of effects". Yet, at the same time they also become a means of rationalisation and lead - if they are good and cheap and if they create an atmosphere of general satisfaction - to an intensification of the bonds.

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The necessary supply with energy and substances, however, has - indirectly - a range of further expenditures in its wake.

3

Where processes take place there is usually waste too. Speaking of which, it has to be excreted, disposed of, and cleared away. Otherwise it appears as self-inflicted disturbances within the energon structure – and impairs the effect.

With single-celled organisms there already exist units specialised in that: the "pulsating vacuoles". They are vesicles that rhythmically narrow themselves and often have rather visible supply-canals. They take in the metabolic products which are obtained in the protoplasm and evacuate them to the outside. Here it has to be mentioned that those "organelles" exclusively serve refuse disposal, yet they do not serve the supply of energy and substances.

If with higher animals the blood vessel system performs *both* functions, then this is not necessarily self-evident. With those energons there rather occurred an extension of the function as has already been discussed: through additional vehicles of effect – kidneys, urethra, etc. – the blood stream distributing energy and substances *additionally* became a vehicle of effect of the refuse disposal (excretion).

"Travelling cells" still play an important role with higher animals. Within our bodies numerous "phagocytes" ("white blood corpuscles") creep about. They "eat" waste and parts of tissue that have become unusable and take them to the surface of the intestines from where they are then excreted with the faeces. With echinoderms such units of refuse collection, if they are fully loaded, penetrate the body wall. They leave the multi-cellular association "body" – and perish in that. Also for that "selfless" type of functioning particular recipes of behaviour are certainly a prerequisite.

Another possibility to get rid of waste products is to deposit them in parts of the body where they do not do any harm. For instance the big countryside plants do not have an excretion system. Many of them store their metabolic slag in the form of crystals (oxalic acid) in the dead wood of their trunks and branches. Thus a necessity becomes a virtue: the supporting elements of the plant are even more strengthened thereby. Something worthless becomes something functional - according to my previous definition (Part Two, Chapter 4, paragraph 5, figure 20) a "function-birth". Also with numerous animals in the first place urea is deposited in special tissue areas and organs. With snails such organs are called "reservoir-kidneys". With butterflies and fish the pigments of the outer skin are often built out of crystallised metabolic slag. By way of guanine-crystals built from waste, fish obtain their silver gleam and that substance is also deposited in the tapetum of their eyes. In every single one of those cases something that is harmful to functioning is turned into something that serves it.

According to our conventional thinking it is regarded as superficial and eccentric to name kidneys, urethra, phagocytes, pulsating vacuoles and guanine-deposits in the same breath as wastepaper baskets, rubbish bins, sewage systems, toilets and industrial waste utilisation. Since those structures look very different we put them into completely different terminological drawers within our brains. As soon as we start questioning that order of the drawers our brain resists energetically. If, on the other hand, we withstand the impressions of the outer appearances but instead take the energons and their balances as a starting point, those facilities fall into the same category.

Every energon is a structure of effects that is dependent on an energy balance which on average is positive. According to that, within every energon acquisition processes take place. With almost every energon there occur waste products which have to be disposed of or neutralised in some way so that they do not impair the acquisition process. What follows from that is that for almost every energon refuse disposal constitutes an additionally necessary expense, additional costs. Whether here the units in charge of the refuse disposal look one way or another does not show in the balance. What appears is only how expensively, how precisely and how fast they work. That - *and only that* - influences the competitive value. And only the competition value - *and only that* - eventually determines what exists and what does not exist. If we force our brains to think along these lines, then the joint consideration of rubbish bins and kidney canals is really not banal. Rather, the consideration of that *effect*-relation acquires central significance. From that point of view the opposite happens; namely, the *outer* relation becomes secondary, minor, insignificant. Even the "natural" (phylogenetic) relation - the phylogeny of the evolutionary development – then shows us no more than simply the historical course.

The peculiar effect of preserving *other* effects has to be produced by every energon. All energons are related in that way. On the one hand, what concerns us here is the supply with necessities, on the other hand it is the removal of harm. Moreover, in that sector, however, further facilities, which again look completely different, are necessary.

4

Accordingly, many vehicles of effect need attention and maintenance.

Swords and ploughshares have to be sharpened: otherwise their effect diminishes. Soiling through contact with the environment has to be removed - through cleaning tools, innate patterns of keeping clean, wash-rooms, orders, cleaning facilities. With organisms such keeping clean is also of additional significance (double-function) for the repelling of enemies - for the repelling of microorganisms. That is true for both an insect state and for the human body. Parts that have become worn-out and defective have to be replaced, protective coats have to be renewed.

The upkeep of the "work ethic" in businesses and of the "patriotic sense of belonging" in the state is considered – instinctively – as something completely different to the facilities and phenomenons discussed so far. For energons and their power of effect from the functional point of view it is all the same. Both in the energon "business" and in the energon "state" humans (with all their peculiarities and complications) are just vehicles of effect. Also their *willingness to produce effects* has to be attended to and maintained. Otherwise there is the danger that another business will poach that vehicle of effect, will snatch it away[2].

Within a state it is also important that the willingness to produce effects does not get lost, that the individual does not succumb to the insinuations of another party or of another state – that he does not become "unfaithful" to the order set down in the state constitution.

In the functional unit "army" attention to and maintenance of the readiness for action is especially important. Not only the weapons and means of transport have to work properly, not only the connections of commands and rules have to function. The willingness to function, the "subordination", the will for action has to be maintained. How? Through the infectious force of a leader personality inspiring confidence. Or through forged informations which are expounded adroitly by a demagogue. Or through threats and terror: a coward or a traitor is executed publicly, exposed to torture – and behold: the common willingness to produce effects rises again. These are also aids for the "preservation of effects".

Even *blueprints* and *patterns* have to be attended to and maintained. With all innate behaviour what is connected to it is an also innate drive to perform it. Within research on behaviour that is called "appetence" and it has only been considered as an aid for the fulfilling of functions (achievement of the drive) up to today. However, if we compare that mechanism to the processes with *acquired* recipes, then it appears in a slightly different light.

It is commonly known that acquired skills have to be practised - otherwise they are "forgotten". With every artist, every musician, every military troop this can be seen very distinctly. Thus, for acquired patterns maintenance is necessary – otherwise they disintegrate. If they are not used, they are something as superfluous as every other functional unit that is not used. Only by activating them regularly can they be maintained. With all innate blueprints that particular type of attending is also innate. That might be the second and not less important function of the "appetences" and it might explain why they occur periodically "spontaneous". It is the necessary "servicing", so to speak. With acquired patterns self-discipline and drill have to perform the same function.

With every tool and with every mobile aid also the "keeping-in-order" belongs to the necessary attending. On the one hand this is a way to objects mutually impairing and damaging each other, on the other hand also their willingness to produce effects is preserved. For only someone who knows where to find his screwdriver, his cooking recipe, the required instructions or an employee can make use of those functional units, can have them at his disposal. Otherwise it is true that they are there – but not ready to produce effects. Thus order, too, is an aid for the *preservation of effects*.

From all that results the importance of controls. Whether it is the maintenance of a machine, of state consciousness, industrial instructions, a cellular structure or the attending of the swarm in a beehive: there always has to be an *is* compared to a *should*.

In enterprises we find aid facilities of all sorts of kinds – technical measuring instruments, statistics, controllers etc. – that are entrusted with that important preservation function. In the bodies of organisms we have to recognise the effectiveness of similar controlling authorities – but temporarily only know rather vaguely what they look like and where they can be found. The genetic blueprints contain the key for the actual organisational blueprint. However, how precisely the constant controls and feedbacks are carried out is still partly not clear. What has to be concluded from a comparative functional consideration is the fact that they have to exist. *For without specialised functional units such differentiated achievements of that kind would not be possible*.

5

Further vehicles of effect which belong to the inner front "preservation" are all security precautions which prevent a vehicle of effect from becoming overstrained or from destroying itself.

The safety valve of the steam engine is a good example. If the pressure in the boiler rises above the allowed level, the valve opens and steam escapes. The sleep drive has the same functional meaning. It forces energons to take periods of rest and thus prevents an overstraining of the functional units. This is especially important for the nerve cells which are very sensitive and in a need of rest. Just as the steam engine is prevented by the safety valve from destroying itself, the behavioural patterns which trigger off tiredness and sleep avert an overstraining of the steering centre.

A fire extinguisher, safety instructions, the common organ "fire brigade" but also the anxiety drive and the feeling of pain also belong to that category. Partly the blame for those structures and functions is to be laid to the account "repelling of environmental disturbances", but partly also to the account of the inner front "preservation". The jeopardising of the structure of effect or of individual functional units can happen both from the outside and from the inside. In both cases safety precautions are necessary, in many cases the same ones suffice for both.

6

Depending on how the sources of acquisition with an energon and the other environmental conditions are constituted it has to have appropriate *reserves* at its disposal in order to continue to exist. If the functional units did not make any demands – and if there were no wear and tear and no damage, that actually "dead" and not working expenditure would be superfluous.

With plants and animals such reserves exist both inside individual cells and inside tissues and in organs that are particularly specialised in it (for instance in the root tubercles of plants and the liver of animals). For some of those energons *energy* reserves are more important, for others, in contrast, reserves of *substances* (for instance water) are more important. With professional entities, businesses and in the state we find energy reserves in the shape of food, crude oil, coal, etc., and reserves of substances in the shape of stored raw materials, semi-finished products or finished products (for instance machines in reserve). (We speak of reserves of *workers* if qualified employees are not made redundant in spite of a lack of work as there is the risk that they won't be available anymore). The most important reserve with all human acquisition structures, however, is the universal order for human labour (or its results): i.e. money. As such it can be stored as cash (in a safe), in bank accounts or in the shape of valuables.

All of those things are burdens for the respective balance: necessary functional units of preservation. The total size of that expenditure that is not really working but just necessary for security depends on the type of acquisition and on environmental influences, thus belonging to the functional field "matching". If the reserves are too big, they form a useless burden. If they are too small, then the risk grows too big. With organisms natural selection, with humans acts of intelligence based on experience bring about suitable in-between values. In any case those values have to be laid down in the steering system. They are not less important a functional unit than every other piece of information in the structural and behavioural blueprints.

Moreover – for times of need – a special plan for distribution can be important. With states that are at war this can be seen in the rationing of food and of reserves of substances: as a result of acts of intelligence. In the bodies of organisms the same problem exists - and is solved there too. With higher vertebrates for example what happens is not that every organ simply "serves itself" from the bloodstream just as it likes. In times of need here, too, we find "rationing": more vital and more sensitive organs – for instance the brain – are given priority. That also requires an appropriate system of controls and commands. Where and in whatever form they are grounded: they have to be charged with the additional expenditures that are necessary for the "preservation of effects".

With many energons further emergency reserves are located in functional units that they can do without temporarily. In times of need professional entities or enterprises "dispose of" parts – that is, they sell them – or mortgage them. With organisms tissues and organs are "melted down" – the body, as it were, eats and digests them itself. It breaks them down in order to make their contents of energy and substances utilisable for vital parts. This also constitutes an enormous output, which requires additional facilities. In this case no animal can reach such parts with its mouth or with its intestines. The units specialised in the breaking down of molecules can thus not even go into action. Completely different processes and controls are necessary for that[3].

Finally, another possibility to survive times of need and thus preserve the effects is: the *shut-down*.

For professional entities and enterprises that path is open for them rather than for animals and plants. A business can dismiss its employees, it mothballs its machines, closes the buildings. By that the regular costs can be reduced to a minimum. For organisms it is only possible in exceptional cases to throw off organs (for instance the throwing off of the leaves with the decline of the trees in autumn). After all, here, too, there exists the possibility of cutting back activities, processes and energy expenses to a minimum. With "alternately warm" animals (amphibians, reptiles) that happens quite automatically: they fall into a frozen stiffness – or "dry stiffness". With some warm-blooded animals we find hibernation. Some of them also have an additional safety precaution: the "wake-up stimulant". If the temperature drops below a certain minimum (for marmots it is five degrees Celsius, for hedgehogs it is three degrees Celsius), the animals wake up, take up their normal metabolism and work actively - through locomotion and "heating" - against a further cooling. With unicellular organisms but also with many low multi-cellular organisms the shut-down assumes even greater dimensions. Some of them form "permanent states". Practically this means: many of the body's functional units are "melted down" and the energon turns them into a unit that is able to reconstruct the body.

That, however, is already the transition to "reproduction". For if later, with the setting in of more favourable environmental conditions the body gets reconstructed, this is actually not the "same body" any more. It rather is already another body of the "same species".

The fluid transition from the individual to the species – which we will deal with in more detail in the next chapter – already becomes clear in this respect. What is more, this process also shows that what is crucial with energons are not actually the vehicles of effect *but the effects*. It is possible to a large degree to do without every vehicle of effect (or functional unit) – on the one condition that the structure of effects is constituted in a way that it can produce it anew.

Again another but related problem ensues from the possible *damage*, from the possible loss of functional units. If the effects should be maintained, in such cases appropriate "repairs" or appropriate substitutes are necessary.

For energons which have not coalesced and which are built by humans, there ensue much smaller problems than is the case with organisms. In the organised structures of civilised countries the professional bodies and businesses always bounce back. If parts of them become useless, get lost or are stolen, they can nearly always be replaced – provided there is enough access to human labour available, i.e. via money. That, however, can be "advanced" by completely different sources, the community can even intervene selflessly with help. In this case not even the structural blueprints and behavioural patterns have to survive. Almost every energon can, as it were, be reconstructed completely.

This means a significant progress within evolution. The security factor that something already attained cannot be lost is increased considerably by that. Until the developmental stage human being it happened only too often that certain species of energons died out – although they would have been able to continue to exist elsewhere or with again changed environmental conditions. That danger now vanished to a large degree. If there is again a market for types of acquisition that have long ago died out – for instance through the human striving for change or through tourism – then they can easily be revived. In the shape of books and other writings the recipes for construction and behaviour have long ago left the organic bodies. If they are needed, they are – provided that not all the records were violently destroyed – again available.

For organisms the *replacement* of lost parts creates a far bigger organisational problem. First there have to be control-reports about possible losses to those vehicles of effect that are qualified for the restoration. Secondly, it has to be considered that the function of constructing organs does not necessarily have to be identical to the repairing or the restoration of organs. The general situation during embryonic development is quite a different one than that of restorations. *As for the latter, much can be achieved through regulated circuits but not by any means everything*.

First of all, an appropriate wound occlusion is necessary with injuries so that no body liquids are lost or the left open for rapacious intruders (endo-parasites). The coagulation of the blood and all units that cause it, for example, belong to that functional circle. Then parts that are damaged or have become functionless have to be broken down, repelled or eliminated in some other way – a task which in the original constitution programme is at best available for the breakdown of aid structures. Finally, newly built organs have to connect with the already existing systems of co-ordination, supply and control: another difficult problem.

Here, too, it is still not clear how all those outputs are produced inside the bodies of plants and animals. In any case, there are special functional units necessary for that which are partly unknown to us. Also, all costs and additional matchings caused by them are a necessary adaptation to the fourth "inner front". They also belong to the category "preservation of the effects" regarding their functions and balances.

With plants and animals "undifferentiated" cells play an important role for that. They are, as it were, universal constituents which can transform themselves into everything that is needed and that has to be replaced, they can "re-differentiate" themselves. With human acquisition structures something similar is achieved through standardisation. Lost parts can be replaced more easily thereby. Today, if possible, machines are constructed in such a way that all parts can be exchanged as easily as possible (principle of modular systems). The VW is an example.

Inside cells – this has only been discovered recently – processes of regeneration even take place on the recipe-threads (DNA-molecules)[4]. Even here it is assumed that there is a mechanism which is specifically responsible and there necessarily have to be control-reports for it, too. With humans, as it were, all medicine (doctors, medicine, hospitals, etc.) has become a common organ of control and restoration. In all those units the function of the preservation has left the genetic body and is performed by artificial organs. Through transplants which have become possible today even the total renewal of genetically built functional units is practicable. Just as is the case with all artificial functional units also the natural ones are replaced by others built completely somewhere else.

With animals that metamorphose it has to be considered that each of their shapes requires correspondingly different units of attending and restoration. With the injuries of a tadpole the processes of healing and of regeneration have to be different to the ones for the succeeding frog. Parasites take on about four or five different shapes one after another. For each of them individual blueprints and functional units are necessary for the "preservation of the effects".

If parts are destroyed by intruding robbers (micro-organisms), by disease or age, organisms are often not able to repel them. They are rather encapsulated so that they cannot harm the healthy sections anymore. This also needs – just as the taking over of functions by other organs – appropriate mechanisms as a prerequisite.

Another problem which is easily overlooked is that each attending unit has itself to be attended to. Functionally, here the cat bites its own tail, as it were. Thus with all organisms the functional units of the energy supply have themselves to be supplied with energy. And those dealing with rubbish removal most of the time also produce waste products. *These problems are not solved automatically*. Cleaning units themselves have often to be cleaned, controlling units have themselves be controlled, regenerating ones themselves have to compensate for damage.

Everybody knows that with many types of plants a new plant can be built from a bulb – that is, a small part. There is a similarity to some animals, If the head and the tail of flatworms (planaries) are cut off, the, the middle part regenerates both and gradually a body of the same shape, only smaller, is built. With the germ of the sea urchin after the fourth step of the division still every one of the sixteen daughter-cells that have developed is "totipotent". If such a cell is removed from the others, then it is able to build a whole –only correspondingly smaller – sea urchin.

According to our habitual way of thinking we consider the development of an organism as its "beginning" and the eventually finished body as its "consequence". The energon theory, however, forces us to view that connection in an exactly opposite way. For energy surpluses are necessary for every reproduction – the obtaining of them thus *necessarily* constitutes the beginning. The answer to the old riddle: "Which came first – the chicken or the egg?" here gets its clear answer: the hen. In the endless chain-process which goes back to the first molecular structures that were able to acquire and to duplicate themselves those that obtained surpluses of free energy or that influenced free energy (use of outside energy) were necessarily at the beginning.

Seen from that point of view reproduction is nothing other than a special kind of regeneration. A highly specialised vehicle of effect achieves that function – namely the germ cell.

In order to see the breeding-process in the proper light it has to be differentiated markedly from the sexual copulation that is often related to it. There are two completely different functions that we are dealing with here – they only appear combined in the sense of a useful combination.

Comments:

[1] Also the question of determining the size of the payment here does not arrange itself. Humans are not as unpretentious as the cells of a multi-cellular organism. For every employee the business is the source of acquisition which is tapped by him/her in the best possible way. This matching causes not inconsiderable costs for the business.

[2] In larger businesses in Japan the executives (from the factory manager to the president) are bound for life through the special facility of the permanent position (chushin-koyo). The business commits itself to take care of them while they commit themselves to not leave the business. Their incomes – even with the same work – is raised with the duration of belonging to the company. Thus the "fluctuation" – which in the West amounts to a third of the workforce a year – is significantly reduced. In the united States the fluctuation is seen as a positive factor, even a basical pre-requisite for the productivity of the business. In Japan, however, the "immobilisation of the workforce" and the resulting by far stronger sense of community attained considerable successes. (Cf. J.- J. Servan-Schreiber, "Die amerikanische Herausforderung", Hamburg, P. 284f.)

[3] With a tomcat starved to death it was established that he lost 97% of his fat, 54% of his liver, 31% of his muscles and only 3% of his brain, spinal chord and heart. Those and similar observations have shown that there are not only distribution-plans for periods of need but that there are also appropriate blueprints and steerings for a break down should the need arise.

[4] "Scientific American", 1967, Volume 2, p. 36.

V

SEX AND RESEARCH

What is it, tell me,
what humans call love?
O child,
both the sweetest and the
most bitter.
(Euripides, "Hippolytos", 428 v. Chr.)

In the last recorded year the costs for
research and development per capita
of the population in the United States
were 94 dollars compared to 25 dollars
per capita in Europe.
(J.-J. Servan-Schreiber, 1967)

1

Authors who want to achieve sales for their books that are as high as possible are not mistaken if they go into the subject of "sex" extensively. We, too, now turn to that subject. Whether interest in this book is increased thereby is an open question. For the quintessence of what the energon theory has to say concerning that topic is: sex and research are closely related and have to be considered comparatively. Functionally they play the same roles.

Up to this point we have been dealing mainly with energon individuals. We asked: how do they have to be constituted? Which functional units do they need? What makes them competitive?

If energons were isolated phenomena – and not vehicles of an immense developmental stream which is continued inside them *and only them* – then we would almost be at the end of our considerations. We then would know that with every energon the central structure is determined through the sources of energy and substances. Further functional units are needed in order to ward off disturbing factors and to use favourable ones. Additionally we also find – as requirements of the inner organisation – those of bonding, co-ordination, matching and preservation. According to that terminological system the structures of all energons are comprehensible and comparable to each other. That system constitutes not only one among many other possible ones but is relevant in that it describes the fundamental structure of competitiveness and thus the actual basis for the existence of these structures.

Contrastingly, if we consider energons not as individuals but as vehicles of life-development, as a prerequisite and the sole possibility for the continuing flow of that process, then the situation becomes a different one. It then becomes apparent that more demands are made on their spatial-temporal structure. They have to produce still further outputs and also have to have further very essential functional units at their disposal.

Not infrequently the process of life has been compared to fire and in fact, there is a certain similarity, though not just concerning one aspect: both processes need free energy and use it up.

However, the peculiarity of life processes consists in the fact that they manifest themselves within spatial-temporal structures which have on average active balances of free energy. Thus, while fire merely consumes free energy, the life process is continued within material structures which supply themselves with the energy needed for the continuous flow of that.

The very first such structures – the very first energons as we call them – thus had to have two basic abilities.First, in a suitable environment they had to exert effects on their surroundings so that their potentials of free energy were raised. Secondly, they had to be constituted in such a way that the raising of the potential resulted in a growth of their structures. They had to be successful in obtaining appropriate substances – so that their structures were extended.

On the basis of those two abilities, however, the life process was still not really ready to unfold itself. It is true that such energons – similar to crystals – could develop in an appropriate environment and also grow correspondingly. Yet, if the environmental conditions became unfavourable, they fell apart again. In order to attain an improvement – a "higher stage of development" – two further qualities, two further abilities were necessary. Life development had – technically speaking – still to take two more "hurdles", still had to surmount two functional barriers.

Until today it has hardly – or at least not sufficiently – been pointed out that those two further abilities virtually excluded each other. The surmounting of the first "barrier" practically meant that the surmounting of the second one became almost impossible. From the very beginning onwards life development was slowed down by serious *functional conflicts*.

We will now consider them in more detail.

2

The first "barrier" which had to be surmounted was the necessity to obtain facilities for reproduction.

If an energon only possessed the ability to extend itself continually, in the case of death life development came to an end. If, on the contrary, it was able to split itself up into umpteen parts, the chance that one of those units could continue its autocatalytic activity became considerably higher. Even if the process of life in 99 such units came to an end and dried up – it continued in the hundredth.

In the most simple case such a division was possible through mere tearing apart. Fire, too, is able to breed in that way. Contrastingly, if we consider the most simple energons still existing today, then we discover that their breeding is already connected to quite complicated functional units. The mere falling apart of the energon is by no means sufficient. Their total structures are already so complicated that they have to have special units at their disposal which can newly construct the whole energon – which can regenerate it.

At this point I come back to the explanations of the previous chapter: reproduction constitutes a complete regeneration. Thus, in addition to all other functional units all higher developed energons also have to possess ones that can achieve total construction. What do those functional units look like? How do they have to be constituted?

If we follow that question theoretically, we will find that for the function "reproduction" two very distinct groups of rather complicated functional units are necessary. The first prerequisite for every process of construction – in whatever way it is carried out in the individual case – is a structural blueprint, a plan of the total structure where every detail of the energon is laid down. If such a plan is missing, then even the best steering cannot build the energon. The second prerequisite is: the energon also has to possess functional units which can duplicate those blueprints exactly. For with every propagation and with every duplication certainly every new energon also has to be given the complete structural blueprint in order then to pass it on to its descendants. Thus, whatever the blueprint may look like – it has to be divided exactly: this forms the second problem. The more differentiated, the more complex an energon is, the more complicated and the more complex the blueprint required for its construction becomes – and thereby also the task of dividing it flawlessly becomes the more complicated

How that duplication mechanism was brought forth with the first energons – and what intermediate developmental stages it had – will probably never be fully reconstructed. Already with unicellular organisms we can make out that mechanism in a high degree of perfection. The centre of action here – as a rule – is the "central corpuscle" (centriol) which is a functional unit that first of all divides itself. That results in two centres which move apart and from which pulling structures are built which seize the blueprint threads, which split lengthways, from two sides, and then pull them apart. This process is called "mitosis". From the viewpoint of evolution it has to be underlined that – necessarily – already energons in a very early developmental stage must have attained that achievement. It was the precondition for higher development.

It is no less difficult to surmount the second "barrier". The mechanism of dividing blueprints makes sure that all the qualities of an energon are transmitted to its descendants, hence that no progress that has been made in the course of evolution gets lost. Yet, how did such progresses come about?

That brings us to the crucial point: progress and change can only be achieved if the structural blueprints *change*. If the descendants are always exact images of the energons that produced them, higher development is excluded.

This is the difficult functional conflict that constituted a burden for the energons – as the vehicles of development of life – from the very beginning onwards. For their propagation they needed facilities which passed on their qualities exactly to the descendants. Only thus could progress be maintained. On the other hand every further development, every progress was virtually excluded by such faultless duplication. Thus, two completely contrary demands were made on the genetic blueprint – the centre of every mechanism of propagation: on the one hand a faultless division – otherwise the progress would have been lost – and on the other hand a change – otherwise no progress would have been made.

Today, when we find almost the whole globe populated with plants and animals and we ourselves exist, this is conclusive evidence that there was a solution to that functional conflict. The "life-stream" – as I would like to carry on calling the life-development – does not dry up. It is manifested in always new, increasingly productive and higher developed energons. How did that happen?

How could the genetic blueprint satisfy those completely opposing demands – *not* to change and *still* change after all?

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3

With that we come to the hermaphroditism.

In principle it is an extremely clumsy process. Despite all perfection sometimes there happen to be mistakes in the division of the genetic blueprint – so-called *mutations*. In a vast majority of cases they lead to a reduction of productivity – but sometimes they can also cause an improvement. The probability that the latter will happen is increased considerably if the genetic blueprints of *different* individuals merge. This then results in constantly new combinations of the deviations occurring here and there. The "selection-material" – as the biologist calls it – gets bigger. While one or another alteration does not create an advantage for itself, in combination with others this can well lead to innovations which are favourable for the balance.

With that, the basic principle of hermaphroditism is already depicted. Some researchers thought that with cell fusions it was possible to compensate for mistakes in the genetic blueprint, thus, that that was the function of those processes. Genetic demands have shown indisputably, this, however, is – as a rule – not actually what happens nor is it necessary. The divisions of the genetic blueprint – with cell divisions – take place very precisely. The probability of mutation is only 1:10.000 to 1:100.000. If in the course of the sexual process different germ cells merge, this does not have the purpose of correcting mistakes but instead of combining changes that have occurred[1].

Summarised in five points this relationship, which is so alien and so far away from the conventional way of thinking, appears as follows:

- *First:* life-development could always only be continued in structures that have active balances. In cases where it became passive, it dried up (went out like fire that does not find any "nourishment" anymore).
- *Second:* the structures with active balances (which we call "energons") had to acquire the ability to propagate themselves – otherwise a further development of that process was not possible.
- *Third:* with such propagation all the features of the parent have to be transmitted to the descendants – otherwise the progress achieved would be lost again.
- *Fourth:* a prerequisite of every improvement – every higher development of energons – however, was changes of the genetic blueprints.
- *Fifth:* there was one solution to that almost insoluble functional conflict: the division of the genetic blueprints was carried out with the highest precision. The still occasionally occurring alterations were combined through a special process. Thus higher development remains dependent on alterations. However, with their constantly new combinations the chance that improvements are achieved is considerably increased. Thus the tempo of higher development is significantly raised.

Thus, it is important to differentiate strictly between the function of propagation and the function of sexual uniting. They do mostly occur together – necessarily – but serve "completely opposing interests". It is the task of reproduction to bring about an exact reduplication of what has already been achieved. The task of sexual merging is – "copulation" – to cause an alteration of what has already been achieved.

Let us consider the consequences of both functions in more detail. First, those of reproduction.

4

Already with unicellular organisms that function can credit itself with quite costly and expensive facilities. In the first place these are functional units – whether we know them today or not – which cause cell division, thus the doubling of all organs, including the structural blueprints. Those facilities may almost in any case be more complex than those of for acquiring energy and substances or repelling enemies. They create considerable burdens for individuals and require additional functional units as regards bonding, co-ordination, matching and preservation.

With multi-cellular organisms the same reproduction mechanism is maintained. With minor exceptions, they do not divide themselves as a whole. Through an appropriately steered series of divisions and differentiations the germ cell constructs a bigger body of acquisition, however, some cells remain undifferentiated and totipotent ("germ-track"). That means that they keep the same abilities as the germ cell: the ability of total regulation. If their energon dies or they are expelled by it they can construct a new energon which is exactly the same.

That process is opposed by considerable difficulties, however. For every energon in the process of its construction is not yet fully "fit for use" and thus correspondingly defenceless. The germ cells and the developmental stages growing out of them are a welcome prey for predator energons.

Here we gain an interesting insight. The energons – as vehicles of life-development – become a brake in that process. Some of them do support their own development – and with that the flow of life – by eating the germs of others, on the other hand they disturb the reproduction of the affected energons and hence hinder their flow of life. We will come back to these and similar conflicts of interests in the next chapter.

There are two possibilities to protect the germs and the processes of their construction. The first possibility is that the germ cell together with the amount of energy and substances needed for construction are covered with a hard shield and then left to their destinies. With plants this is called a "seed" and with animals it is called "egg". With plants, from that wrapping there shoots the young seedling – if the seed is put into suitable environmental conditions. With animals that process of development takes place inside them and once the new energon is capable of acquisition it hatches out, that is it leaves the protecting wrapping.

The other possibility is that the reproducing energon carries out the nourishing of the germ *directly* and thus takes over the function of protection. In that case the descendant grows inside the host body – exactly like an organ. With animals in particular where that type of propagation is widespread this builds a considerable burden for the propagating energon. Only when the germ has itself become capable of acquisition and able to defend itself ("viable") is it disposed of. Also for that process of "birth" special facilities (especially an appropriate opening and co-ordination blueprints for processes inside the body) are necessary.

With higher animals we find another reproduction technique. There, too, the "young" matures inside the body, if expelled, however, it is not yet fully capable of acquisition and defence. Its further development takes places separately from the parent, yet under its protection and care. This we call the "care of the brood". For that type of reproduction – which is practised by most birds and mammals – innate behavioural patterns are necessary in addition to the other reproduction mechanisms.

A rationalisation of those costly processes is only found in a small number of animals, especially with insects building states. With termites, ants and bees not every individual is still burdened with reproduction – *which does not even serve the individual*. The "queen" takes over the business. That is an effective combining of functions. In the framework of the energon "insect state" that specialised individual becomes an organ (vehicle of effect) of reproduction. For the balance of the community this means a significant saving of energy.

With humans we still find the individuals burdened with the problem of reproduction. Yet, an important transition took place which passed the further function of construction on to a *multi-cellular* organ, the central nervous system. With the bigger energons built by us, where we ourselves are only the "germ cells" and the steering centres, the problem of the blueprint-threads constantly getting longer, entailing increasingly difficult division, does not exist. The blueprints that are laid down in the central nervous system can be duplicated much more easily: through language and writing they can be transmitted from one brain to another directly. Finally, they can also leave the body in the shape of artificial organs. Their duplication then becomes an almost banal problem.

If for instance the structural blueprints for an enterprise should be duplicated, it suffices to copy all instructions and drawings – thus all "plans". From every table of instructions and from all specialist literature umpteen numbers of cheap "copies" can be produced fast with the printing process. Only seen from that perspective it becomes clear what the first part of the evolution's burden was like and how much easier the same function can now be managed.

Inside human communities, specialist literature – science per se – became an aid organ of the construction of blueprints (which today is already available for everybody) .The organised human being draws from that enormous information reservoir via the common organs "school" and "university" and by that learns the art of building blueprints. It is up to him/her to decide what structures of acquisition he builds – which types of energon he reproduces.

Energons are not forced anymore to spend their surpluses on the reproduction of the own species – but instead a completely different mechanism guarantees that the propagation of energons is continued. It is the human "striving for luxury" – the entirety of all inherent and acquired drives which urge humans to the striving for "convenience" in the most ample sense of the term. The units that trigger off that behaviour – we will come back to them later on – make humans especially keen on the construction of energons. They build professional bodies and businesses. Those energons that have not coalesced other reproduce themselves – without the contribution of a relative belonging to the species. A new tailor's company or a new insurance company can come into existence without the smallest contribution of another tailor's company or another insurance company. Now the surpluses can be spent in places where the best possibilities of acquisition prevail – a change which is tremendously favourable for the development of energons.

What is more, the human striving for luxury supports the development of energons – and thus of the stream of life – also in another respect. The individual human being does not need to spend the surpluses at his disposal for the construction of energons at all – nevertheless they are of benefit. The jeweller who spends his money in Mallorca contributes to the flourishing of the hotel-energons established there. The attorney who uses his money for belles-lettres or for prostitutes also becomes a source of energy for other energons. Even the playboy who transforms his parents' fortune into racing cars which he then wrecks supports the development of energons: all professional entities and business organisations who were involved in the construction of those toys have cause to be grateful.

Surveying this course of development entails difficult aspects of the energon theory, i.e. those that run most counter to the habitual way of thinking. To summarise briefly:

- *First:* with unicellular organisms the genetic blueprint is the most important functional unit for reproduction. In addition there are further advanced facilities – especially those that are needed for the faultless duplication of those blueprints.
- *Second:* with multi-cellular organisms this reproduction mechanism is maintained. As the blueprint-threads grow increasingly extensive their division becomes an increasingly difficult technical problem. If with every cell division that leads to the human body always the complete blueprint responsible for our construction has to divide itself in every individual chromosome, this is – from a technical point of view – atrocious. It is perhaps the most costly multi-track process in which the development of energons ever became involved.
- *Third:* through the central nervous system taking over this further function of construction, that functional load was cast off. Non-coalesced energons built by humans do not have to reproduce themselves in accordance with their own species any more. In this second stage of evolution surpluses can flow into the construction of those types of energons that have the best possibilities of acquisition. Principally it is up to the "germ cell" human being which type of energon he constructs – and hence *reproduces*.
- *Fourth:* inside organised communities, apart from the oral tradition literature became the auxiliary organ of reproduction for energons. The common organs "schools" and "universities" became protectors, stewards and transmitters of the experiences gained – became protectors, stewards and transmitters of the *energons' structural blueprints*. 225
- *Fifth:* the human striving for convenience (in the broadest sense of the term) became the driving force for reproduction. Such striving supports the construction and growth of energons in a twofold way. On the one hand, it leads humans to create bodies of acquisition – in order to be able to afford convenience. On the other hand it leads humans to acquire the achievements of others – by which they become the acquisition sources of all those energons whose services or work results they buy.

The course of development of the second barrier-problem was no less complicated: that of the *merging of blueprints*. That function was another prerequisite for evolution.

5

The original mechanism of "improvement" worked on its own, so to speak. Without special functional units, without its own contribution. Mistakes – mutations – possibly became advantages.

Mutations are sometimes caused from the outside (heat-effects, cosmic radiation, etc.) or they result from mistakes in the process of division. In any case, they are *lacking a sense of direction*. They usually reduce the power of acquisition and competition of the respective energon (its productivity) but can also increase it. The latter then is, as it were, destiny's "gift" which some energons and their descendants are lucky to enjoy – and which are opposed by a far higher number of "gifts" that aggravate the balances of the energons that receive them and which then mostly do not even get as far as reproduction.

The second mechanism that supported the higher development of organisms, however, was an immensely more costly one. It is the facility "hermaphroditism". Already with unicellular organisms it becomes apparent what kind of burdens sexual processes constitute for individuals.

Reduced to the simplest formula the second requirement is the following: the genetic blueprints do not only have to be able to divide themselves – they also have to be capable of the opposite: to merge with the genetic blueprint of another individual[2]. One has to consider what that means! The endless thread molecules have to be put together with other similarly long thread molecules so that each of the thousands and hundred thousands or millions of vehicles of commands (genes) can merge exactly with the analogous part of the other thread. Anybody who has to disentangle a ball of wool or a fishing line may be aware of the difficulty which that technical problem involves.

Already with a bacterium as simple as the coli the blueprint threads are a thousand times longer than its diameter. Here the energons were confronted with an extraordinary difficulty.

Special facilities (functional units) first have to make sure that uni-cellular organisms of the same species search for each other, recognise each other and commence the process of uniting. Then the blueprint threads have to find their appropriate partners and the uniting of the cells has to take place in a way that does not extinguish their productivity but, rather, provides the means for a process of division.

With multi-cellular organisms the problem was even bigger. The germ cells nestling inside their bodies had to be merged with those of other individuals. That resulted in the necessity for appropriate openings and insertion organs. In water it might be sufficient if the partners excreted their sexual products together and thus caused them to combine. This is what happens with many types of fish. This, however, was not possible on land as germ cells dry up when they are exposed to air. Here the sexual cells have to be inserted into the body of the partner. The same is also true for those water animals whose descendants grow inside the body of a parent.

The subdivision into "male" and "female" which is so self-evident for us is a rationalisation of that process. *One* kind of germ cell takes over the task of searching for the partner: the "male" sperm. The *other* kind takes over the task of the succeeding energon construction: the "female" egg cells that are equipped with appropriate reserves of energy and substances.

With unicellular organisms that distinction does not always exist and among multi-cellular organisms there are many that are both male and female. With most of the higher animals, however, that division of labour became distinct and led to further differentiation. The female animal is specialised in the bringing forth of descendants, the male animal is specialised in the search for the female and the protection of the "family".

The sexual partners have to recognise each other by distinctive marks. The normal tendencies, i.e. hostility to competitors for food, at times have – for the purpose of the copulation process – to become the opposite. Appropriate steering (behavioural patterns, drives) has to impel them to an extremely intimate contact. Correspondingly positive feelings have to accompany the successful performance of the copulation process (or negative ones with the non-performance) – otherwise there is no point in it taking place.

What enormous expenditures – from the viewpoint of the balance – those processes constitute is shown by all kinds of animals which migrate, move to areas with higher dangers or exhaust themselves in fights with rivals and mating ceremonies for the business of copulation.

With land plants growing in the ground, reaching each other became a particular problem for the sexual partners. Here – as has already been discussed – outside energy is utilised. In the fist place it is the wind. Some of them succeeded in inducing insects to transport male sexual cells to the female through their specifically shaped sexual organs, the "blooms".

All parasites have to face even bigger problems due to the necessity of combining germ cells. As has already been explained, often the only possibility for them to attain their actual sources of acquisition – inside the bodies of their hosts – are through complicated detours and through several changes of shape. What makes it even more complicated is the fact that – at least occasionally –the uniting with organisms belonging to the same species also has to be included in those cycles.

Enough has been written about the enormous variety of facilities and types of behaviour which ensure the sexual uniting with the individual kinds of plants and animals. However, not enough stress has been put on the function which makes all that expenditure necessary. The important thing to be mentioned here is that the genetic opportunities that occur by chance have to be mixed so that the chance of changes improving acquisition is increased.

The rather clumsy mechanism’s effectiveness is improved, if among the individuals of a species the more productive ones have preference in mating. This is the biological meaning of fights between rivals. Individuals who seek that process actively (mostly the "male") are by that more likely to attain the partner (the "female") if they are stronger and more capable.

With higher animals another improvement we find is the active recognition of the partner’s qualities (strength and integration). Only distinct marks then trigger the willingness for mating. This also accelerates and supports the slow and ponderous process of natural selection.

According to the energon theory the outer multiplicity of those appearances is secondary. What is primarily important is the fact that here we have altogether an enormous expenditure, an eminent energetic burden which we almost without exception find with every type of organism.

With some plants and animals (especially parasites) there also exist "asexual" processes of reproduction (budding, parthenogenesis). Here reproduction is not preceded by a merging.

Yet, also with such types, at least at times, again there is sexual union occasionally. This compels the following conclusion: organisms could not do without the process of the copulation, could not attain further development and an increase of their competitiveness without it[3].

More precisely: those species which had that function at their disposal were without exception advantaged. If others came into being without possessing appropriate facilities for the process of mating, they – with rare exceptions – fell by the wayside.

That consideration gives us another argument in answering the dispute whether there was a supernatural force at work which led the organisms to a higher order or not.

6

The phenomenon of hermaphroditism supplies evidence, which can even be expressed in figures, that no such force ("entelechy") directly intervened in the process of evolution. As far as I know this has not been pointed out before.

If such a force – as the "vitalists" assume – had steered evolution, then the costly and ponderous mechanism of improvement would have been superfluous. There would have been no need for hermaphroditism to develop or it would have been degenerated a long time ago. The guiding force would have led the organisms far more directly and more elegantly to 228
improvements[4].

One may not put aside that argument lightly. Throughout evolution it is shown clearly that costly structures which are not required degenerate. If animals changed to a mode of living where the visual organs became superfluous, they degenerated. If they changed to a sedentary way of life, then the organs of locomotion degenerated. If plants changed to a parasitic way of life, their leaves degenerated. If organisms living in water changed to living on land, then all functional units serving their life in water degenerated. In the competition energons with functionless parts that burden them and which they still have to nourish and attend to cannot assert themselves. They become disadvantaged in comparison to others which get rid of such burdens and are ousted. Thus, in the end, it is those which who manage the change successfully which remain.

It can be determined measurably what percentage of functionless parts is still tolerable for organisms, that is what is still below the level which burdens competitiveness. The costs of hermaphroditism certainly lie considerably over that mark – for there are hundreds of provable cases where far less costly structures degenerated.

With regard to that fact it can practically be excluded that the functional circle "hermaphroditism" that is so costly and which actually burdens every type of animal’s and plant’s balances would have arrived at such a formation and at such a strong unfolding, *had itnot been dictated by an urgent necessity*. Yet, all of the results of research we have today clearly point to the fact that this process does not provide any other advantage for the organisms than the following one: to obtain changes, new combinations and hence – possibly – improvements.

The final word has not been spoken regarding whether that mechanism plus mutations and natural selection was sufficient to guarantee the higher development of organisms. Today the majority of biologists share that opinion, yet there are also arguments against it – mainly the relatively "short" duration of evolution (only about 3 billion years). Therefore it is not impossible – in my opinion it is even probable – that yet another connection of effects that favours improvements will be discovered.

Yet, also such an additional mechanism has to be – this can already be said now – constituted in a way that it cannot do without the faculty of "hermaphroditism". The enormous expenditure on that function with all organisms speaks an all too clear language.

7

That burden was disposed of at the developmental stage "human being". It is true that humans – we will come back to this soon – are particularly burdened by sex and its consequences, *but the energons built by them do not need those processes anymore*. We do not see a business copulating with another one in delight and orgasm. Yet, all bodies of acquisition built by humans show considerably faster changes of the species and considerably faster higher development.

The function "improvement of the blueprints" was also taken over by the multi-cellular unit of the central nervous system at that developmental stage. Humans devise new structural blueprints and behavioural patterns on their inner projection screen of "fantasy" and can even examine them for their suitability. The individual parts of the energons built by humans are not coalesced any more, so humans can change or exchange them much more easily. The result – as a further consequence – is a considerably greater ability for regulation. The high correspondence between the individuals of one "species" with animals and plants is now lost, is not necessary any more and also not supportive. Similar forms of acquisition still dictate similar structures but the individual energon more and more becomes an individual phenomenon. The value structure which is necessary for *all of them* remains decisive – in the outer appearance we find a growing number of differences, however.

In the course of development the function "improvement of blueprints" was separated from the individual germ cell "human being". In enterprises we find bigger and even more specialised units entrusted with that task: the departments of research (including those of the market research). Here a number of people combine their abilities of devising plans and are supported by a growing number of artificial functional units: for instance by statistics and computers. *These* functional units do not have anything in common with the functional units and processes of hermaphroditism superficially – yet, they do exert the same function.

Within the even bigger states that process was continued. Here the functional units of the "improvement of blueprints" also leave the bodies of the individual professional structures and businesses. In the shape of research that is subsidised by the state that function is taken over by common organs, whose results are then generally accessible. Eventually those common organs also detach themselves from state bonds – unite with each other – so that today research can already be called a "techno-structure" of the evolutionary progress. Like a spider's legs they spread over the whole globe and become the central evolutionary organ as such.

According to our habitual way of thinking sex and research are completely different phenomena: it seems grotesque to equate the act of love, lipstick and prostitutes functionally with seminars, chairs and scientific periodicals. Yet, here it is also the case that in the course of evolutionary development one function was passed on to another functional unit.

Despite the outer difference – as can be expected – there are also structural parallels to be found here.

The first one is: with all organisms we find the functions of improvement and reproduction closely coupled to each other – necessarily. For the merging of blueprints only has a "value" for evolution, if it is followed by a process of reproduction. Although with human acquisition structures the whole situation is different there are also similar couplings here. Accordingly, the common organs "universities" are not only functional units of the *reproduction* of blueprints but also such of *the improvement* of blueprints.

A second parallel is even more informative: the fundamental function of hermaphroditism is the merging of different blueprints. Very similar mergings also occur in the second stage of evolution – only they appear in a completely different shape.

Every specialist debate is a merging of blueprints. Blueprints are – via language – transmitted to another energon and are there "mixed" with the ones already there – more precisely: matched with them.

If a researcher reads a scientific work, the same process takes place. The author's blueprints that are written down come into contact with the ones that are in the brain of the reader. Also, all study thus leads to a merging of blueprints: to new combinations.

With scientific congresses – for instance with symposia – but also with every discussion in businesses or states the blueprints of *numbers* of people are matched with each other. In that case – this is a novelty of evolution – more than two partners are involved in such a uniting of blueprints.

Certain philosophers of history considered the merging of different nations as the starting point for cycles of cultural development. This is also a merging of blueprints of energons. This also brought forth new combinations, new developments – both in the area of acquisition and of luxury.

It was in the transitional phase of energon development, at the developmental stage "human being" that sexuality lost its meaning. At the same time though – like a final flaring up – particularly with humans it attained a power that was bigger than in any other organism. While most animals only mate at certain times – which is also a form of rationalisation – with humans the drive that urges the uniting is active for the whole year, even almost for life.

Why?

At one time it was considered as a hyper-function (hypertrophy) similar to that found in domestic animals. By shielding them from their natural enemies we work against natural selection. The consequence of that – as is known today – is that some drives are intensified (for instance the eating drive and the sexuality drive). Humans also shielded themselves from their natural enemies through technological progress – thus Lorenz spoke of a "self-domestication" of humans. According to our opinions today, however, hypertrophying is not merely a negative side-effect of our being shielded against natural selection but has a highly positive significance.

With the particularly long "care of the brood" which the human child needs in order to mature, parental protection was particularly important with primeval humans. It is assumed that sexuality then became a means to bind men and women more firmly to each

other. The mechanism which originally only served to improve acquisition also became secondarily an aid for the care of the brood – that is reproduction.

As that drive provides us with particularly strong feelings of desire and joy – that is "convenience" in the broadest sense of the term – it furthermore became a decisive impulse in the human striving for progress. Many of the acquisition structures that have been constructed in the course of history – directly or indirectly – owe their construction, their flourishing to that driving force.

Our sense of beauty, which also derives from that functional circle, not only guides us in the choice of a partner but we also prefer those artificial organs to which the receptive mechanism in our brains especially responds to: organs which we find "beautiful". From the viewpoint of the energon theory this is very natural. For all those units that we create artificially are nothing more than extensions of the human body. If we thus draw up a similar assessment as for the body itself, this is a fully organic development.

Thus, in the first part of evolution the clumsy mechanism of improvement called "hermaphroditism" was at work. In the second part it was replaced by the functional units "intelligence" and "research". At the transitional stage – with the germ cell "human being" – "sex" attained a special place. Even the completely neutral and sexless bodies of acquisition which we create are influenced by that drive. Not few of them owe their existences to that relic. What is more, it imposes a standard of value on their form which not infrequently collides with the economic standard.

It certainly goes without saying that also all functional units relating to "reproduction" and "improvement" have to produce their effects as cheaply, precisely and quickly as possible. However, if we ask how those values have to be fitted into the overall formula of competitiveness – we come across a difficulty.

Comments:

[1] If I do not write of combining mistakes" in this context, which would correspond to the opinions of most biologists today, then this is because it is still open whether there any inheritance of acquired qualities – according to Lamarck and Darwin – takes place or not. Then the connection of the effects would be the following: the genetic alteration would not merely be the consequence of mistakes that occur, of mutations. It would rather be the case that individual adaptations (at least as they are possible for higher organisms because of their ability to regulate themselves) become hereditary. In that case, during their lifetime the individual alterations would produce effects on the genetic blueprint and alter it. The process of the division here would already be carried out with a changed genetic blueprint.
[2] In the beginning of the development of energons the genetic blueprints may still have been so simple as to make the merging of different types possible. In the course of differentiation it happened that only very similar ones – belonging to the same species – could be united.
[3] With a few rotifers and nematodes no sexual processes have been proven up to today. Here the function might have degenerated to a secondary one. Such species can continue to exist in constant living conditions. However, the possibility of higher development and of phylogenetic adaptation is reduced in that branch of the life development.
[4] This is also no argument against the existence of a higher force that constitutes the basis of all phenomena – of "God", that is. It is only the intention here to provide evidence that such a force – in whatever way we may imagine it – does not intervene in the process of evolution in a direct and shaping way but that this process is left to its own devices. The fundamental laws to which it is subjected – all laws of energy and of mass known to us – naturally again bring up the question: what is their origin or even their meaning? How were they achieved? What ultimately is manifested in them, unknown to us?

VI

THE LIFE FLOW

Who knows whether living isn’t
dying and dying isn’t living?
Plato (427-348 b.C.)

If we do not dream, however, but instead
investigate, the history of life does not
appear to be an accumulation of numbers,
but it seems to be subject to great laws.
Ludwig v. Bertalanffy (1949)

1

The two barriers against which the life process inevitably had to fight from the beginning led to conflicting values making their mark on evolution. Many of our main problems have their roots there and date from that time.

From my descriptions so far it may seem as if each energon had *one* overall value, representing its competitiveness and as if we were seeking to measure it. This is because I did not want to further complicate the description, already complex enough, from the start. The overlaps of the single levels of values are in fact much more complicated. Each energon has not only *one* competitive value but at least three, the human body of acquisition even have more.

Let’s take a closer look at the two barriers.

Figure 31 is a diagram of the first barrier. The energons A and B – as is to be expected – are equally capable of absorbing energy and differ basically in one characteristic only. Energon B has the ability to reproduce itself due to the additional effective unit x, whereas energon A does not have this ability.

The two energons meet with a functional obstacle (barrier W) which makes it impossible for them to survive as individuals. Barrier W may stand for unfavourable environmental conditions such as disadvantageous conditions for acquisition or natural forces. Or it may be an obstacle occurring in the interior of the energon, e.g. the limited duration of life due to the process of "ageing". A "barrier" thus does not necessarily need to be a visible, tangible obstacle but it may be a factor which at a given point in space or time makes an on average active energy balance impossible.

In this case undoubtedly energon B has the advantage, though not as individual – which dies too – but as "species". Since the energon produces offspring (in the figure below only two but it may produce as many as it likes) the young have the chance of passing this barrier. Should unfavourable living conditions be the hindrance, then the offspring may lead a better life at a different place. If it is the process of ageing, it can be overcome because the offspring are also capable of reproducing. This ability is thus an advantage for the development of life which is of use to the species but not to the individual.

Thus we have defined the origin of the term "species" as far as the viewpoint of the evolution is concerned. Each *individual* energon is a structure capable of reaching an average active energy balance. The energon species is characterised by the additional ability of "reproduction".

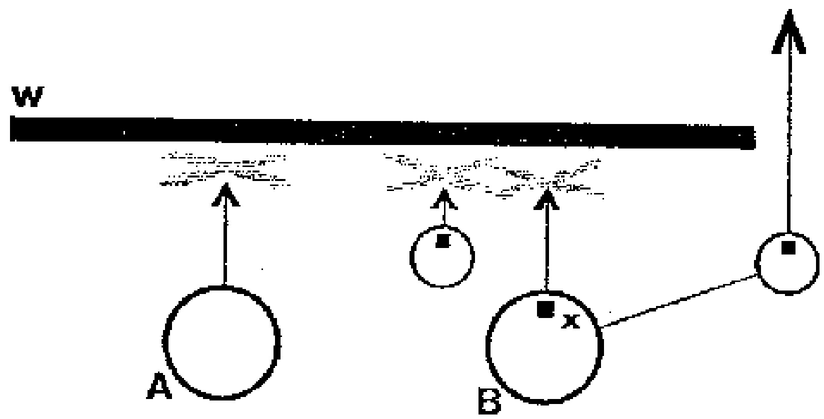

Figure 31: Diagram illustrating the advantage in competitiveness given by the ability to reproduce

The energons A and B meet with an evolutionary obstacle (W). Whereas energon A is not capable of duplicating its structure, energon B is capable of doing so because of the additional effective unit x. Energon A sooner or later dies but energon B has the chance to "survive" in one of its offspring. Further details in the text.

At this stage of development two different sets of values appear. The additional unit – the reproduction mechanism in its entirety – is of no use to the energon individual B (and to each of its offspring), it is even a burden. It does not increase the *individual* competitiveness but even reduces it by causing additional expenditure. In the individual competition – if there was no such barrier – energon A would have the advantage over energon B. Since it does not have this unnecessary expenditure, its balance is better.

All animals and plants which are equipped with reproductive organs bear a kind of burden which is of no use to them but even impairs their competitiveness. The respective species though profits from this expenditure which increases its competitiveness. If we want to define the competitive value of an energon, we first have to decide whether we mean the individual energon or the entire species. For the individual the costs of reproduction are mere debit items[1] whereas for the species this is not the case. In the case of the species adequate credit items (advantages) make up for the debit items. Individual and species also differ concerning the values of precision and speed of reproduction, there different correlations occur.

The differing interests of individual and species (or "genus") were on the mind of quite a few philosophers, for instance Schopenhauer[2]. Also biologists have dealt with these interests-W. Zimmermann for example distinguished between the "individual value" and the "group value".[3] In each case a different "useful value", a different "appropriateness" would arise. Thus different targets are presented for natural selection. In this sense Zimmermann makes a distinction between "individual selection" and "group selection".

What has however been overlooked so far is the existence of another, *third* standard which has always been included in the second.

2

Figure 32 is a diagram of the second barrier. The energon type B which is capable of reproduction meets with an obstacle which makes it impossible for itself as well as for its offspring to survive. This may be the case when energy sources run dry or unfavourable environmental conditions (disorders, predators, competitors) gain so much influence that the structure type basically is no longer able to reach an active energy balance. All individuals of that species will then be doomed to die-the species *becomes extinct*.

Energon C has exactly the same features but is able to produce not only conspecific individuals but also different individuals unrelated to the species due to the additional unit y. In the diagram there are two individuals (D and E): D is also not able to reach an active energy balance while E is able to do so. E thus "avoids" – "overcomes" even this barrier. Due to the different structure of individual E the barrier is no longer an obstacle, E is not affected by it. The new energon type may be capable of tapping new energy and material sources or is better prepared for natural forces. While B and C as well as their conspecific offspring are "keys" which are no longer able to open "locks", E is a different "key" which succeeds in unlocking other "locks".

Let us put it more directly: a new species has developed in this way. This species is viable whereas the species it originates from dies.

The essential ability to produce offspring unrelated to the species (illustrated by the mechanism y in the diagram) is largely based on the function of "mingling blueprints" (copulation, hermaphroditism) in organisms, which we already discussed in the last chapter. All animal and plant species which possess the required organs were thus superior to those which lacked such organs. Let us take a look at the competitiveness of these animals and plants.

It is obvious that the *individual* C is not superior to the *individual* B, both become extinct. C may even die more quickly – namely when the additional unit y constantly causes extra expense (that is because of handicaps or necessary maintenance). But even the *species* C is not superior to the *species* B. None of them may survive in an individual, both become extinct. The species C may even die sooner – when the additional unit y is a burden for the balance of its individuals. On the third level of evaluation, however, energon C is superior to energon B. Even though it does not survive in conspecific offspring, it continues to exist in offspring unrelated to the species.

The life flow which reaches an insurmountable obstacle in B and C flows on in structural type E.

What should we call this third and highest level of evaluation-in order to distinguish it from the terms "individuals" and "species"? I call it "life flow" which is not an ideal term but I can not find a better one. Since we are talking about the interests of the development of life, we could use the term "evolution value". But evolution is a *process* whereas a "value"-as well as individuals and species - should be connected with a spatial structure. The term "life flow" fulfils this requirement. What supports the "life flow", has "life flow value", is "beneficial to the life flow". This may sound complicated but it has the advantage of being unambiguous[4].

All organs and processes of hermaphroditism are – in this terminology –beneficial only to the life flow. They are of no use to the individual, they are a burden to the balance. Whether it is animal or plant species: these organs do not serve the species. After all they cause a change in the species, that is, the life flow continues to exist in differently structured-species. These energons are so to speak "deserters" who change sides.

Seen from this angle it becomes very clear that it is incorrect to look upon reproduction and hermaphroditism as uniform, related features. Reproduction serves the purpose of species formation and species existence. The processes of hermaphroditism however serve the purpose of transformation of the species-and thus overcoming their limitations, in fact the extermination of species.

The seed plants are a good example for the way in which each of the three values for individuals, species and life flow-manifests itself in the energons.

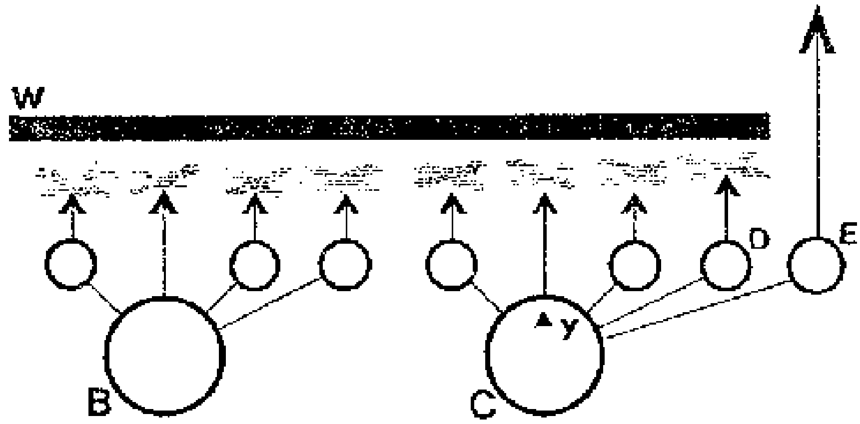

Figure 32: Diagram illustrating the advantage in competition given by non-conspecific reproduction

Energon B and C meet with an evolutionary obstacle (W). B is only capable of conspecific reproduction; this type and all of its offspring die. C however produces conspecific individuals as well as individuals unrelated to the species (D,E) due to the additional effective unit y. C has the chance of surviving in one of its offspring-to carry on the evolutionary process.

What is of use to the individual in this case is only the leaf structure, along with roots, trunks and branches. Those organs which make plants so endearing, that is their flowers and fruits, are a burden to the individual. They are expenditures which have a negative effect on the balance. 237

Adapting the quotation of Goethe, we could say that three souls dwell within a plant. Leaves, roots, trunks and branches are of use to the *individual*. The fruits are reproductive organs -they are of use only to the *species*. And the flowers are organs for hermaphroditism that is for improvement – they are of no use, either to the individual nor the species, only to the *life flow*.

It is the same with animals: everything that serves only the purpose of reproduction is an organ of the species. What serves the sexual process of mingling blueprints is an organ of the life flow.

Necessarily these sexual organs had to be closely linked to the process of reproduction. They had to influence the germ cell and were of no use when copulation was not followed by reproduction. Therefore these organs are closely linked with each other though in terms of function they are miles apart.

In the course of evolution these differences in competitiveness resulted in quite a few cases of *conflicting interests*.

One of these conflicts has already been mentioned. Low production costs are always an advantage for the energon *species* but not for the *individual* energon (Part One, chapter VI, paragraph 6).

An individual animal or plant does not have an advantage in competition even if it takes up only half of the amount of energy for production needed by an otherwise equally matched competitor. What matters exclusively in this personal struggle against opponents is efficiency and resistance – the production costs have no influence on the result of the competition.

For the *species* however low production costs are a great advantage. If the species A is able to produce twice as many offspring as the competing species B while using the same amount of energy, it definitely has the advantage – if the young are totally equal. It then can produce twice as many offspring, using the same amount of surplus energy. Thus the chance that some of the young may find favourable conditions of life and may survive will be twice as good.

All this changes in the case of the human body of acquisition. Here it may happen that low production costs are an advantage in competition also for the individual – namely if the production of the energon is financed by credits which have to be paid back. The less an energon is burdened with such repayments, the better, since it may more quickly gain surpluses and put aside reserves.

Another already mentioned case of conflicting interests provides an even better example of how these values may possibly alter. All animals and plants are forced – by innate blueprints to produce conspecific offspring when they have an appropriate surplus. In reality this implies that they were compelled to produce their own competitors – since no energon other than another member of the same species is directed exactly towards the same type of acquisition.

It was the life flow which imposed these blueprints on the energons. It was able to survive, exist in them only if they possessed reproductive organs. It was a constructive restriction that exclusively conspecific offspring were produced –

there was no other possibility first. With the genetic blueprints being highly complex, the division as such turned out to be the main problem – it was virtually impossible that as a result a fir tree would develop out of the germ cell of a maybug or an earthworm out of that of a hippopotamus. In the first stage of evolution the interests of individuals thus clashed with those of the life flow and the species. For the individual the reproduction mechanism was an unnecessary burden. For the species and the life flow it was not just an advantage but simply a necessity.

In the second part of the evolution the values changed and the energons created by men no longer had to use their surpluses for producing conspecific energons. Since it is not the genetic blueprints that are responsible for reproduction but the central nervous system, each energon can now produce any other energon. What purpose does this serve, though?

It is without doubt of use to the individual which is now released from the nonsensical duty of producing its own competitors. It is however of no use to the species: its existence is now much less guaranteed. If the acquisition possibilities for an energon type are not ideal, it is more likely for the species that this type will be replaced by others[5]. The life flow however profits from an extraordinary gain: the surpluses automatically reach those places where the best acquisition possibilities the development of life are found. Thus "substance" is wasted much more rarely where it is of no real use to the life flow.

It takes some time to analyse these different values which are connected with one and the same structure. Another example of conflicting interest is the problem of the life span.

For every organism a life as long as possible is undoubtedly an advantage for the individual. This holds particularly true for all those animals which learn through experience. With growing age their competitiveness increases provided that they do not fall into decline. For the species as well a life span as long as possible is advantageous. Since then the size of the species will remain constant, with the number of required offspring being small.

For the life flow however a long life span is a disadvantage because each energon of old age takes away space from its successors, as far as acquisition is concerned. This means therefore that the chance of alteration – and thus improvement – becomes slimmer. Consequently a long life span of individuals *hinders* a higher development and increase in power[6].

Even these few examples show the energons in a different light. The form of their body is certainly a unity but it was by no means shaped consistently in the course of the evolution. Values were added to the control mechanisms which were similar everywhere and were carried out by the external and inner fronts. And these values made demands too and were often diametrically opposed.

4

It is a rather universal phenomenon that animals eat up other animals or plants. For the organism that is being eaten this is certainly a disadvantage as well as for the species to which the organism belongs since it loses one of its members. For the life flow however the disadvantage is much smaller. When eating and digesting, a portion of energy is lost in the form of heat – the rest is preserved for the life flow. It is only shifted from one structure which transfers it to another.

In this way the life flow may even gain an advantage. If for example the organism that is being eaten is not capable of acquisition (or competitive) and thus not capable of reproduction, it is of no value to the life flow. The organism just uses up the last available energy resources. If it is eaten by a successful energon, that is, one which is capable of reproduction, the life flow gets back a share of its value. And another advantage is that due to the mutual extermination the average life span is shortened and thus the chance of improvements increased.

In the case of human body of acquisition this correlation gained even more importance. Let us assume that energon B steals an effective unit from energon A which is not coalesced with the energon – for example a shovel, a coin or any other functional unit. In this case the life flow does not decrease in value – provided that this unit is of the same use to energon B as it was to energon A. An effective unit of power is simply transferred from one energon to another. In this case as well may the life flow even profit from the process. If the effective unit of A did not have any function (like the shovel in the shed which is not used), its value for the life flow was very small. If it is now used by energon B, the power of the life flow will be increased.

This already indicates how some views common in totalitarian states are so to speak the mouthpieces of the interests of the life flow. Property which one person does not need but which would increase the acquisitive activity of another person is seen from this point of view to be judged negatively, it is so to speak a misdemeanour for society, a punishable offence.

In totalitarian states, e.g. in communist states, it is a postulate that everybody has to work in order to acquire the right to exist. Seen from the energon theory this means that humans are forced to fulfil their function as "germ cell". Everybody must develop professional entities or work within the organisations of acquisition-everybody has to "labour". This reminds us of the genetic pressure exerted on all animals and plants in the first part of the evolution to increase their acquisitive structure (instead of wasting their surpluses to such an extent that they were no longer of use to the development of energons).

But the interests of the life flow are becoming visible even in countries with market economies and economic policies (practically in all countries of the western world). The national economy profits from highly flourishing sales – thus it takes incentive measures in order to boost them. Neither the savings in the stocking nor the unused shovel in the shed boost economic activities. Surely, in these states unproductive property is not condemned and the individual cannot be forced to work. In this case a different means is used to reach the same goal. In every possible way the demands of consumers are aroused, which then make the individual strive for surpluses, spend the savings in the stocking and use effective units.

Our "hurry" which is becoming a chronic disease in the western world has its roots in this principle. It does not actually comply with the interests of the individual but with a totally different, superior interest which has from the beginning accompanied evolution as a sort of guiding agent.

5

Very tricky cases of conflicting interests arise when energons become a functional part of other energons. Today everybody knows this process: when a free-lance is employed – in the language of the energon theory: when a professional entity becomes an effective unit of a company or another professional entity.

Preliminary stages of this process can be found in the plant and animal kingdom: precursors for example are the already mentioned "digestion assistants" which live in the intestine of insects or mammals where they aid digestion and in so doing fulfil the function of a gland (Part One, chapter II, paragraph 4).

Figure 33 is a diagram illustrating this relation. A is an insect (like a termite), F is a digestion assistant (like a flagellate). A as well as F are energons though F becomes an organ, an effective unit of A by fulfilling a function in the interior of A (that is in its effect structure). Both energons profit from this relation. The digestion assistant is supplied with food in the stomach of the termite – it does not need to look for it; an enormous advantage for the balance. The termite on the other hand does not need to develop the necessary glands (which this energon perhaps was not able to produce). This thus has a positive effect on the balance of the termite.

Energon B in figure 33 is an example of a similar relationship: it has the same features as energon A (it is again a termite) except for the digestion assistant G living in the intestine – G differs from F in so far as it has a detrimental side effect (n), for example it discharges substances which attack the intestinal walls.

If energons A and B enter into competition, A, which is not hurt by its digestion assistants, will have the advantage. If the advantage is large enough, energon B will be forced back. This however means that energon G does itself harm due to its side effect. By hurting its "host" ("employer") it undermines its own existence. If the species B becomes extinct as a result of this burden on the balance, the species G will lose its source of acquisition. Should this be the only one the energon has, it will die too.

Thus if we want to determine the competitiveness of F and G, we need to take into account the positive and negative effects they have on their "hosts" (A and B). The more they are of use to their hosts, the better will they maintain their own source of acquisition. The more they harm the hosts – the more will they undermine it. As a general rule this holds true only for the *species*. The repercussions often appear long afterwards, so that they do not affect the individual.

Although it is quite different with the human body of acquisition the same principle applies to them. Each employee becomes an functional unit, an organ of the company he works for. Within this larger energon he fulfils a necessary function and gets paid for it. The company is his source of acquisition. The better he fulfils the function, the better for the company. If he harms it – he will have a negative effect on his own source of acquisition. Yet the repercussions do not necessarily affect him. If he lines his own pockets, he need not be affected by the damage (provided that he is not caught).

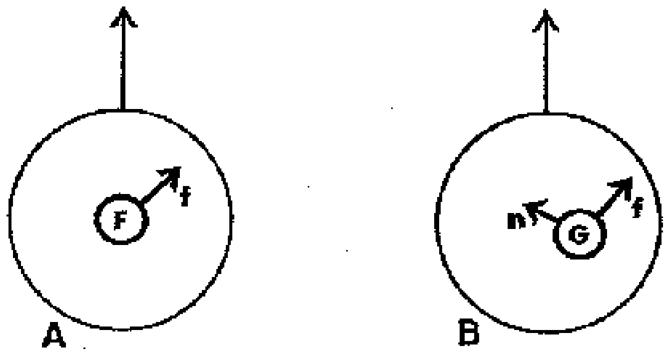

Figure 33: Energons which are active in the body of effect of other energons with regard to their competitiveness.

F and G have an certain necessary effect (f) inside the energons A and B. Since G furthermore has a detrimental effect (n), it harms its host (employer, firm) and thus indirectly itself. Details in the text.

The "species" however will be affected. To demonstrate this I prefer the example of machines to humans. If a machine for example often does not work, this will have a detrimental effect on the factory. The consequence is that people will know that and other companies will no longer buy the respective type of machine. In the language of the energon theory: energons which have this effective unit do not exist, "reproduce" (themselves) anymore, they "die out".

The same is the case when the functional unit is a human – in detail a professional entity, that is an energon. If this type of professional entity – or the type of human which is its centre – is not the right for the required function, negative effects occur. Other companies will know about them and avoid the respective type. Those with the unsuitable type of professional entity will become more seldom, they "do not reproduce", they "die out".

There are many sorts of parasites which live in the bodies of other organisms. As a rule they have an exclusively negative effect on their "hosts". Here repercussions also occur which in most cases do not affect the individual but the species.

Some parasites for example castrate their hosts, which consequently are no longer able to reproduce themselves. Thus these parasites undermine their own source of acquisition. This effect is irrelevant for the individual since it can be felt only after the death of the individual. For the species however it is a disadvantage. In future generations the individuals of that species will have far fewer sources of acquisition at their disposal.

Even this phenomenon has parallels in economic life, e.g. illegal ways of making a living. Let’s suppose that bank robbers succeed in making a spectacular coup. Thus they improve the individual balance of these professional entities – which are also energons – but at the same time undermine the "basis of existence" for the members of the their species. Their success makes society mobilise its defences and banks install more effective alarm systems. Thus "business" deteriorates, the "market" is disturbed and this source of acquisition is no longer as easily available for other bank robbers.

In general we can say that if an energon (digestion assistant, parasite, employee, robber within a state) lives in the body of another, larger energon serving as a source of acquisition, the positive or negative effects this energon has on its host will themselves have positive or negative repercussions not on the individual but on the species.

In almost all democratic countries there are two major parties facing each other today: one represents the interests of the employees, the other that of the employers. Both parties are aware of the fact that they need each other. The employer serves as source of acquisition for the employee – the employee serves as necessary effective unit for the employer. What they constantly been argue about is "a fair balance of agreement". How much profit does the employer have to pass on to the employee?

Or the other way round: How much energy may the employee take away from the employer?

If the energon theory proves right, computers will one day help to settle this contentious issue. What it is all about in the end is nothing other than the harmonising of competing values which are mutually dependent. If the optimum harmonisation can be calculated (a value which is influenced by various environmental factors), the loss of output will be very small for both parties and a "fair" effective output for both will be determined.

Within the state, too, the interests of the individual may serve or go directly against the interests of the community – the repercussions however are much more slower and complex (unless in the form of legal measures). A person evading taxes harms the state though he will hardly be affected by any repercussion – provided that he does not get caught. The numerous conflicting interests of states and the functional bodies which are subordinated to the states in the field of politics, civil and criminal law will never be settled by computers. But they may supply the basic data for the fundamental harmonisation.

Again and again in the course of evolution the hierarchic order of energons has involved the same problems. Each subordination to a bigger whole means that a balance has to be achieved between those energons which are part of other energons. Both energons benefit from this and have to accept the disadvantages. The appearance of multicellular organisms, siphonophorans or insect states (which consist of numerous multicellular organisms) may differ from that of companies, concerns, states and leagues in the end the situation, the problems, the necessity to reach a balance between the different energons are the same everywhere.

On each of these integration levels there are numerous correlations with the competitive value of the respective subordinate or superior partner. In the second part of the evolution the differences between the individual and species fade in importance. Very bitter conflicting interests occur between the professional entities and the enterprises as well as between the professional entities and enterprises and the "superior" state. The interests of the state – in totalitarian states as well as in liberal states-become to a large extent like the interests of the life flow[7].

In addition to these rather complex correlations there are the luxury interests of humans (in detail: of the germ cell human being). They are also relevant in the sector of acquisition and even play an important role within the framework of competitiveness (survival).

It is hardly of direct advantage to a single professional entity or enterprise if those people making them up use the surpluses to increase their personal advantage. On the other hand it would become no longer necessary to invest these surpluses in conspecific reproduction – which as such is actually an advantage to them. Furthermore the surpluses spent on luxury benefit other energons and in this way – within the circular flow – serve the individual interest. Seen from the interests of the state and the entire life flow, the luxury interests of the germ cell human being are-as already mentioned – vitally important and beneficial. They may have the disadvantage of diminishing the defences of the state and in this way threatening it in the case of hypertrophy. By the way, men’s willingness to work and make progress is increased in this manner. The luxury interests indeed became the strongest impetus for the formation of energons – the main of all driving forces of evolution.

6

As for the energon theory, the life flow is the actual "reality", whereas the individual energons
and energon species as well as their hybrids are only components and supporters of this 244
process[8]. Even humans – as varied as their development may have become – are only components. We, too, continue this process which passed us by long ago[9].

The life flow however is nothing personal, it is not an intentional or even conscious "will".[10] It is a phenomenon, a causal event which like an avalanche gains power. What serves, upholds the life flow – continues to exist. What does not serve it – dies. Only in this sense can we say: this or that was in its "interest", increased its "value". The supporters of the life flow, the energons, compete with each other. For them competitiveness is vital: that energon which is more competitive upholds the life flow. The life flow itself does not know competition or "competitiveness". Here only the term "power" can be applied. According to the respective environment the avalanche in its entirety may be more or less competitive, may have a higher or lower "power".

Like a dubious wire puller the life flow influences every energon – very often contrary to its personal interest. On the other hand it is the greatest helper of all energons, the broad basis on which all are founded.

Who for example "paid" for all the innate structural blueprints and behavioural patterns of the organisms? These blueprints do not appear in any balance – neither in that of the energon individuals nor in that of the energon species. Every energon gets these blueprints as a free gift. Somebody however had to pay for them – the ancestors: each of them either formed new ones or passed on already existing ones.

Also the costs of each blueprint can – in principle – be calculated. They are made up by the number of generations which were necessary for their development; the total number of energons with the help of which the single improvements were achieved; the costs of the "total biomass" which had to be formed to achieve them. Seen from this perspective the "life flow" is (no longer) a frightening tyrant but a patient donor, a raiser.

In the second part of the evolution the "development costs for the recipes decreased tremendously. Improvements which in the genetic blueprint would perhaps have been achieved via millions of energons were now made available by a single central nervous system within years, days, even seconds, with a relatively small expenditure of energy. The way these improvements are transferred from one brain to another was manifold. Today they are collected, ordered and made available to all human energons by the gigantic community organ "science".

Even in this part of evolution the life flow serves as a donor on the one hand and as a tyrant on the other. We will leave out its function as donor – ungrateful as we are – and concentrate on the hidden dictator who controls even our most intimate actions. As if we were puppets and the life flow pulls the strings. By guiding us in certain directions it makes us serve not our but *its* interest.

Comments:

[1] It is possible that an individual reduces its own power of acquisition by growing too much. In this case the individual would also profit from ridding itself of a portion. To do so, differentiated reproductive organs are not necessary and it is these organs we are talking about.

[2] „Zur Philosphie und Wissenschaft der Natur", in „Parerga und Paralipomena: kleine philosophische Schriften", Vol. 2. Berlin, 1851.

[3] W. Zimmermann, „Methoden der Phylogenetik", in G. Heberer, „Die Evolution der organismen", Stuttgart 1967, pp. 137.

[4] The term "life flow" may sound a bit metaphysical. I however understand by it nothing but all "vitalised" material in the dimensions of time and space: all the agent of a causally proceeding event involving energy.

[5] Another example may illustrate this even better: Whereas in the first part of the evolution violets at any rate produce violets, in the second part jewellers for example may easily close down their shops and set up night clubs if the economic situation is favourable to night-clubs but not to them. The energon "species" jeweller's shop will then suffer some loss.

[6] After World War Two it became clear that this principle applies to the bodies of acquisition in economic life as well. The destruction of so many companies and factories led to a reconstruction of factories which were much more up-to-date. If they had not been destroyed, the old structures-"species"-would have existed much longer and improvement and progress would have progressed only much more slowly. Even the dismantling of companies in the French occupation zones of Germany contributed to the economic miracle: whereas the machines in France were old, they were up-to-date in Germany.

[7] We will take a close look at this tendency in Part Four, chapter VII.

[8] Johann Gottfried Herder wrote: "At the human species evolution ended; we know no creature which

is superior than humans and which is more manifold or artificially organised: he seems to be the highest form of end organisation which could be constructed" ("Ideen zur Philosophie der Geschichte der Menschheit"). This illustrates the opinion prevailing throughout history up to now.
[9] Goethe and many other philosophers saw the organisms as "a purpose within itself": seen from the life flow this is not true. Only the life flow itself is "a purpose within itself".
[10] For Schopenhauer and Nietzsche the "will" was the actual centre of organic appearances. The life flow in its entirety is indeed a "will": not a conscious, intentional one but a process which in its continuation creates more and more complex correlations.

I

COMPETITION AND THE AREA OF ACQUISITION

What was meant by this world,
doesn't seem to be a question to me,
We are all together here
Happy at a banquet.
Sit down and look around,
all tables are full,
None of us is so stupid
To not get anything.
Wilhelm Busch (1832 – 1908)

And finally the fighting seized because
there were no fighters left.
Pierre Corneille (1637)

1

Let's take a look back at the previous chapters.

In the first part of the book we took a look at the two main fronts which all energons – without exception – face: energy and material sources. The energons need to reach them, tap them, this is the *conditio sine qua non*. The energy absorption comes first, without energy there is no activity. The acquisition of material is also important but not always.

In the second part we discussed other environmental factors the energons have to cope with. First and foremost they are unfavourable, hostile; secondly they are favourable, beneficial. All this environmental factors – energy sources, material sources, predators, disturbances, support and symbionts – control the evolutionary formation of energons. They are responsible for a major part of their functional units and movements. They dictate how these spatio-temporal structures must look .

In the third part we turned to the internal fronts against which every energon has to fight. All functional units need to be linked with each other, functions need to be co-ordinated in many ways. No functional unit should hinder the other but if possible support it; each part needs to be adjusted to the whole. Furthermore all functional units must be able to fulfil their functions. And finally the energons need to be able to reproduce themselves and alter (improve). Even these "inner" factors have control effects but are not as manifest as the outer ones. They can not be recognised by the senses but by the mind.

The categories of thought so developed differ to a great extent from those which have so far been used for the general division of phenomena. They are characterised by their function and can be clearly distinguished. What makes them so important is the fact that they (and I claim, they alone) reveal the invisible framework of values which dictates the required spatio-temporal structures to all energons – however different these energons may seem. In each of these categories – which can be compared with the internal and external "fronts" – it is possible in principle to measure what expenditures are required, caused by the "factors" ("groups of factors"). Whether such measuring may be carried out with today's means is of no importance; especially in the case of organisms such measuring would involve major difficulties. First of all it is only important to find out what has to be measured and where it has to be measured in order to be able to calculate the competitive potential of the energons. The most important claim of the energon theory is that such measuring can be carried out according to the same pattern on each energon. The same set of criteria can be applied to all of them – whether they are organisms or acquisition structures developed by humans.

One main and very important category is still missing: the front against "competitors". So far I have neglected it because the correlations in this field are most difficult to grasp and because it cannot clearly be assigned either to external or internal fronts.

Competitors as such are real elements of the environment and belong to the external front in this sense. The struggle with this group of factors is often as direct as that with disturbances or predators. The major struggle, though, takes place somewhere else – it is so to speak the struggle of the energons with their own structure. In competition, the energons which almost always prove superior are those which work more cheaply, precisely and quickly. This has an effect on practically every single functional unit. The main weapon against competitors is thus the improvement of one's own structure – which would often not be necessary if there were no competition.

From this it is evident that competitors have two main effects: on the one hand they force, i.e. control, the development of direct defence and attack measures. On the other hand they force – control – processes on the "internal" front.

This may sound much more complicated than it really is. Every businessman will be familiar with such phenomena in real life. Without competition – this applies to an energon in a monopoly position – the energon simply has to be capable of acquisition. As soon as a competitor appears, however, the situation changes entirely. In order to survive, the manager – or the Brains Trust advising him – has to re-examine the entire structure. Where can expense be saved? What can be improved? How can the structure of acquisition be made to work in a more rational, smooth and better integrated way? This is what I mean when I refer to the indirect control effect that comes from the inside.

We usually recoil from the term "control". We are used to think that it is the manager, it is humans who control, but this is not true. In this case humans are only the tool of a control – the mind only fulfils the function of recognising, if possible ascertaining in advance the demands made by this control. Where it leads to is only in exceptional cases dictated by the mind (Part One, chapter II, paragraph 1). Usually it is determined by the form of acquisition, external and internal influences and competitors. Humans can only more or less follow this dictate.

The competitors can be clearly distinguished from the predators. They pose a much greater threat than the latter. This can be easily be demonstrated.

2

For a predator, the energon it attacks is always a form or source of energy. If the predator exploits the source too much, it cuts off its nose to spite its face. 248

In the case of individuals this principle is not as obvious as in the case of species. If for example lions feed exclusively on gazelles and even exterminate them – then in the end they will starve. The same holds for acquisition by exchange. If a type of job or company gains the upper hand, it absorbs too much of the demand on which it lives – and finally there will not be enough demand.

In both cases the same thing happens: those energons which are predators as well as those which exchange in a way "balance" their source of acquisition If the lions become predominant and reduce the number of gazelles too much, a corresponding number of lions will starve in future generations. The number of lions will then decrease – and the gazelles will have better conditions for reproduction.

It is the same with enterprises. If too many soap factories, dry-cleaning shops or cinemas spring up in an area, some of them will sooner or later vanish. As a result the demand pressure rises again (provided that the demand has not changed fundamentally) and supply may increase too.

Humans with foresight try to anticipate this development – but they often do not succeed. Due to the non-transparency of the market it is much harder to recognise demand and supply as such. The supplying energons as well as the demanding sources of acquisition nevertheless arrive at a balance.

The relation between a *competitor* and its victim however is totally different. In this case the energon in question is not the source of acquisition but it taps the same source. The energons often struggle with each other though they do not see each other – they compete for the same prey, the same demand that has to be satisfied, the same feeding bowl.

If an energon succeeds in ousting its competitor and seizing the source of acquisition, it does not have even the slightest disadvantage, only an advantage. This is why each competitor is so terribly dangerous. One could say that the predator is half a friend of its victim, since this victim is its source of acquisition. The competitor on the other hand is a totally ruthless opponent who does not even take part in the destruction of its victim. The conquered opponent dies somewhere and the winner profits from this.

We have already discussed the indirect effect of competitors in detail. If each functional unit of an energon has to fulfil its function in the cheapest, quickest and most precise way, then this is due to the pressure exerted by competitors. While trying to measure the competitive potential, we dealt with this indirect effect coming from within. What remains to be analysed is the direct warding off of competitors.

But before doing this, I would like to make a few general remarks.

3

First it has to be pointed out that some energon species are acquisitive within a certain "territory" whereas others are not.

The majority of plants are tied to one location. Though animals may move, there are many species which are resident in a certain area. The same is true for human forms of acquisition. Whether farmer or hairdresser or commercial agent, all work in a more or less limited area. The bacteria floating in the air and the plankton drifting in the water however are moved here and there by external energy. If they hit upon food, they grow, if they do not find any food, they die[1].

Their area of acquisition is actually tiny: the energons take it with them, so to speak. Only what they touch directly is comes under their sphere of control. The area of acquisition of mobile animals living like nomads is much bigger. When migratory locusts find appropriate food, they attack the respective area. The same holds for primeval humans, who were nomads. Wherever they found suitable hunting grounds, they settled down. When these grounds were exhausted, they moved on. It is quite similar today with major production plants. Although they are stuck to one place, they are nevertheless nomads. Their acquisition organs – products – circulate around the world. Where they come across a corresponding demand they establish themselves and in so doing enlarge the area of acquisition of the company.

The term "area of acquisition" as I use it is thus defined by performance, by success. It is, so to speak, a part of the entire source which the respective energon is able to tap. It is a statistical term which cannot easily be depicted on a map.

If for example there are 100,000 animals of prey for lions in a certain area, the areas of acquisition of the single lions will often overlap. In statistics the figure is clear. If on average 6000 animals are eaten per year and one lion eats 60, the area of acquisition of that lion amounts to 1% of the entire area.

This type of "definition of territory" – which differs fundamentally from that used in biology – can universally be applied. It there are 20 dentists in a city, their source of acquisition will be the complete needs of dental treatment. Drawn on a map of the city, the territories of the single dentists cannot be clearly distinguished. It may well happen that a patient consults a dentist in another part of the city. As for statistics, the balance sheets give detailed information about the territory of each dentist. If one dentist succeeds in achieving 10% of the total turnover, his/her area of acquisition amounts to 10% of the total .

In the lions' area of acquisition of the lions, as well as in that of the dentists', there may be more or less favourable places. At certain spots the prey may prefer to stay (for example at the watering place), in certain parts of the city richer patients may live who can spend more money on dental treatment. The animal or person able to expand its sphere of influence in that area has the advantage. It is especially these strategic places which the energons compete for[2].

Thus we have to distinguish between two differing features: first the energon's ability to search for prey, and its mobility, and second the ability to assert itself against competitors. What is of great importance – and thus we have come to the vital point – is that efforts are always made, energy is used.

Seen thus, the territory of acquisition is not an actual area but a sphere of influence. Its value can be defined in energy for each area and each type of energon: the amount of energy that has to be expended in order to control the area or type. If there are no competitors – which happens rarely – average individual effort will lead to an average result, depending on how rich the source of acquisition is in the respective area. If there are competitors, however, competitiveness will determine the share of the source of acquisition, the area of acquisition. The more popular dentist or production firm with the better means of acquisition (sale goods) will then gain the bigger market share – the larger area of acquisition.

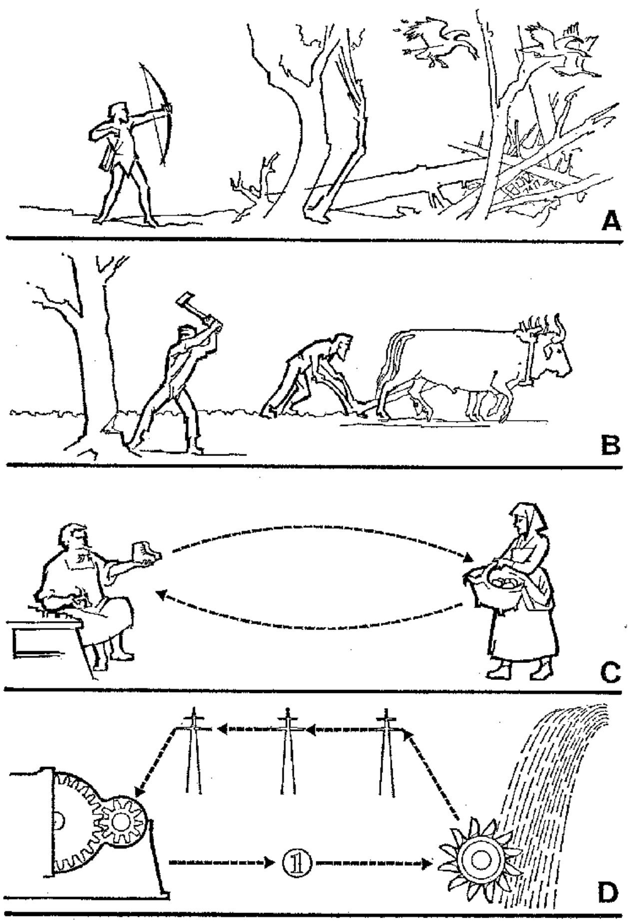

Figure 34: Increase of the energy and material acquired by humans, achieved by special performance of the intellect

A Primeval humans expand the sphere of influence of their genetic body with the help of *artificial* organs and becomes more and more superior to animals and plants in their capacity as hunters.

B *Farming* stands for an enormous increase of potential prey per area. Those plants which do not serve as food are eliminated, the others are cultivated. Animals are used for operating artificial organs (plough, wagon) directly. Humans no longer need to take up energy via their stomach and use it by means of muscular labour – a limited process. The "professional entities" created by humans include even those functional units (like an ox) whose energy is used for directly powering another functional unit (plough).

C The exchange of output established by humans leads to another enormous increase in power. By producing a personal achievement or selling its result humans may acquire achievements of other people or the results of these achievements..

D As a consequence of discovering *electricity* humans succeed in conducting natural forces (such as the energy of a waterfall or coal) quickly across long distances. A company may in this way use a waterfall which is a hundred kilometres away for directly powering its functional units. Another energy source which can be used quickly and without loss is "money": a universal entitlement to human achievements within a community. Electricity as well as money can easily be transformed into various forms of energy: electricity may be transformed into mechanical power, light, heat and so on; money can be transformed into every possible specialised human work or its product.

The area of acquisition is thus always the product of an effort. It needs to be first won and second maintained in each area competed for.

Here I have to add that besides the territories of acquisition there are other territories for the securing and maintaining of which the energons need energy. In the case of animals this applies above all to the space necessary for mating and reproduction, especially for care of offspring. If this area is the same as the area of acquisition, an additional achievement is no longer necessary. Just think of the salmon, which swims upstream in order to spawn; this is an energon which produces a second area of action for the purpose of mating and reproduction, thereby expending a considerable amount of energy. The salmon does not find new food; rather, it has to overcome a lot of hurdles and take further risks. As discussed in the last chapter, these efforts do not serve the individual but the species and the life flow.

In the case of humans, there is also an unusual feature – the luxury space which may become many times larger than the area of acquisition (seen from the point of view of energetics). It too has to be won – acquired. Its protection as a rule requires constant expenditures of energy in the form of taxes.

The energon theory leads to a different and , as it seems to me, more accurate definition of the terms ownership of land or property. The owner does not actually possess the ground but has a temporary or permanent right of disposal – that is a sphere of control. If we purchase real estate from another person, we displace this person and eliminate his sphere of influence in this area. This may be achieved by using force – as in old times – or through exchange, handing over an appropriate sum of money – as in organised states.

Here the close relationship between robbery and exchange becomes obvious since money is nothing but an entitlement to a human achievement, to energy from an outside source (Part Two, chapter VI, paragraph 3) – as we have already seen. Whether energy is used for forcible displacement – as when stealing land – or whether an appropriate equivalent for the energy is *voluntarily* transferred to the vendor is not shown in the energy balance. In both cases however "territory" is won with expenditure of energy.

Animals have constantly to defend the acquired territory against competitors trying to oust them. Within the organised human communities which permit the acquisition of land, however, the state fulfils the function of safeguarding this sphere of influence. It is laid down formally in the land register, turning the holder into the owner. By erecting fences the owner keeps away intruders. The actual sphere of influence ,however, is safeguarded by the state, which takes action against intruders in cases of emergency. It is for this protection that citizens pay taxes and charges.

In trade and industry, too, some space may be acquired by purchase and in many cases the state protects this, also. With the help of licences, patents and copyrights the state prevents competitors from becoming active in a certain spatial and temporal sphere. These are also possible means of safeguarding against competitors. In many acquisitive groups, though, there is almost complete freedom of trade nowadays. The developing energon at most has to prove its basic qualification – by means of "examinations" – (as a precautionary measure for the community), then, however, it has to fend for itself and try to win an area of acquisition in free competition. Almost always are the relevant sources of acquisition are already being tapped by other energons. The human acquisition structures have to fight for their place in this hostile community – like every young plant or animal.

Certain territories are kept by the state for all citizens, for the purpose of acquisition as well as luxury. Such territories are first and foremost all public roads and other transport routes which, like spider's threads, run through the overlapping areas of acquisition. Everyone may move freely on them – whether for acquisitive purposes or for fun. In addition there are parks, estates which are open to the public and others.

Today human areas of acquisition are based on private and community law. What characterises human development is the increase of output by means of *intensification*.

4

Terrestrial plants face double competition: above ground they raise their leaves as high as possible, thus absorbing the light other plants need, too. Below ground their roots compete for water and nutrients. Some plants even discharge substances that prevent other competitors from growing.

Animals often act as predators when fighting their competition at the feeding and watering place. In this struggle they may mostly use the same "weapon" though different patterns of behaviour are required, since the competitors look different and behave in a different way. Superior size plays an important role in this competition: at the feeding and watering place the large dog shoves aside the small one, the large elephant shoves aside the small one.

It was however left to the human intellect devise the most dreadful weapon in this struggle for energy and material. Before the time this special ability of inferring and concluding arose in the central nervous system of humans there had never been such a cruel slaughtering of competitors in the course of evolution.

The first strategy thought up by this functional unit was "clearing for cultivation", which sounds rather positive to us. We subject nature which has no or only little value to our will, organise its activities. What is of no value to us as raw energy is eliminated by force, what serves as "food" is cultivated and promoted. In practice this implies the unparalleled extermination of competitors. They are eradicated root and branch – the individual area of acquisition is intensified a thousand times.

The same area may now a bigger yield. Humans thus improve their area of acquisition by eliminating competitors totally.

Another measure consists in fending off those competitors which could profit from the result of this ruthless activity as well. Fences are erected, scarecrows are put up, attempts are made to exterminate parasites with poisonous substances.

The energons planted to be eaten are cared for and supported in every possible way. All disruptive factors are countered to the best of our ability. The soil is irrigated, fertilised. Poets sing the praises of seed and crop, compare the fertility of the soil with that of women. It thus becomes the most natural thing, a good deed, to exterminate competitors opposing our interests. We see ourselves as the centre and purpose of Creation.

Another display of intelligence consisted in increasing the yield by means of "rotation of crops". Monocultures lead to exhaustion of the soil – to a de-intensification of the area of acquisition which is met with two or three cycles of rotation. Pulses are ,for example, planted after wheat ,or the field is left to its own resources for one season – it "lies fallow". The result of these manipulations is a further increase in the total yield.

And that is not all: humans breed. This is the same procedure as natural selection, only with regard to personal advantage. Cattle are turned into highly productive suppliers of meat and milk. The average cow may produce 3,000 litres of milk per year, the Holstein cow produces up to 10,000 litres per year. The purpose of such breeding is an animal which digests its food particularly efficiently. This is another method for intensifying the area of acquisition, for increasing the amount of raw energy squeezed out of it.

Further increases in yield are achieved by improving or adding artificial organs: by improving the transport route, mechanisation, collectivising. The ideal size of companies is calculated. According to the distance from the sales area, either lighter or heavier crops are planted. Butter, for example, needs a hundred times more soil than hay in relation to its weight, wool approximately a thousand times more than potatoes. Finally, another important method of intensification is recycling. Some products may serve as manure, others may provide additional "by-products" after being processed.

It is remarkable that only at this stage of evolution, at this point of transition from organisms to human acquisition structures were competitors so rigorously exterminated. The competition among the human acquisition structures, however, again reminds one of that between organisms.

5

For a baker or a soap factory it is virtually impossible to eliminate all human needs which are not directed towards bread or soap. Only in extremely totalitarian states where the state itself has the monopoly in producing the majority of goods are there such processes. Needs not catered for by the state are eradicated if possible, with the help of propaganda and force. All the products the state has decided to offer and distribute are however glorified as being the "best" and "most desirable" ones.

In countries with a market economy similar methods are used as regards competitors as in the animal and plant kingdom, with the difference that they have been considerably refined by means of human intelligence. Competitors are hurt as much as possibility as well (by influencing lenders, middlemen, consumers, by a blockade on means of transport, exclusive distribution arrangement, fidelity rebates, underselling and so on). Physical size and power also play a significant role. "Marketing instruments" furthermore include offensive measures which are without parallel in the animal and plant kingdom, such as payment by instalments, rebates, cash discount, additional gifts. In addition to these there is also the unusual feature of aggressive advertising[3].

These methods can best be compared with the manure of soil and the breeding of particularly productive and useful organisms. Just as these measures increase the yield per area, this type of advertisement increases the demand – and thus the specific source of acquisition – per area. New, even non-existing demands, that is, sources of acquisition may be created with these methods. Just as agricultural acquisition structures make the soil as utilisable as possible, other human acquisition structures make their fellow men as utilisable as possible. With every means they have at their disposal they try to create demand where it has so far not existed.

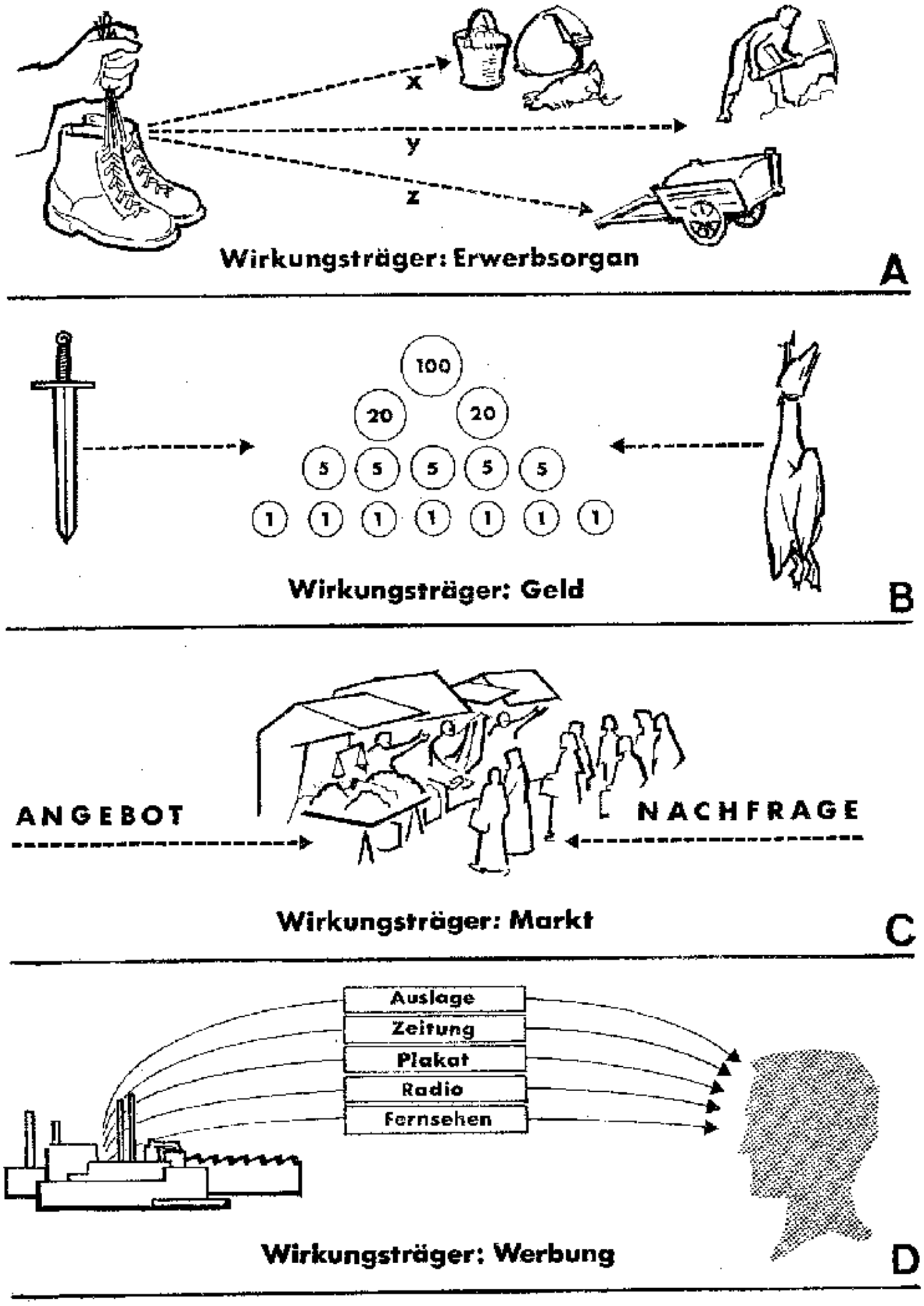

Figure 35: Auxiliary organs for acquiring energy through exchange

A Functional unit *organ of acquisition* ("object of exchange"). In exchange for shoes the following products may be obtained: first food, that is, organic molecules which can be digested (x); second human labour (y): for the duration of work the person working becomes an artificial organ of the energon offering the object of exchange (rented performance); third a product of human labour (z): in this case an artificial organ is exchanged for another.

B Functional unit *money*. If a blacksmith needed a goose, he could hardly have got one by exchanging goods because the farmer perhaps did not need a sword and above all because the sword had a higher value. With the help of the universal means, money, every achievement can be shared and transformed into any other. It furthermore makes possible the gradual accumulation of exchange values ("savings").

C Functional unit *market*. It makes it easier for supply (organs of acquisition) and demand (surpluses of energy plus need) to meet. The mutual search process is thus rationalised by a common organ (market).

D Functional unit *advertising*. It makes the search process easier and furthermore makes possible the artificial creation of demand where it has not existed so far or where different demands have existed. Development aid is a perfect example, since there can only be demand when people have surpluses at their disposal. Thus it is necessary not only to create demand in other people but also to help them acquire surpluses. They need to be encouraged to develop professional entities and business organisations.

This process, as well as the elimination of animal and plant competitors, is backed up with positive feelings. No producer promoting his products would mention the profit, he would always talk about the services that are offered, the progress that is supported. The struggle against competitors thus becomes a signal of real humanity even in this field[4].

6

All these attempts to oust competitors – whether it is the discharge of special substances from the roots of plants or the advertising campaign of a company producing washing powder or the patent of an industrial enterprise – constitute efforts, thus consuming energy.

In this case too the competitive value is increased when the effects are achieved in the cheapest, quickest and most precise way. And finally, the situation in the development stage differs fundamentally from that in the acquisition phases and the resting or dormant phase. Thus we again obtain twelve factors which have to be taken into account when defining competitiveness.

This holds true for individuals as well as species. If the energon is part of a bigger energon, the result will be conflicting interests and seen from the life flow the assessments will then be different.

7

In the case of human energons these conflicts manifested themselves particularly at the time when the first nomads settled down. The question was: to whom do the areas of acquisition and the benefits reaped from them belong? Does an area belong to the individual who cultivates it or to the community – that is the superior energon – of which the individual is a member?

In order to realise that this problem has not been solved so far we just have to look to the East and the West.

In the course of history the development was generally from communal property to private property. The reason for this is obvious: the respective area of acquisition and real property (fields, farmsteads, etc.) were in most cases threatened by other groups of humans rather than by animals. Only the community (clan, tribe, people) was able to provide protection. Thus it naturally saw itself as the owner of the area of acquisition and allocated parts of it to the individual for cultivation and use. This is today still practised by many primitive tribes (for example in Africa and Malaysia). Or the individual is transferred the right to use the ground which the individual itself clears for cultivation (like most Indian tribes do). During the time of the Germanic people the first "private property" became the homestead. Even in the times of Tacitus arable land was part of the community property: lots were drawn to see who would temporarily use the fields. Only after the Migration of Peoples did individuals come to possess farmland. The Romans, however, had a very individualistic concept of real property: the power of the owner reached *usque ad coelum et infernos* – to the sky and the interior of the earth. These are simply definitions which have been recognised because of human conventions. They offer advantages as well as disadvantages for the state and the individual.

The fact that private possession of land and crops is a major incentive to work can clearly be seen in communist countries, where such a stimulus does not exist in many cases because property is either limited or totally forbidden. Thus for example individual farmers in communist Poland made a profit of 621 Zlotys per hectare, collective farms 517 Zlotys and state-owned farms 394 Zlotys[5]. This implies a drop of more than 37%. This difference may be even bigger in other fields.

Seen in terms of evolution – beyond good and evil – private property is without doubt a natural condition. Those supporting the law of nature were wrong when due to the early conditions of human development they believed that communal property was the original, *natural* state[6]. What is original is the fact that performance wins and develops. All evolution is based on this principle.In the case of organisms living in herds there are also community interests. As for animals which are overwhelmingly led by instinct – like insects living in states – these interests may take the place of individual interests. Withdrawing the fruits of their work from intelligent people would however mean taking away the strongest and most original impulse from the life flow

The much more critical question – which we are talking about here in essence – is that of the *heritability* of property. As regards its evolution it is difficult to judge this phenomenon – simply because there are hardly any early stages in the kingdom of organisms.

Only in the case of the human acquisition structures it so happened that the individual functional units did not die together with the human obtaining and combining them. Another person may take over the empty place – and the energon lives on.

Quite naturally would humans like it most if their own children took over the abandoned acquisition structures: they would prefer to supply their children – being parts of themselves – with present and future surpluses. The individual who is less lucky will inevitably regard this as injustice – especially if he believes that humans are chosen by God personally and thus should be granted the same starting conditions.

Due to this bequeathing of property, families and clans came to occupy important positions of power which were more and more consolidated over generations. These complexes of acquisition are in so far peculiar in that they often develop in different forms, combining them in many ways. They can hardly be compared with ordinary energons – rather, they make us aware of the basic principle of the stream of life in a smaller version.

Humans who do not belong to any such clan thus face others who easily and, so to speak, undeservedly came to hold such positions of power. Whereas one is without any efforts taken to the top by the achievements of his ancestors, another human has nothing, his progress is even blocked by these clans.

A similar situation arises when a young tree begins to grow in a high forest. In this case the competition is a lost cause. The giant trees – created by numerous generations of cells – have already been holding a position which can hardly be challenged. With regard to humankind this brings up the question whether the giant trees should be sawn off, whether the state should see to it that every young tree has the same starting conditions.

There are plenty of arguments for and against this view. In the course of history many extreme features have been eliminated or mitigated

8

The autocratic rulers of the past very often turned the entire area of acquisition of the community (tribe, people) headed by themselves into their own private property. This was not extremely difficult since they were in command of the militant units on which the power of the community was based. All their vassals directly depended on the rulers: without soil no food. The highest-ranking and most important members of staff (on whom the ruler had to rely very strongly) were paid by simply awarding them with property. The others were granted the right to use the land as "feud" and in so doing the ruler without any efforts came to possess a constant "basic income".

In this way estates of gigantic size developed. It would however be wrong to assume that such accumulation of area of acquisition in the hands of few people was always and only achieved by means of force.

Rather often – as in the times of the Migration of peoples – did free peasants seek the shelter of a ruler or of the church, which was very powerful at that time. The kings themselves looked for settlers to cultivate their land and offered them advantageous conditions. For each acquisition structure built by humans the worst enemy is another human acquisition structure. For the development of such energons – this has hold true since the beginning of human development – protection was always the main problem. Such protection can only be provided by a superior organisation. Thus what is of importance is a division in accordance with the achievements of the two sides. The seizing of the entire area of acquisition by the head of this organisation is surely a payment too high for the protection provided. This excessive display of power by individuals, families and clans, which passed on power to their blood relatives and prevented all others from rising, resulted in countermovements, deposing the ruling houses, sharing out the large estates.

Then the force of industry took the place of that of property and here too similar positions of power developed which were passed on by bequest. They too were used excessively. As a consequence, the communist movement arose which up to today has suffered from a mistake in the logic of its founder Karl Marx. He believed that these excessive positions of power could only be eliminated by abolishing the property rights of the "means of production". Thus he turned the state into a monopolist in economic affairs and robbed it one of its major forces: the entrepreneurs. The fact that a reasonable balance of individual and state interests can be achieved in a much less drastic way has meanwhile been proven.

These conflicting interests look quite different as regards the "highest authority" – the life flow.

I see – and I am repeating myself – no sign of the rule of a conscious will in this highest authority. This is a process which can be best compared with fire. What serves the spreading of fire is "good" and "useful" for the fire, what contains and smothers the fire however is "bad" and "inappropriate" for the fire. If we look at evolution from the point of view of the life flow, it is easy to distinguish between "beneficial" and "not beneficial". This distinction can be compared with the total sales of the life process, with the "gross life product" in the language of economists. What results in an increase of the entire "vitalised material", including all structures built by humans, is "beneficial", what results in a decrease is "not beneficial".

How rational this evaluation is can be seen in the following example. As for the life flow it is essential that the totality of animals and the totality of plants are in proportion; it does not matter, however, what species are involved.

As already mentioned, plants could not live without animals: they would be suffocated by oxygen. Animals could not live without plants: they would be suffocated by carbon dioxide. Seen in this way, plants as a whole can be regarded as necessary "organ" for the development of animals or animals as a whole can be regarded as necessary "organ" for the development of plants.

It was in the interest of the life flow to increase the area of acquisition. Therefore the development of new entities able to penetrate into areas which had not been populated before was in its interest. The advance on land was the biggest "battle" of this campaign. The life process spread like fire across more and more parts of our planet. It always and exclusively manifested itself in energons.

Subsequently it was in the interest of the life flow to intensify the areas acquired: that is, to increase the life turnover per area. The division into animal and plant kingdom ("autotrophic" and "heterotrophic") complied with this interest. For plants the maximum development per square metre of ground is limited. By growing in size they are able to increase further the life substance – but there are limits to this process. The truth is that plants could produce much more – but they simply lack the space required for doing so. Animals, so to speak, provide a way out of this deadlock – they eat plants (which naturally grow again) and do not depend on sunlight. Seen in this way, animals are *offshoots of plants* which can develop in places where plants cannot. The overall life substance per area is thus increased, the area of acquisition intensified.

The human energon then opened up new ways of increasing and intensifying the area of acquisition. It created artificial organs – in practice this means that it more and more included inorganic matter in the structure of life, "vitalised" it and turned it into elements of the life flow. If a human builds a house out of stones, the stones become functional units: elements of the life process. If we construct a machine and use steel, the metal becomes part of the life flow . This process is not totally new: even the "living" substance consists in the end of inorganic matter. Though only in the second part of the evolution do large, organic structures become highly effective components of life.

Then humans – or the energons developed by them – succeed more and more in smuggling outside energy into life events, in utilising it for these events. Coal and oil are of organic origin – the free energy contained in them was an "unexpected legacy", as Ostwald put it. Wind, water power and nuclear energy though are totally inorganic forms of energy. All these forces are used for directly powering artificial functional units, increasing the power potentials in the areas of acquisition.

By means of artificial heating, humans drive the life flow to polar regions, by means of artificial irrigation to desert regions. With the use of particularly functional units humans are even able to leave the planet. One could say in a more human way: the life flow is kindly disposed towards all this. *All these phenomena serve the life flow* .

It is also kindly disposed towards wars – they promote innovation and exterminate acquisition structures which are stagnating.

The life flow is also kindly disposed towards the haste of the age of technology. Wherever the national product is increased, it can automatically credit it as increase in the gross life product.

What the life flow does not like is introverted humans who look for values and the aim of their life in themselves, who do not drift, whose needs cannot be influenced. Diogenes in his barrel was a particularly disgusting energon for the life flow .

Such individuals break away from the large river, they do not increase its turnover.

Thus we have reached the point where it becomes inevitable that we must talk about the *motives* of human behaviour. On another occasion[7] I went into that subject in more detail – and already mentioned the basic ideas of the energon theory. Seen from the energon theory human behaviour is one of many other phenomena.

Comments:

[1] The existence of these species proves that they often enough find food. If they did not, they would not exist.
[2] In economic life the term "market density" stands for the number of potential customers, enlisting the services or buying the products of a particular company. Large department stores require cities of at least 500,000 inhabitants. For self-service shops of 200 square metres a trading area of up to 200 metres in radius is essential.
[3] What is meant here is not advertising in its function as means of orientation for interested customers but its second function of creating demand.
[4] An important counterargument is the following: advertising creates mass demand – thus an originally luxury good may be turned into a much more cheaper good for daily use. This is undoubtedly true. It is equally true that many people need to be influenced because they do not know what they want for their life. Militant advertising is nevertheless an offensive measure, like predatory acquisition.
[5] These figures are taken from the eighth plenary of the central committee of Poland (1956), in which Gomulka denounced the state-owned farms and collective farms as not functioning not well enough. H. Gross in "Gegenwartsprobleme der Agrarökonomie", published by A. Zottmann, Hamburg 1958, S 131.
[6] Gerhard Uhlmann, for example ,wrote that common property was the original condition, while private property was a result of sin. ("Die christliche Liebestätigkeit in der alten Kirche", 1882).
[7] "Wir Menschen", Vienna 1968

II

WHY AND FOR WHICH PURPOSE?

*A human being is a mammal indeed,
because he sucks a lot of liquid into his body;
males drink wine and beer, females prefer
coffee. But a human being is also a fish,
because he often does incredible things in cold
blood and also possesses scales that suddenly
fall – mostly too late – from his eyes.*
Johann Nestroy, "Die schlimmen Buben in der Schule"

1

Humans are the germ cell of the most powerful energons that have developed on our planet. At the same time, their wishes, needs and desires form the basis of existence for all these energons created by them. They build factories: Their market – i.e. their source of acquisition – represents the human need for this or that product. They establishe world-wide trade organisations. Their source of acquisition – i.e. their market – is the existing need for goods. They develop governmental systems of incredible power. These structures can only survive if there is a corresponding need for such organisations – whether in the form of an auxiliary tool for society, or as means for individuals reaching for power.

Two tendencies which depend, indeed even condition each other, form the basis of this whole development. The first tendency is the human impulse to build up such acquisition structures – in order to live and to create convenience. Secondly, this energon structure and this search for convenience requires efforts by others, i.e. represents a source of acquisition for other energons. In this case, we can draw a remote parallel to the interdependence of animals and plants. As these two preconditioned each other in the first part of evolution, there exited an equally decisive dependence between those who offered and those who demanded. Without corresponding needs, the spreading of acquired sources of acquisition through barter would have been impossible, and without those sources of acquisition, human needs could not have been satisfied.

Hence, the key to the understanding of the second part of evolution are human beings, or, more precisely: our controlling instincts. It must be said that human sources of acquisition show the same scheme as those instincts. If we want to know details about human desires, we just need to look at what is being offered to a human. It is true that – on some occasions – there is an offer which is neither wanted nor necessary; however, such energons will inevitably founder or they improve their adaptation towards the actual need. One can say that offer reflects demand – more or less. All human sources of acquisition that acquire through barter are adapted to some existing human desires – *like key and keyhole*. If we want to understand the key, we need to examine the keyholes – the human desires: *the motives of human action and decisions*.

The theory of energons clearly shows how we have to proceed. We search for the reason for actions and reactions, i.e. for the explanation of behaviour. If they result from education and individual experience, they are difficult to analyse, as those influences and experiences may be of very different kinds. If, however, behaviour is based upon inherited information, comparisons with animals – especially vertebrates – are possible and their behaviour will tell us a lot about how the "motives" for our actions arise.

Consequently, there are two decisive questions to answer: To what extent do inherited structures of control influence human behaviour and, in this sense, to what extent is it determined, i.e. *dependent*? To what extent are we – personally – responsible for our behaviour – i.e. how *independent* is our behaviour?

From the viewpoint of evolution, this formulation seems logical. Still, many people sticking to outdated thought-patterns refuse to accept this kind of question.

2

Until recently, the study of human activities – human *behaviour* in the widest sense – was limited to sciences that hardly impinged on research into nature. Sciences in the field of culture, art, economics, politics and law, as well as – to a certain extent – sociology, psychology and philosophy put human beings at the centre of their approaches. Because our life is so different from that of plants and animals, this method seemed logical and natural. And religious doctrines justified this even more: humans had been called upon by supernatural forces, and even forms the centre of such a planned "creation".

All those aspects led to the result that we tried to analyse the human "ego" or "I" from the basis of the human "I" – with the help of our spirit we wanted to explain precisely this spirit. From a scientific point of view, this is our central nervous system’s attempt to analyse and explore itself. If we see it from the angle of the energon theory, it is an attempt to set an functional unit to act against oneself.

Some philosophers even went so far as to describe our "I", our thoughts and feelings as the actual and sole reality, while they consider environment as something not provable[1]. And different religious doctrines – in particular Buddhism and Christianity – explain that this "I" (consciousness, thinking, "soul") would link us directly with the world’s reason and must then be seen as a phenomenon outside of nature.

From this point of departure systems of definitions and valuation developed, categories of thoughts were set up and named. Other life forms were measured by other standards, and relations in this field hardly found any place in the assessment of the human problem.

Even the theory of the origin of species could not bring about a radical change in this attitude, which – like every established point of view – persists almost unchallenged. Some people accepted that we stem from the animal kingdom, others did not, and there was no real interest in this field. Even if this theory were to be proved right, people said, it would not have implications on the assessment of human beings. A short look at humans and animals was enough to demonstrate an enormous gap between them – namely in *behaviour*. There was bodily correspondence, but our actual life and its motives showed great differences. Of course, similar instincts existed, but they only concerned the outer appearance of the phenomenon "humans". The centre of our problems was rather seen in spirit, soul, everything that reaches far beyond all material items. In principle, many people do not accept any other kind of approach. They believe that a different approach would push us down into the abysses of materialism and that the prevailing basis of perception preconditions all our cultural creations. Right or wrong, they feel obliged to keep the flag of "actual and real humanity" flying.

However, the – today undeniable – theory of the origin of species imperatively requires another approach. If we proceed from human beings, we choose the most complicated and complex phenomenon as our basis. And as we are human beings, too, this point of departure is everything but objective[2]. In this sense, various philosophers have posed the question whether it is right to use the tool of our perception, namely our spirit, in order to contemplate oneself directly. With regard to plants and animals, we are far more objective.

If all organisms form a part of a single, great development, another, somewhat different possibility allows research into our conduct, but making a major diversion. This research path starts at the opposite end: at the most primitive known organisms. It begins with the simplest forms of life, with the simplest forms of conduct, and leads – step by step – up the ladder of evolution.

Comparative examination shows how functional processes in organisms are generated and explains the roots of more complex phenomena of behaviour in higher animals. Only at this point does the diversion lead to humans. In this case, it is not our *uniqueness* which is put in the first place, but our *common, unspectacular aspects* – they are seen as a further development of animal behaviour. Consequently, our brain does not contemplate itself, except through a diversion into its historical development. The course of this development can be reconstructed via today's existing species[3]. Hence, the inherited elements are selected first; and thus uniqueness and new aspects of humans can be determined.

This kind of research is in its infancy.

Konrad Lorenz provided the major impetus to the comparative examination of animal behaviour. During recent decades, he and his students successfully proved that the most important phenomena of the instinctive behaviour of higher animals are connected with a few mechanisms in the central nervous system, working on quite a similar basis in different individuals. Some have already been mentioned and others will be added. On the following pages, a brief overview will be given:

- *First*: "Instinctive motor control" is quite a common phenomenon. When a butterfly leaves its pupa there is no need for it to learn to fly. The required and complex commands from the brain to the acting muscles have already been co-ordinated. The co-ordination blueprint which is necessary for this process is built up by the genetically inherited material; this is also the case as regards the brain, the head, the whole multi-cellular body. This is why we talk about "hereditary co-ordination."

- *Second*: "Innate recognition" is also a widely known phenomenon. All higher animals are able to select quite specific combinations out of a whole range of sensations: they recognise them: In this case, we speak of key stimuli, or it is a signal between two animals, of a "trigger". For example: the male stickleback recognises another male stickleback by the characteristic red belly. The animal reacts similarly if we present it a sausage, the end of which is painted red. If we turn the sausage round, so that the red point is at the top. the stickleback does not react. Here, the cerebral cells do some data-processing. As a rule, such a hereditary "recognition" of an environmental situation is linked with a certain motor movement. In the case of our stickleback, the key stimulus, "longish body, underside red" sets off aggressive conduct.

- *Third*: Between these two hereditary abilities – and we have not talked about them yet – we find the "instincts". Numerous researchers share the point of view of the Russian biologist Pavlov: every example of hereditary animal conduct (instinct) could be derived from reflexes. They thought: the animal responds to specific stimuli ("stimulus situation") and reacts in a particular way. But there is more to it. Between the kinetic and sensorial blueprints a third one comes into the play: instinct. In simple words, it functions as follows: If the animal does not encounter a certain combination of stimuli which it can recognise through its inherited information (e.g. prey or a sexual partner), it will act in a restless way and will start an active or passive search in order to find this combination. It tries to find "prey" or the "sexual" partner", to be more precise: the corresponding key stimuli or triggers. If the animal finds them, its instinct starts (feeding, mating). If it still does not encounter those stimuli this "excitement may be diverted towards other channels". In that case, the animal carries out its hereditary co-ordination in vain, or another form of hereditary co-ordination, not related to this instinctive behaviour, will follow. In that way, the animal can work off its own stimuli. These drives are variable and lead their own lives, as it were. If they are active, then the animal only looks for the key stimulant to which its instinctive behaviour is directed. If the drive is worked off, then it does not pay attention to such key stimulants any longer – and other drives dominate its behaviour.

- *Fourth*: with animals certain innate behavioural pattern are not fully developed at the time of the animals' birth, they only mature later, as with some organs. In such cases it seems as if the animal has only acquired the respective behaviour – however, the truth is that it is innate and only matures later. This is why it was believed that doves still have to learn how to fly, as young doves cannot yet fly. However, an experiment prove the opposite. Young doves were brought up with their wings tied up so that they were never able to use them. When they had grown up the ties were removed – and alas, they were able to fly. Thus, doves do not learn that ability, but the building of the necessary steering-structure, which is caused by the genetic blueprint, is not fully developed when the bird hatches out.

- *Fifth*: certain innate behavioural patterns are not complete: not until a specific sensory impression at specific stages of their developments occurs is this the case. This is for instance comparable to a cooking recipe which is as such complete but which lacks certain data that have to be filled in. Accordingly, with young ducks the "following-reaction" is innate, however, whom the animal follows depends on the sensory impressions it has between the 13th and 16th hour after its hatching out. Normally the young duck sees its mother – and then follows the mother. Thus it happens that the mother's characteristics become the key stimulants that trigger off that behaviour. If, on the contrary, the young duck – in an experiment – is shown a red balloon instead, then it will only follow red balloons. The mother is not able to trigger off the following-reaction any more. This is called "imprinting". A behaviour that is actually innate is completed by the missing part, it is imprinted. With some animals the sexual partner is determined by that. If young roosters in their "sensitive phases" are only shown ducks instead of chickens, then they will later, once they have reached sexual maturity, only mate with female ducks. Chickens will then be of no interest to them.

- *Sixth*: many animals are able to refine innate behavioural patterns through learning or they can even build up totally new behavioural patterns. For the young toad it is instinctive to jump at even the smallest moving object. If it is stung by an insect, then this sensory impression is "associated" with the innate pattern. In future, the toad will not jump at similarly looking, moving small bodies anymore. Consequently, this is an improvement, a refining of the key stimulant which by than becomes more "differentiated". If the dog learns to "give his paw", then this is an already fully acquired new behavioural pattern built up by learning. It is not influenced by the genetic blueprint. The dog develops the necessary co-ordination through the instructions of humans but perfectly individually ("co-ordination of acquisition"). This is already a low-level intelligent performance.

- *Seventh:* such learning, too, does not happen completely "involuntarily". What it should learn preferably can also be instinctive in the animal. This was only revealed after in-depth experiments. Accordingly, with chaffinches the specific singing is imprinted between the fourth and sixth month. If during that period the young bird is kept from hearing other chaffinches and if instead it hears the singing of other kinds of birds, then, a year later when its singing-skill sets in it will sing accurately like these other kinds of birds. If, on the other hand, it hears a few different kinds of singing of birds in that period and amongst them also the singing of chaffinches, then it will decide in favour of its own species. This is a meaningful connection: it is thus innate for the organism, in what "direction" it preferably develops its life.

Very early on Lorenz pointed out the fact that such knowledge relating to animals should also be taken into account for the better understanding of human behaviour. He called "the most important task of his branch of research" and also gave numerous hints for that himself[4]. Nevertheless, the area "human being", strictly fenced in by the humanities, was only approached hesitatingly.

Numerous authors have shown the evident parallels between animal and human behaviour in "amusing" or "provocative" portrayals from which the scanty field of research has hardly profited. They depict what is actually a mere supposition or daring hypothesis as proven results of research[5].

In the meantime, very little has been proven, hardly anything. The difficulty lies in the experiment. With animals it can be determined what is innate and what is acquired: the two experiments with the tied up young doves and the chaffinches are examples of that. With human beings, however, analogous experiments – which would have to be prolonged over years and which would in most cases require the total isolation of a child – are completely out of the question. On the other hand, some parallels cannot be seen clearly without experiments.

To this another important argument may be added. Comparative investigations with animals 268
have shown that the innate steering-mechanisms are rather "conservative". In the course of evolution they have, whenever they became superfluous, only receded relatively slowly. There even exist examples that organs have receded while the nerve-structures in charge of their steering still remained intact, even active. In such cases the animals make movements which appear meaningless – and which are only explained by proving that there once existed an organ necessary for the performing of them[6]. This, however, clearly runs counter to the fact that with the transition from the manlike ape to primitive humans extreme recessions of steering-mechanisms have taken place. This development – as we today know – did not take much more than two million years: a rather short span of time seen from the viewpoint of evolution.

4

Even with great caution and hesitation the following claims should be defensible:

There are only very few examples of *genetic co-ordination* in human beings. The sucking movement as well as coughing, sneezing, crying, and laughing are innate with a baby. Also other basic elements of human mimicry might to a large degree be innate. With higher "learning animals" (apes, dogs, the big cats, etc.) there is also only relatively little genetic co-ordination. The advantageous ability of learning required the recession of rigidly determined motor activity.

Innate recognition might influence human behaviour in many aspects. For instance, ulcerous skin triggers off a feeling of revulsion. Biologically this is rather useful as ulcerous skin is a sign of illness. To recognise that illness and to avoid contagion by keeping at a distance is of advantage. Yet, what is interesting here is that we also project this reaction onto animals that have similar skins – therefore we also find toads revolting although their skin is perfectly healthy[7].

Lorenz found out that with our domestic animals the innate mechanisms that steer behaviour have to a large degree lost much precision. Practically this means that their innate mechanisms of recognition appeal to many more stimulants than was the case with their ancestors living in the wild. These mechanisms lost in "selectivity" – which, according to Lorenz, is a consequence of domestication. The same phenomenon also appears to have occurred in human beings. We shield ourselves from natural dangers and defend ourselves – for instance through medicine – from natural selection. The mechanism which originally should only react towards sick human skin has lost in precision. Now it also reacts to similar sensory impressions – for instance to toad skin.

This "shift" of a reaction is rather insignificant, but others are not. Accordingly, the human sense of beauty probably has its most important root in the innate recognition of a strongly and harmonically built representative of the other sex. Amongst different possible partners we preferably choose the one "we like best" which is a reaction that cannot be steered by reason. Biologically it was significant because by that the most harmonic and strongest – thus the most healthy – is preferably reproduced. Also this innate blueprint of recognition obviously lost in precision and reacts to completely different objects if they match our sense of beauty somehow. What for us is "beautiful", thus is not beautiful *per se* – but merely made in that way in order to trigger off our innate value-reaction[8].

Consequently, here, too, our "free will" is put into question. It is not we who look for the beautiful – but the beautiful wins power over us.

There is every reason to believe that the same applies within the ethical field. The reaction of indignation when we observe that a child is battered is innate – it is "fixed in its views" as Lorenz puts it. Such a scene one can watch dozens of times in a row in a film, and still one always responds to it[9].

One kind of behaviour which philosophy and religion have often considered as a human speciality is thus reduced to a rather "mechanical" process. Animals forming herds show the same innate reactions – only mostly more strongly. According to Lorenz these belong to those instincts which receded early in humans due to their "self-domestication". As a result, this way of acting is not a noble aspect of our free will – or the motion of a "consciousness" which only exists in humans – but instead the innate reaction of our central nervous system to a key stimulant. We respond with a feeling of indignation – whether we want to or not[10].

With apes the social defence reaction plays an important role. If a herd meets another one, the animals develop aggression and combat-readiness. According to our common way of thinking and assessing it seems absurd and tasteless to bring our feelings of "national enthusiasm" seriously into connection with these reactions of the apes. However, there is good reason to believe that both here and there the same nerve-mechanisms are at work. National enthusiasm – which often precedes wars – is a phenomenon which can hardly be explained by "sensible" processes of thinking.

The same is true, very generally, for the contagious effect of masses on the individual: of customs and fashions, pillages and celebrations, carnival and so on. Here there is a certain appeal to layers of our "subconscious", whereby the persons involved cannot give a clear account. A "mood" is created within them. The actions of others urge them to actions of their own.

These are only few examples. Our behaviour might be directed through innate responses to specific key stimuli to a much larger degree than we ourselves would like to admit.

5

As far as the *drives* are concerned the correspondence is even more distinct. Hunger, thirst, the sexual drive – but also display patterns, aggression and fear find their expression with us just as in the animal. Through our conscious thought processes and through our awareness of 270
the self these drives collide with other forms of making decisions. What is more, they have lost in "precision"; they make us uneasy without always showing in what direction they urge us. Mechanisms that work precisely with animals became certain "dark urges" with humans, as Goethe put it. If they do not find appropriate situations and stimuli where they can be worked off, they will "jump to other tracks". Freud pointed this out with regard to the sexual drive which, if it does not find a normal expression, can "sublimate" itself in a completely different activity – for instance in art.

Humans have great troubles with the also innate and strongly developed aggression-drive[11]. With our ancestors who lived in groups it had a high biological value. Fights among one's own species made sure that those belonging to one species were spread very evenly over the available acquisition area – an advantage for the species. Subsequently such fights served to determine the strongest and thus the building of a hierarchy. This was very important for the determination of the most capable one who was to lead the herd. In the process of mating the strongest and most capable males were preferred, got the females and consequently were privileged in reproduction. Within the civilised human community this drive, which still appears completely out of our control, cannot be fulfilled properly. Strained atmospheres and irritation without cause, often arguments and a divorce are the consequences. Football games, races and thrillers often provide a "substitutional situation" in order to work off those "impulses".

6

In humans the curiosity drive became particularly important. From the viewpoint of the humanities, which try to investigate the self from the perspective of the self, it was hardly possible to consider human curiosity as occupying an even more special place than our aesthetic and ethical ideas.

This drive is characteristic of all intelligent animals. To them only part of the necessary behavioural patterns is innate, the rest they acquire in their personal interaction with the environment – during their youth. During that period the curiosity drive – also called the play instinct – urges them to an active exploration and testing of themselves. Every kitten and every child clearly displays the effectiveness of this instinct. "Playing" is nothing other than a restless collecting of experience and a purposeful trying out of every movement one can think of.

With animals this instinct wears off with sexual maturity. The animal then has to acquire all the skills it needs. With humans – and this is where the essential difference lies – this is not the case. We remain interested in the "new" until old age. Humans remain "cosmopolitan" as Gehlen called it[12].

The curiosity instinct was an important prerequisite for the development of human beings – for the development of the energons build by humans. This "germ cell" maintains its playful willingness to try out new things – to build new behavioural patterns and structural blueprints. While every animal remains tied to a specific biosphere, humans conquer and create new 271
biospheres. By adding artificial organs to their bodies, by merging with others into multiply organised complexes they build ever new and ever more powerful energons. Now the mental power of humans is extended into old age; the more important it is that we maintain the readiness and the urge to use those forces for ever new experiments.

The curiosity instinct has considerably advanced the second stage of evolution. The individual steps of progress may well have been intellectual achievements. Yet, behind them was the innate urge to activate and develop that same intelligence and to induce it to try out new possibilities. Even the game with thoughts and imaginations, full with relish as it is, the "making of plans" and "building of castles in the air" may have been "fuelled" by this driving force.

This force is particularly clearly manifested within research, exploring and the spirit of adventure. In daily life it shows itself when humans stop to look whenever they happen to come across something "unusual"; when athletes test themselves with new tasks; when we read and talk much more than is actually necessary; when we are magically attracted by theatre, cinema and television; in short, when the interaction with something new bestows us with positive feelings until old age.

7

With that we have reached an important point. With animals we can only assume that every gratification of an urge gives them pleasurable feelings – with ourselves we know for sure.

If we satisfy our hunger, our thirst, our sexual drive, our craving for admiration, our drive for aggression, then this gives us pleasure. These positive feelings – originally a necessary addition –consciously thinking humans made the centre of their interests. For a long time we have ceased to eat merely in order to supply ourselves with energy and substances; instead we prepare our meals in such a way that they are "tasty" and thus give greater pleasure. The same is true for drinks. The process of breathing is used for pleasure through smoking. The sexual relationship – for its own sake – and the search for beauty – for its own sake – became centres of our culture. The pleasures which attending to the brood gives have become the centres of family pleasure at home. The satisfaction to be somebody, to be admired, to stand above others physically, mentally, as concerns power, and culturally, to be liked, to impress others, is one of the central forces for the human striving for progress.

The production of pleasure and displeasure to which we are indebted for such rich "emotional lives" is the actual mechanism which advances evolution – and accordingly must have already developed very early on. It is also a function which has to be tied to appropriate vehicles of effect. What these are like in detail we do not yet know. With multi-cellular animals this skill is rooted in the central nervous system. Most innate modes of behaviour are "rewarded" with side-phenomena which the animals strives for; if they are not fulfilled they are "punished" by those which it seeks to avoid. Even with plants there may exist similar – just not observable – "correlates".

Humans, aware of themselves, strive for sensations which bring "pleasure" for their own sake, they even breed them. The "inventories of drives" are not the same for everybody. In one person a particular drive is developed more strongly, in another a different drive is stronger and when it is fulfilled provides more satisfaction, joy, luck, pleasure – or whatever we call it. After all, all these positive feelings that are within reach of humans are motivating forces for the building of energons. If they could be removed – for instance through drugs – then the boundless scaffold of our progress would collapse like a house of cards.

And this is not only because the actual impulse to make an effort would be lost but also because for all exchanging energons (and most them are of this kind) the distinction between pleasure and displeasure forms their essential basis. Without demand there is no sale – and without pleasure-displeasure mechanisms there is no demand.

Already during the first phase of evolution this addition to the instincts was a decisive function. In the second stage of evolution it became – *in two respects* – the prerequisite for further development.

However, only a few human impulses derive from innate patterns of behaviour. There are just as many that derive from acquired behaviour which influences us via upbringing, tradition and our own experience. What we call "habit" is a phenomenon that is quite similar to the instincts. Roughly speaking, habits can be called "acquired instincts"[13].

Once habits are formed – this will be known by everybody from their own experience – they exert pressure on us. If we have become accustomed to particular life habits, then they call for repetition and produce uneasiness and even pain if we have to do without them. If we are used to tasty food, alcohol or cigarettes, our will has for a long time not been free any more as we repeatedly strive for the feelings which they create in us.

Here, too, the eminent significance of the human "imagination" is evident. Also mentally we can form "habits": plans and wishes which are rooted in us and get a hold can produce considerable feelings of displeasure, if they are not continued. This is the case with all "illusions" that one has to give up.

The drive of human curiosity is, as it were, the antagonist to habits. While the latter urge us into well-worn ways of behaviour, the curiosity instinct campaigns for abandoning them. This interplay was an important prerequisite for the development of human energons. On the one hand it was important that what had once been achieved was maintained and consolidated: this is the conservative tendency. On the other hand it was no less important that at least a few broke away from the already existing, who got rid of self-created ties and ventured into new territory. 273

Just like instincts, habits, too, produce feelings of pleasure and displeasure: the former, if we indulge them and the latter, if we are hindered from doing so. Even more crucial than the building of habits within an individual, however, are the "habits" of communities. We call them: ethics, custom, tradition, culture. These common habits remain in existence over generations, even over centuries. Established doctrines also belong to them: for instance religions and ideologies. They influence – as fixed rules of life – the actions of individual human beings and thus make them unfree. On the other hand they save them making their own decisions and provide feelings of safety, security, satisfaction and pleasure.

On particular days particular celebrations take place. The main points in human lives: success, marriage, birth, pleasure, death to a large degree occur in the wake of common habits. They are also rigid and urge the individual into particular directions. They, too, just like the instincts, "reward" and "punish". They, too, make our will *unfree*.

9

The phenomenon of "imprinting" in humans also plays an important role. Freud proved that. He found out that "sensitive phases" in early childhood are responsible for outward influences gaining the power to mould and thus determine the behavioural structure of humans in their future lives in important aspects.

Therefore the human child between the first and third year of its life needs a grown-up partner to which it can attach emotionally – "psychologically". Normally this is the mother, yet, it can also be other persons. If the child is deprived of the "stimuli-situation" – as can for instance be the case with hospitalised children when the nurses often change – then this has harmful influences for life. The formation of the "original faith" is prevented and the children – unless they die anyway – will appear "unsociable" in their further lives[14].

Between the third and the fifth year of life – Freud called this span the "Oedipal period" – the sexual behaviour in the future is influenced and even determined. According to the results of psychoanalysis the influence of the environment – especially of the parents – can cause sexual disturbances, and also homosexuality, in future life.

During puberty children form their ethical ideals. What is imprinted during that time, they can hardly ever completely overcome in their future lives. Also in that "sensitive period" the nerve structures that are built are obviously influenced lastingly.

With animals imprintings are "irreversible" – they cannot be corrected later in life. A rooster that is imprinted for female ducks can never again be induced to love-actions with a chicken. With humans – not least thanks to intellectual achievements – this fixation is less rigid. Here, too, irreversible alignments or damage to the control of behaviour can occur but many problems can be moderated or even corrected through appropriate "treatments". However, it can no longer be disputed that with humans as well as with animals the same connections of effects exist.

Especially interesting is the phenomenon of the "innate dispositions to learn". Chaffinches – but also other kinds of birds, for instance nightingales – choose among different kinds of singing the one that belongs to their own species. With such animals the ability to decide upon what they prefer to learn is genetically manifested.

Does this phenomenon also still exist in humans? Does it also explain *tendencies* in our behaviour?

This is new territory for future investigations. It is striking that with many nations – completely independent from each other – similar behavioural structures have developed. Let us consider a very general one: the human predilection for ceremonies, for regular orderings and sequences of events. As order is such an important tool for human progress, the shaping of such innate tendencies would without doubt have supported the balance – thus it would have had a "positive selection value".

It is not impossible that certain guidelines as to what they should preferably learn are innate in humans, also.

Lorenz talked about a "parliament of instincts" which is a very concrete comparison. Together with the acquired drives, called "habits", they raise their voices, as it were, inside the control centre and the respectively strongest "member of parliament" is successful and takes over – or influences – the control of the body[15].

The "I" that is aware of itself – which in humans came to be the "highest" unit of control – seen from that perspective becomes a mere dogsbody[16]. It uses its skills in order to satisfy hunger, to win a sexual partner, to gain pleasure through success, to satisfy habits and to conform with society's norms. We say: " I am free". If we "want", we can take a step to the right or to the left, nothing in the world can prohibit that. If we consider ourselves – or other people – over a longer period of time, then this "freedom" shrinks considerably.

Depending on his or her "equipment" with innate or acquired drives, the life of a person takes this or that direction, behind the "will" there are many effective forces.

It is true that principally, of course, the "I" has the possibility to obtain control of all those forces – like horses that are harnessed in front of a carriage. That control does not have to consist in suppressing them but can make use of them so that a personal, self-built steering-principle co-ordinates all those forces and "brings them into harmony"[17].

A person who achieves that – from the human viewpoint – can be called "free". His or her total co-ordination has been created by him or herself. His or her will, in this sense, is "free".

From the viewpoint of evolution as a whole, however, this freedom remains dubious. For the strongest motor of life development, the principle of pleasure and displeasure, cannot be overcome even by those people. Even with ascetics who forbid themselves any kind of pleasure and who force themselves to intensive displeasure, it remains questionable whether they are not made in a such way such it is precisely that which makes them happy and satisfied. Through domestication and the connection with our conscious thinking human drives became very complex. Almost every tendency can connect to positively tinged inner experiences, hence with "emotions" ultimately worth striving for.

With regard to the life flow parts of this growing complication were advantageous, others were not. We now turn back to a more distant perspective: to development of the whole.

The most powerful energons which ever came into existence were the so-called "states".

Comments:

[1] In particular G. Berkeley, John Locke and David Hume (between 1670 and 1770), but also Kant and Schopenhauer held this opinion.
[2] Pascal formulated it in a wonderful way: "If reasons are falling apart, one often calls on one's feelings."
[3] Goethe had already expressed his view that examinations should not commence from the top, trying to find humans in the animal, but should start from the basis and rediscover the more primitive animal

in humans.
(In: "Lectures on the first three chapters of the draft: A general introduction to comparative anatomy, on the basis of osteology", 1796)

[4] Especially revealing is his work "Ganzheit und Teil in der tierischen und menschlichen Gemeinschaft" (1950), included in the collection "Über tierisches und menschliches Verhalten", München 1965.

[5] This for instance is true for the widely read book by D. Morris "The Naked Ape", Munich 1968.

[6] One example for instance is the threatening of stags. They lift their lips and thus expose their canine teeth – which, however, have for a long time not been weapons any more. They are recessive, while relatives – for instance the muntjak – still has dagger--like eye teeth at its disposal. Here the co-ordination of the movements remained intact longer than the organ to which they relate. Another example: during the mating foreplay male cuckoos give material for the building of a nest to the female – more precisely: they perform the typical movements for that (without actually taking material for the building of a nest into their beaks). The co-ordination of movements still derives from the ancestors who built nests – thus, it refers to the common building of an artificial organ. Since the cuckoo is a parasite who has other birds brood the eggs and thus does not build its own nest any more, the latter has become superfluous. The co-ordination of movements, however, was maintained and even acquired a new meaning in the ritual of the mating ceremony – an example of a change of function.

[7] Some people presume that our predilection for smooth, flawless surfaces, for instance spotlessly painted walls, can also be explained with regard to that root. This is an example for the kind of conclusion drawn so frequently today. It is not impossible that such a connection in fact exists – but it is only an assumption. Other roots may have no less influence: for instance the urge for tidiness which is strongly developed with animals and also still exists with humans.

[8] What is meant here are only basic elements of assessment. Undoubtedly, the human sense of beauty is also to a large extent influenced by upbringing and tradition.

[9] Some people will at this point raise the objection that there are also humans who do not show this reaction. But this means little: the strength of single instincts and instinct residua is quite variable in humans and there also exist – especially since medicine tries to maintain all life – a high number of "abnormalities". Here only very general tendencies are illustrated which are clearly backed up by statistics.

[10] Naturally, intelligence and personal assessments can intensify, decrease or even completely prevent such reactions. What is crucial here is not the actual mode of behaviour but the surging "impulse" which puts us into a specific "mood" and urges our action.

[11] K. Lorenz wrote about this in detail in "Das sogenannte Böse", Vienna 1966.

[12] A. Gehlen, "Der Mensch", Berlin 1940.

[13] Already Aristoteles called them the human being's "second nature".

[14] Details can be found in R. A. Spitz, "Hospitalism", Internat. Univ. Press, New York 1945, and in J. Bowlby, "Maternal Care and Mental Health", World Health Organ., Monogr. Ser. 2 1952.

[15] Already Spinoza recognised that. He wrote that a desire which is only related to one or a few body-parts "does not consider its usefulness for the whole human being" (Ethik IV, 60).

[16] Schopenhauer called the intellect a "servant of the desires".

[17] Into that overall co-ordination the willingness for change has certainly to be incorporated. Somebody whose principles are "in charge" of them is not the "rider" anymore. Due to the fact that world development remains in a constant flux, a harmony that is "perfect" (the optimum one) for humans – which depending on their inventory of drives and on the environment can be very different – in most cases cannot remain completely untouched by changes.

III

THE FOUR SHAPES OF THE STATE

I am the state!
Louis XIV. (1638-1715)

How do I recognise the best state? In the same way as you recognise the best woman. – Namely, my friend, by not talking about either of them.
Friedrich Schiller (1759-1805)

The modern state is a sub-human being with a huge body and a tiny head, with an insatiable hunger for money and power and very little reason, very little conscience, very little character.
Richard Coudenhove-Kalergi (1937)

1

Numerous theoreticians considered the state as defined by a "rule" which can compel obedience from all its subordinated individuals and associations. They viewed the state as an "association which is caused by the organisation of a rule". Depending on the kind and on how this rule came into existence a distinction can then be made between "rule-affirmative" and "rule-tolerating" associations (nations).

Others considered the system of laws as constitutive for the state. In that sense, for H. Kelsen the state is "the unit of a system of norms that regulate the conditions in which a particular pressure should be executed on humans".[1] Accordingly, the state is "a nation which has been build into a unit through its law" (J. Binder). Or even more precisely: "the system of laws creates the state" (A. Finger).

The organologists wanted the state to be seen as "a desiring and acting unit" not only in juridical terms, but "also in terms of sociology and the natural sciences". For them the state was an organism comparable to animals and plants: "a being of higher, spiritual-ethical order." Leopold von Ranke wrote: " In power itself there seems to be a mental being, an original genius that has its own life, that fulfils more or less characteristic conditions and that builds itself a *sphere of activity*."

The phenomenon of power also forms the centre of assessment for other thinkers. The theory of power within political science defines: "The state is power". " Power is the prime and connotatively necessary purpose of the state."[2] Bismarck thought along the same lines when he explained: "The only healthy basis of a big state is state egoism and not romanticism." From that, however, there derives "the fundamental question as to in the services of which *purposes* the authority of the state should use its power".[3] Hegel went even so far as to raise the extension of power and war-politics to the level of the "immediate and required purpose of the state." He demanded war when the times of peace lasted all too long and there the population has sunk "into egoism and greed for acquisition"[4].

Others, in turn, saw in the state an instrument for the suppression of the subjugated. Franz Oppenheimer wrote that the state was "a social institution which was forced upon a defeated group of people by a victorious group of people with the sole purpose of regulating the rule of the latter over the former and to protect it from internal and external attacks."[5] Karl Marx formulated this even more precisely: "The modern authority of the state is only a committee which administrates all the common affairs of the whole bourgeois class."[6]

Terminologically there exist different opinions whether an unsettled and travelling herd can already be considered a state or whether a fixed territory of state is one of the criteria of the "state". Depending on size a distinction is made between: herd, association of herds, tribe, tribal relationships, state, confederation of states.

Apart from the "nation of the state" and the "national territory", other important characteristics of the state are the "authority of the state" and the "national constitution". According to the "purpose of the state" the *violent state* serves the interests of an individual or of a group. There, the citizens partly become "part and means of the state". The other extreme is the *security state*. Here the state is merely a "useful means for present individual purposes". As Prince Smith said, it then is a "producer of security". Lassalle, who mocked this kind of state, thought that in such a state he would only be a "watchman in the world of business".

The modern *state under the rule of law* stresses: order, freedom, a flourishing economy, ennoblement of culture, social justice, national unity. The freedom of the individual is reduced in many ways for "reasons of state". In the *welfare state* this influence goes even further.

Depending on the "building of norms for the activities of the highest organ of the state" one speaks of "absolute" and "constitutional" states. If those norms – those rules for behaviour – are limited to the utmost, then one speaks of "liberal" states, if they are far-reaching and strict one speaks of "authoritarian" states. Depending on the kind of government the following distinctions are made: monarchies, aristocracies, democracies. Depending on the influence of individual groups on political life there derive further distinctions: in the "theocracies" the priesthood, rules in "plutocracies" capital, in "bureaucracies" civil servants, in "feudal states" land owners, in "ergocracies" unions of professions (this, for instance, was the case with the guilds), in the "party-state" one party rules, in "polycracies" different, equally strong social groups compete with each other.

With all these different ways of looking at the subject, one thing was hardly ever put into question, namely whether what we subsume under the term "state" should even be subsumed in that way.[7]

2

As was shown to the reader, the energon theory subsumes phenomena which formerly were considered as completely different into the same terminological categories.

With others – and at such a phenomenon we have now arrived – exactly the opposite is the case. Here, this theory leads to the fragmentation of a term which so far has been considered as a justified, even self-evident unity.

According to the energon theory the phenomenon "state" appears as a mixture of four different basic structures. In the following I will depict them as purely theoretical models: the state as a common organ, as a professional entity, as an business organisation and as an organ of acquisition. The order is irrelevant: it does not concern the actual historical appearances of these phenomena. None of these models ever appeared in completely "pure" form. Most of the types of states, on the one hand, can be assigned to one or the other, yet, on the other hand, in most cases also elements of the three others can be found. Consequently, always all four standards have to be considered in an assessment.

This sounds more complicated than it actually is.

3

First model: *the state as a common organ*.

The premises for this model have already been discussed. Energons created by humans are to a large degree built up by "artificial organs" and their power depends on "functional units that have not coalesced". The protection of these units – as with the total protection of the areas of acquisition – can be achieved effectively only through correspondingly strong common organs (army, police, courts, etc.). Such common organs, therefore, were the prerequisite for that development (Part Two, chapter I, paragraph 2, Fig. 15).

Similarly, division of labour and acquisition through exchange can only take place in organised communities. If chaos breaks out, a farmer may still survive but an insurance agent or producer of rocking horses for children, on the contrary, loses his basis of acquisition. Similarly, the order of all relationships of exchange and transfers of rights necessitates a higher, legalising, deciding and protecting authority. This was the prerequisite for the first manifestation of the "state".

In our first model the state is a big common organ of protection absolutely needed by all acquisition structures. The fact that this organ can be millions of times bigger than the energon which it serves should not bother us. The car is an artificial organ of locomotion and is also bigger than we are. If we use it we are surrounded by it completely. Even bigger is a train or a plane. A functional unit is not defined by its size but by its productivity. In the end it may encompass the whole world – like for instance the postal organisations – but nevertheless it is an organ of the individual human being.

With each functional unit it is crucial that it produces its work as cheaply, precisely and fast as possible. Its necessary "appearance" – thus the appropriate spatial-temporal structure – derives from the function that has to be fulfilled.

Therefore, let us consider what this first type of the "state" – which is nothing other than a common functional unit of protection – necessarily or ideally has to look like.

A functional distinction has to be made between protection within the territory of the state (total acquisition area) and that of the whole state vis-à-vis the outside. We start with internal protection.

This internal protection is directed against all energon "colleagues". For the legalisation of property, transfer of rights, etc. rules of behaviour are necessary – namely, behavioural patterns. In their totality they are called a "system of laws". Such a system has to correspond to the general will: thus, an organ is necessary which this system of laws has to fabricate according to the wish of the general public or which it supplies in some other way. Such a system is the organised unit we call the representative body of the people, parliament, the executive body. The people – namely, all matured germ cells which we call "adults" – elects representatives of their interests and these design the necessary recipes. If it turns out that changes are necessary, then this functional unit is also responsible for that[8]. 280

Thereupon further units are necessary in order to see that these patterns are obeyed and to avoid prevent them being disobeyed. This unit we call the "police", the executive.

Thirdly, an organ is necessary in order to punish violations and also, if necessary, to enforce private rights. Otherwise these patterns have no power and no effect. Principally, also the executive could take on this task – and occasionally this has already happened[9]. According to the function, however, a separation is useful. The judicial office requires – in order to be carried out properly – a high degree of specialisation. The police needs physical strength, the judicial office requires mental power. Thus – seen only from the viewpoint of the energon principle – the judicature (the judicial authority) becomes the third necessary organ. Then judicial execution, prisons, organs of distraint and so on can be linked to either the judicature or the executive.

All these units also have to be supplied with energy (money), their commitment and co-ordination has to be secured, appropriate matchings between these units are necessary and controls have to be carried out. From these requirements arises the necessity for a further organ. We call it "administration". With that a central place for decisions is useful – however, in our model, it can only act according to the guidelines of the people’s representatives.

These, then, are further patterns which do not really order the relationships between citizens, but which determine the rights and duties inside the common organ "state". These patterns we call the "constitution". They, too, are elaborated by the representatives of the people.

The raising of the necessary amount of energy "money" and its correct distribution constitutes a particular problem within the administrative function. The common organ "state" is paid for by the citizens – thus proportional contributions have to be levied. This total activity requires specialisation – it presents itself to us with the functional unit "Ministry of Finance".

As far as the protection vis-à-vis the outside is concerned, the units mentioned do not suffice. Associations of enemies do not care about the constitution of the people's representatives and cannot be put off by judicial authority and prisons. An additional, particularly powerful and expensive organ is necessary: the national defence. It presents itself in the shape of fortifications, weapons, soldiers, moreover in units for the investigation of the enemy (espionage) and internal defence against enemies (counter-espionage).

This unit is independent and requires – as a vitally important backbone – its own body of co-ordination. The co-ordinated units of the administration are not suited for that. On the other hand, the assigning of the necessary energy (money) can be carried out by the financial office which attends to internal protection.

The centre of the co-ordination of the defence has to be equipped with special authorities. Often, the repelling of the enemy requires fast decisions – it cannot be that first the people's representatives have to be called in. This head of co-ordination must therefore be granted more freedom of action.

Finally, apart from the internal and external protection, the community also needs representatives in other countries. This task the head of the administration can take on additionally, yet, for this also any other person elected by the people's representatives is suitable. Thus, what also belongs to this first – and cheapest – model is a representative head of the state. In addition to that, an organ for the maintenance of relationships with the environment, except in the case of war, can exist: a "Ministry of Foreign Affairs". Already in this first model which only consists of what is absolutely necessary, we have most of the familiar basic units which build up "the state". The bigger a state is, the bigger and the more hierarchically graded are the single functional units. The smaller it is, the more frequently it happens that one and the same unit is in charge of several functions.

The state as a common organ is totally and completely beneficial to the public. No superfluous tool, no superfluous department, no superfluous function should exist, no superfluous expenditure of energy should occur. As with such a huge shape natural selection can hardly have an effect, a corresponding *inner* selection, an organ which is aligned to control and rationalisation is also important. According to its function it belongs to the financing unit – in close co-operation with the people's representatives.

The picture which I have drawn here corresponds most closely to the type of state characterised by extreme liberalism. It creates security but otherwise does not intervene with the individual functional units. It creates "order" – however, only to the degree needed for internal and external security. Additionally it also provides the representation which is also absolutely necessary.

4

Second model: *the state as a professional entity*.

This type of state may historically be the oldest one; it was the predominant one for long periods of human history and was only supplanted by others during the last two hundred years. Here and there it still exists today. For the understanding of the phenomenon "state" it is highly important.

The term "profession" seems to be far off the mark in this respect. Yet it is fully legitimate and should not be avoided. The energon theory subdivides the human entities of acquisition into professional entities and business organisations. Acquisition structures built by humans are called professional entities if they function as the extensions of the single individual. The second model clearly belongs to this category.

One of the first "professions" of humans was hunting and robbery. If such a hunter or robber surrounded himself with assistants to whom he gave orders and whom he rewarded with part of the booty,[10] then his professional entity was extended correspondingly. His henchmen and companions served him as willing functional units. The prey went to him. Parts of it he distributed.

We can also call him – if we want to– the first entrepreneur.

A small step led to the unsettled, autocratically led herd, to the war alliance. The chieftain, general, tribal prince –whatever we call him – forms the centre. The unit organised around him is his extended body. In whatever direction this body moves, he carries his space of power and his acquisition area with him. The robbery, the profit, the prey principally belong to this top performer. From them he nourishes and finances his subordinated functional units.

Thus, while in the first model the state in its totality is an organ, or a functional unit for that matter, in the second model it is a real energon. It is a professional entity, which – as will be shown immediately – extended and inflated itself much more than any other. No other kind of profession produced a bigger power structure.

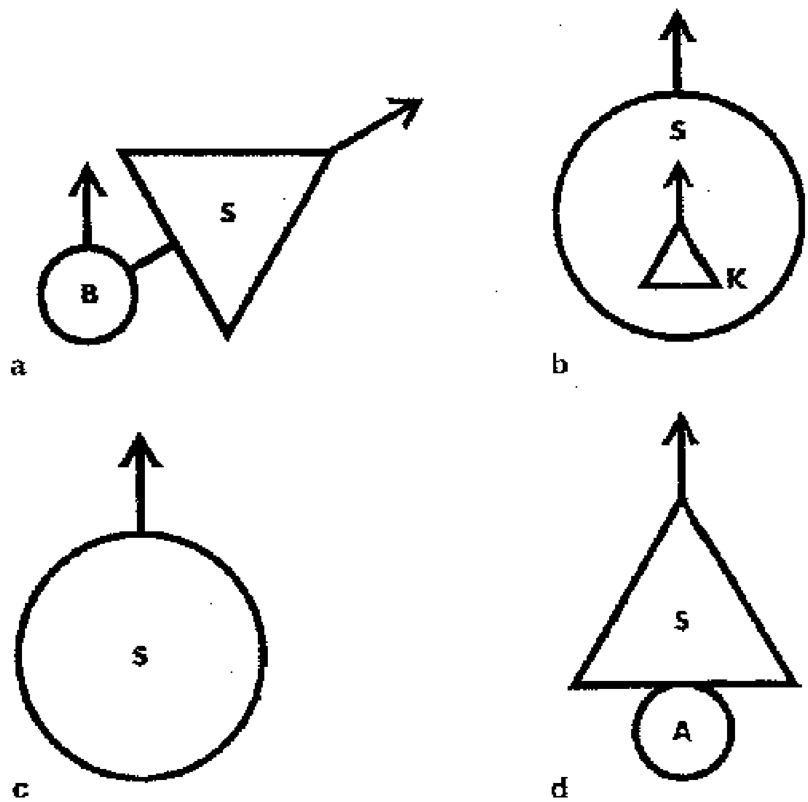

Figure 36: The four basic types of state

a) *The state as a common organ*. This state is a big, protecting common organ (S) for every citizen, professional entity and business (B). Its costs are paid proportionally (through taxes); it has two important main functions: protection against the outside (against enemies) and protection inside the state's territory (property, security, etc.).

b) *The state as a professional entity*. This state is an extreme extension of a single human being, of the ruler, the king, the emperor (K). One of these forms the steering centre all citizens and institutions of the country are functional units in its professional entity. It is a real energon, comparable to a classical entrepreneurial business.

c) *The state as an organisation of acquisition*. This state, too, is a real energon, however, one of a higher order of integration. It is an supra-individual structure where all citizens, professional entities and business organisations are functional units. The interest of the state dictates the respective activities and payments for them (supply).

d) *The state as organ of acquisition*. An exploiter (E) uses the state as a "milch-cow", as an aid for his/her acquisition. This exploiter can be another state, a ruler, a ruling clique or a party, This "state" is a functional unit which has to serve the interests of the exploiter: it is structured accordingly.

These four basic types are hardly ever realised in pure form; almost any state consists of elements of all four types. Further details in the text.

This unit which used to travel settles down. The land is farmed and cattle are bred. Now the acquisition area is precisely determined and stabilised. The legal situation remains the same. The whole acquisition area basically is the property of the prince, he pays reliable employees with parts of it, to the others it is leased profitably.

This line of development then leads – without basic change – to really huge formations of states. The prince or king here is nothing else than an entrepreneur. It is *his* country, *his* structure of power. He tries – following his human impulses – to pass it on to his children but this is not necessary for that structure. He or his inheritors might be murdered – and somebody else "usurps" this profitable position. It does not change the professional entity at all. Numerous times in history have ruling dynasties been superseded by others – and the basic legal structure could still remain untouched[11].

Now, what does this kind of profession look like, what requests does it make and which functional units are necessary?

For the herd, easy to view, this was clearer than for an already vast, autocratically ruled empire. Here, the maintenance of command and the keeping of the functional units under one's own dominion is of primary and decisive importance. According to the energon theory here the problem of bonding is in the foreground. The functional units have to be kept from running away and making themselves independent; their willingness to function has to be maintained. How can this be achieved?

The answer which suggests itself is: through power. If one contemplates this more carefully, then it is a rather amazing achievement to counter each functional unit by another one. Thus, the matter is not that simple after all.

The main weapon to achieve this subordination is a different one. For the subordinates – at least for the most important ones – there has to be more profit from employment than from independent work. This is the key for the comprehension of such creations. In the beginning – and also long after – the individual human being only had the possibility to build his own professional entity within such associations. Alone, they were at the mercy of wild animals and other humans without protection.

Thus, the individual human being was willing to join such a power structure – if he had the impression that this would offer concrete advantages.

This was the starting point. This made it easier for human beings with the qualification of leaders to attract others and to make them parts of their professional entities. Here an exchange of achievements took place. The subordinate accomplished his service – the prince protected him and offered him a safe livelihood. The necessary achievement in this particular job "prince" or "king", thus consisted in the ability to build bonds – partly through contracts of exchange, partly through violence. And then he also had to ensure that these bondings and this willingness to function remained intact.

For that, functional units of control and punishment were necessary. Such organs he could build by making corresponding payments. In other respects, all main functions could remain concentrated in his own person. He was his own "Minister of Finance": the prey came to him and he distributed it. He was his own General: he commanded military actions. He was his own lawyer: he dispensed justice.

Innate reactions of humans made the execution of this job easier. Our social instincts are – just as with higher mammals which form packs – designed in a way so that also subordination to somebody with more power provides feelings of satisfaction. Persons who want to lead under all conditions are more the exception. Incidentally – and everybody knows this from the own experience – humans readily subordinate themselves to somebody whom they consider as having a higher qualification. To work for somebody like that, to be praised and rewarded by him bestows considerable feelings of happiness. Persons with outstanding intelligence, strength and leadership qualifications were able to trigger off this innate following-reaction in humans. In economic terms this means a saving of otherwise necessary control and force. Also luxury and the unfolding of power caused corresponding intimidation in the subjugated. Ceremonies, celebrations and similar fuss stimulate feelings of reverence in subordinates. No wonder that the rulers used such means – and even use them today. Another form of "outside energy" which was put to use here was structures of the human imagination: especially the religions[12]. Nothing protected the ruler better than when he made himself the god or one of the relatives of the god-family. This was also one of the few measures of power which effectively protected the line of succession. Another, no less important means of power was moulding and habit. The symbol of the ruler was imprinted onto the adolescent person in his sensitive period, and all ethical and aesthetic values were related to this ruler and his family as positively as possible. The result was that people became so strongly accustomed and intimidated that most of them did not even think of the possibility of changing the state any more.

This type of state, therefore, derives from principally different roots than the model described first. It is not a common organ but a professional entity, a real, independent energon. The means that hold this unit together are thoroughly different ones. It is a fundamentally different phenomenon – however, it leads to a highly similar structure.

The association becomes settled, the monarch is in charge of the country and enlarges it: a powerful reign is created. Inevitably, there arises the necessity to build rather similar common organs as with the first model.

If the community is to flourish – and only then can appropriately high taxes can be levied that go to the king – there has to be internal peace. In this case this peace is not created by the people’s representatives but by the king – however, in order to be effective it has to appear similar to the first model in many respects. Police are necessary, legislation is necessary, prisons are necessary. An army for the protection against the outside is necessary. All these units have to be co-ordinated, they have to be supplied with enough energy, they have to be controlled and attended to. The overall leadership and representation, of course, is the task of the ruler – but here, too, we have a "Ministry of the Interior", a "Ministry of Finance", a "Ministry of Defence" and later a "Ministry of Trade".

Concerning its external appearance, therefore, a quite similar shape is created. One difference lies in the fact that there are no people’s representatives who draw up laws and the constitution. The behavioural patterns are dictated by the king, orally or in written form. A second difference lies in the fact that the police have to be more aligned to avoid insubordination and revolution. A third difference is the higher taxes – they have to cover not only the actual expenses of the state but are partly the king’s "proceeds".

If the king is wise, he will keep these proceeds within reasonable limits. If he is unwise, and the feeling of power goes to his head, then he will squeeze out of his acquisition area whatever is possible in any way. In this case he forcefully suppresses the grumblers. The end – sooner or later – is revolution.

What is very remarkable indeed is how model two, as fast as lightning, can change into model one or model one into model two.

5

Let us take the first case: a revolution.

What has to be created is representation of the people. Certain one-sided laws which serve the ruler have to be repealed and a constitution which secures the common interest has to be built up. Otherwise, many things can remain the same. Military power is necessary, police and 286
judicial authority are also required. A certain number of persons have to be replaced by others but the actual functional units can remain. The only change is that slightly modified behavioural patterns force them to pursue slightly different activities .

A second and opposite case: a state which functioned as a common organ (model 1) is usurped by a dictator or by a "tyrant". In this case, too, the latter can practically take over the complete apparatus: only minor changes are necessary: the people’s representatives are removed, the authority of the police is made stronger, the laws, insofar as they do not suit the usurper, are changed, the taxes partially go to the usurper. These changes can be carried out relatively quickly, the basic structure can remain the same. Reliable people who are paid correspondingly are exchanged with the former holders of the posts. With a certain degree of cunning this transformation can be achieved in only a few days.

Two things become apparent from this. First: model one offers an excellent possibility and a big attraction for the usurpation of its apparatus of acquisition. Secondly: in order to prevent this, further measures of security are necessary in model one.

The possibility to seize such a gigantic business organisation has been exploited frequently. Somebody who manages to eliminate the people’s representatives and to place himself/herself at the co-ordinating centre of a democratic state gains an incredibly huge professional entity overnight. Everything is, as it were, ready for him/her; only a few changes have to be made.

What is then created has so far – due to the structural resemblances – also been called a "state", just like that from which it derived. According to the energon theory, however, they are two fundamentally different structures.

In order to prevent the danger of such a transformation, therefore, appropriate precautions have to be built into model one. No external power can threaten this type of like the danger from inside. For a cunning person, as it were, this is an immensely profitable body of acquisition that lies ready to hand.

And not only the body of acquisition – but also the body of power. This is an important point. With the innate instincts of human beings, power often provides far greater satisfaction and pleasure than a very successful body of acquisition.

The military leadership is predestined for this way of taking over power. For the already mentioned reasons it has to be equipped with appropriate authority. It has the strongest means of power under its control. Thus, it is hardly surprising that most often it was military leaders who could be found among the usurpers.

6

Third model: *the state as an business organisation*. 287

Galbraith calls those American concerns which have cast off the management of the enterprise and have become organically, self-managing acquisitional structures "matured businesses". Analogously, the third model can be called the "matured state".[13] It is not a common organ anymore, nor a hugely blown up professional entity. It is an organisms of a higher level of integration – similar to the big businesses.

These states are characteristic for our modern world. Due to the fact that the free spaces have already been conquered and distributed, these states are primarily economic and social organisations. By increasing their total ability of acquisition they increase – in the ideal case of model three – also the individual acquisition of the entities of acquisition by which they are build up.

Here, too, both internal and external protection is necessary: practically the whole apparatus of model one. In addition to that, however, much more is needed: economic and nutritional politics, support of the traffic and the information system, of education and research, the upkeeping of the culture, social welfare, protection and attending of employees and much more.

This means, many more common organs are added – the partial costs increase correspondingly. Yet, these are costs which serve the general interest – or which are supposed to do so. The ideal structure of this type of state can probably be determined with the help of the energon theory very exactly. These states are real organisms and as such directly comparable to plants and animals. With the state as professional entity the human impulses of the ruler play a crucial role. Such states only to some degree behave according to the statistics, some of them quite idiosyncratically and individually. Nowhere else does the human independence of mind and striving for luxury unfold better than there. The matured state, on the contrary, can be determined statistically. Here the innate, unpredictable tendencies of the germ cell "human being" count less and less. The total usefulness pushes itself through. It is identical with the basic structure of competitiveness[14].

7

Fourth model: *the state as an organ of acquisition*.

Let us suppose that the state conquers another one and makes the latter pay tribute. From the viewpoint of the energon theory in this case an energon makes another one its slave, servant, a functional unit. It makes it into an additional organ – namely an organ of acquisition. Seen from the point of view of the victorious energon the unit that was gained has exclusively the function of acquisition. It has to create acquisition and to hand it over. An independent energon has become a milch-cow.

Again, most of the institutions that already exist there are still necessary. If the milch-cow is to supply enough milk, then order has to prevail in that structure, it has to be shielded from external disturbances and threats. It needs co-ordination and attention just like any other organ. What changes are the behavioural patterns. The people's representatives may remain, however, under the supervisory control of the winner. The essential behavioural patterns are now dictated by the winner. While so far – in the case of a liberal state – it was largely up to the individual how much he wanted to earn, now only one function is required: acquisition and handing over. The golden freedom has gone – and the subordinated citizens can only to a limited extent use their own judgement and enjoy the fruits of their work. A target is imposed on them. In order to meet this target, correspondingly more severe control, stronger authority of the police and tightened centralisation are necessary. The organs required for that can largely be built up by local "strengths". If appropriate advantages are offered (money, power, privileges), one or the other citizen becomes a "traitor", a "collaborator". He unties the old bond and builds a new one – thus, helps in the suppression and exploitation of his former colleges. 288

Therefore we see that model four also corresponds with the others as regards many of its structural elements. And yet, in essential aspects it is fundamentally different. It is not an energon – it is an organ, like model one. Accordingly, just as with model one – in the ideal case – where everything has to be aligned to the function of security, here – in the ideal case – everything has to be aligned to the acquisition. Inside the functional unit the whole structure is always dictated by the effect that has to be achieved: everything else would be a waste. It is the same here. Inside the acquisition organ not even the smallest body of luxury is appropriate. Every functionless unit in this organ is a burden and has to be removed or to be forced to work. Every unit needs an adequate supply of energy, the necessary care in order to remain able to function, however, there should be no surpluses – this creates a sad situation in this model for the people affected by it.

Also with model one – the state as a common organ – the functional units are aligned to achievement and accordingly nothing in this structure should serve individual luxury. Yet here we have bonds that have been build voluntarily – for appropriate payment. Thus these units "affirm the reign". In model four – the state as an organ of acquisition – the bondings and duties are based on force. Here the units are "tolerating the reign". This results in the necessity – inevitably –of an additional structure of effect for the maintenance and control of the bondings and achievements.

The state that was accused by Marx of being nothing but an "administrator of bourgeois interests", also belongs to this model. A group of people can also make a state into an organ of acquisition. To the outside, again everything appears very similar: many major functional units (army, police, Ministry of Finance, courts etc.) are more or less identical with the ones of the other models. Additionally, however, here there exists the structure of effect which is necessary for the maintenance of force. Here it appears less openly than in the tribute-state, however, functionally it is equally important. In the tribute-state there is not much point in hiding force (although this can be tried in certain ways), in the interest-administrating state (as I will call it, following Marx), on the contrary, this is highly useful. The better the actually existing force is hidden, the more economies can be made concerning the otherwise necessary measures of control and compulsion. This is the "hypocrisy" against which Marx declared war, the "mask" which the Marxists wanted to snatch from the faces of the exploiters. Model four is – beyond good and evil – an energetic structure where human emotions are merely elements which also have to be taken into consideration. For this model hypocrisy is an important factor. It is a possible means for rationalising an organ of acquisition and its effectiveness[15].

Finally, a third complex of phenomena belongs to this fourth model: all "corruption", all individual enrichments at the expense of the state.

As with model one the totality of the "state" is a common organ which serves everybody – the big structure of the "state" can also for many at the same time become an organ of acquisition. Like parasites hundreds of acquisition structures can suck at this structure and branch off the stream of energy into private channels.

Here one does not speak of a normal, "honest" business of exchange. The state is, in any case, the biggest client and the richest source of acquisition inside the whole territory of acquisition. It requires numerous achievements in every model and acquires them – through exchange – with money.

The state only becomes an organ of acquisition when an exploiter changes parts of the state’s structure according to his interests, when he brings parts of this body into his power and then sees to it that the state’s expenditure does not serve the state itself anymore – but primarily himself.

This, for instance, is the case when the state is made to acquire equipment, apparatus and weapons which are either too expensive or which are not even needed or which are in worse condition than what can be acquired for the same price.

C. N. Parkinson pointed out another important form of exploitation[16]. The state organs show a tendency to expand themselves more than is necessary. From the point of view of the single acquisitive individual this is understandable: enlargement means a growing of power and profit. If, in the state, departments become superfluous (for instance after a war is over), then often they try hard to not be removed: they simulate a non-existent importance, create problems where there are none, and by that fight for their rights to exist with cunning and imagination. Such and similar tendencies threaten the state apparatus everywhere. This is which is meant by "human inadequacy" which is often discussed in political science.

According to the energon theory it is simply a matter of conflicts of interest between energons. The huge structure of the "state" can be made into an organ of acquisition by another energon – likewise, also groups inside the state itself can be turned into organs of acquisition by entities of acquisition which influence parts of it, or by state organs which blow themselves up within the total structure beyond what is functionally necessary and at the expense of the state expand their individual entities of acquisition.

It goes without saying that in the latter case of the "corruption-state" (as it can be called) the veiling of the means and hypocrisy are even more important weapons than in the "interest-administrating state". Any such tendency has the normal control-organs of the state as its enemy. This system of exploitation is perfected, if precisely these control-organs can be incorporated into the net of the secret exploiters.

8

From these four models, which are hardly ever realised "purely", all types of states – I would claim – are built up. They are, as it were constructed according to four different building plans of which every single one is a closed system of relations functionally dictated and which can even – at least in principle – be determined arithmetically.

Between each of these models and the rest there exist all conceivable transitions and all conceivable combinations.

The transition from model two (professional entity) to model three (business organisation) took place visibly from the absolute via the constitutional kingdom to the republic. The controlling power of the ruler is reduced bit by bit and the power of the people’s representatives and of the common interests grows. In the end the king maintains himself as a magnificent representative (which is also a function) or is totally "relieved from the service of the state".

The transition from model one (common organ) to model three (business organisation) is marked, for instance, by the ideas of W. Eucken[17]. Extreme liberalism (*laissez faire, laissez passer*) was supposed to grant the individual the greatest freedom. However, as a matter of fact, it led to the building of monopolies which robbed many acquisitive structures of the possibility of free development. From that derived the idea of the state as exercising influence on the economy, hence the idea of economic *policy*: that is, the limitation of the economic freedom by the state – in order to secure the freedom of the economy. In this case the state intervenes more and more into matters concerning the individual and is not merely an organ of protection any more. It becomes an energon itself with the highest state interests. The extreme is achieved with the communist state which itself becomes the central business, the common economic enterprise and makes all its parts into functional units.

The transition from model two (professional entity) to model four (organ of acquisition) shows a bad, egoistic ruler following a good one. When Frederick the Great said: "The king is the first servant of his state", he spoke in the sense of model two. This statement is not merely – according to our conventional assessment – a "beautiful and moral" one, but economic for this model – energetically correct – and in this sense "wise". Every energon, if it wants to survive, has not only to be lord, but also servant of its organs and functional units. Somebody who overextends their heart, eventually is harmed, people who do not take care of their legs and break them later walk with a limp. The same is the case with the professional entity of the "state". A good ruler has to reign well but also has to serve. Only then does that body of acquisition endure. Then it works with the smallest amount of "inner friction".

If a good king is succeeded by another one who only considers his kingdom as an acquisition organ, then maybe for some time everything remains the same. However, only too soon dissatisfaction arises. It has to be dealt with – in order to maintain the organ of acquisition. And thus it happens that the one model – necessarily – changes into the other one: an additional inner structure of control and the practice of force has to be implemented. Gradually, the parts that approved the reign become a society that merely tolerates the reign – which is dangerous for the ruler.

What is interesting inside "democracy" (model three but also model one) is the party system. It is a functional substitute for natural selection which has only little effect with states (due to their small number and long lives). Here another mechanism of improvement is necessary – especially considering the constant danger of the influences of model four, namely the spreading of parasitic phenomena. The opposition (additionally fuelled by highly personal interests) exerts an appropriate controlling function and elections replace the expensive processes of revolutions. Admittedly, this solution, too, has its functional weaknesses. The party system also opens up a range of possibilities for model four, thus for corruption. Or a party uses its power for the elimination of others and makes its interests (which can also be of an "idealistic" kind) the main thing, and expands by force – and therefore here too the pendulum swings in the direction of model four.

Inside the "states" many different human entities of acquisition develop, as in a tropical flower garden. Which are the most successful ones? What is their maximum profit?

Comments:

[1] “Allgemeine Staatslehre”, Berlin 1925.
[2] L. Duguit, “Traité de droit constitutionnell”, Vol. 1, Paris 1921, p. 398.
[3] R. Thoma, “Staat”, in: “Handwörterbuch der Staatswissenschaften”, Jena 1926, p. 755.
[4] Collected works, Vol. 7, Stuttgart 1938.
[5] “Die Geburtsstunde des souveränen Staates”, 1954, p. 427.
[6] Manifesto of the Communist Party, 1848.
[7] H. Kelsen also had such doubts. He thought, “that already with a superficial examination of scientific, linguistic usage, more than a dozen highly differing meanings of the word ‘state’ can be found”. (“Allgemeine Staatslehre”, p. 3.)
[8] Here and in the following somebody who works within the administration. may find it particularly difficult to follow the arguments of the energon theory The habit of viewing human beings as units and their functions as properties of those units is deeply rooted. Accordingly, for instance, a minister or head of a department has rather different tasks. However, according to the energon theory it is always the effects, the functions which are in the foreground – they and not their vehicles are the actual reality. Today with most effects there are always different departments co-operating with each other – and today most departments have several functions. Therefore, if somebody who is rooted in the conventional way of thinking assesses the energon theory with the standard that is self-evident to him or herself, then he or she will be provoked by contradictions everywhere. Here I can only recommend: trying things the other way round. Certainly, in this case what seems simple becomes incredibly complicated. Yet, if we search for the actual units that build up the structure of effects, then we have to take into account that in some cases – as for instance here – it will turn out as a highly diffuse shape. Double functions, extensions of functions and joinings of functions within the state’s administration – as well as in that of businesses – have led to an extremely complicated network of effects. 292
[9] An example: a sheriff, as he frequently appears in westerns, who both arrests and passes judgements.
[10] The family and kin were the first such groups.
[11] In Serbia the Obrenovic and Karadjordjevic were hostile ruling dynasties which repeatedly superseded each other. With the professional entity into which they in turns slipped, of which they in turn seized control – with the “state” and its system of laws – nothing changed.
[12] The religious reader may here disregard his/her own religion and only think of the others. That at least some of them were figments of the imagination may hardly be doubted.
[13] H Krüger calls it the “modern state”. (“Allgemeine Staatslehre”, Stuttgart 1964.) G. Jellinek called it the “completed/perfected state”. (“Allgemeine Staatslehre”, Berlin 1914.)
[14] H. Krüger says of the “modern state” (which he sees as the state per se), that it was “a structure which belongs to history”, it was “a historical answer to a timeless question”. And he continues: “Because such a group has always to be built and held together, it constantly needs order and leadership, and, on all sides, it is in confrontation with the environment.” (“Allgemeine Staatslehre”, p. 1.) Almost the same formulation can be applied to all energons. Their essential characteristic is: they are answers. That is, answers to a historically changing environmental situation and to problems which every kind of interaction of units raises.
[15] W. Eucken also considered “ideologies” as such tools. According to him they are “weapons that have been built according to specific plans used in the economic battle”. They are supposed either to “veil the true motives of the demands of interests or give them greater force”. He writes: “The whole human history of ideas is determined by attempts to secure claims for power ideologically or to support it when it is attacked.” (“Die Grundlagen der Nationalökonomie”, Berlin 1959, p. 12.) The judgement passed on “ideologies” here is without doubt a bit too one-sided. Yet, doubtless they were – and still are – perfect tools for building a professional entity or an business organisation, for strengthening it and rationalising it.

[16] “Parkinsons Gesetz und andere Untersuchungen über die Verwaltung”, Düsseldorf-Stuttgart 1957.
[17] “Grundsätze der Wirtschaftspolitik”, Hamburg 1959.

IV

THE BIG WAGE-EARNERS

The central problem of the economy is scarcity.
W. Eucken (1959)

Wealth is comparable to seawater. The more one drinks, the thirstier one gets.
Arthur Schopenhauer (1788-1860)

1

Neither in the animal nor in the plant kingdom are there "big wage-earners". It might well happen that plants or animals get into particularly "favourable living conditions" and then come across enormously productive sources of acquisition without competition. This is not of much use for them, though. Their maximum growth in height is determined by gravity and by their type of structure. They can merely invest their surpluses in reproduction – which is not a favourable solution for them because by doing that they create competitors for themselves. These in turn also reproduce and soon all places of acquisition are full. As a result, sources of acquisition and the organisms exploiting them always automatically come to balance.

This means: with plants and animals that every monopoly removes itself automatically, as it were. For the successful individual this only results in a moderate advantage. The actual profit only goes to the *species*. Its overall volume is increased.

The life flow only profits from that process in the case of plants. If a plant can spread itself over areas that have not been acquired previously, then this means growth of the overall life structure, of the overall volume of life. With animals, on the other hand – no matter whether they live on plants or animals – a monopoly is of no consequence. In the process of feeding there is always only one organism changing into another one. The total life volume is not affected at all, or only to a limited extent.

With human acquisition structures the situation suddenly became different. Their structures are of a kind that enables them to collect any amount of surpluses – and then also use it as they like.

Nevertheless, also with those energons the principle of self-regulation is maintained – unless the "state" intervenes by force. If one source of acquisition turns out to be particularly lucrative – that is, "if the sources of acquisition concerned are plentiful" – then other people quickly build analogous acquisition structures. Here, too, a balance between the productivity of the source of acquisition and the volume of the exploiting energons is achieved automatically. Thus, here, too, the relation "levels off".

There is an exception, however, if there is a monopoly which can be maintained. Then one acquisitive individual suddenly becomes a big wage-earner[1].

2

Up to the evolutionary stage "human being" in the flow of the evolution the *species* reigned. Disregarding a few exceptions – for example the "pashas" among apes –, then one can say: individual energons have never been able vastly to increase their positions of power. Even if an individual was very capable: its success was actually of no benefit to itself but only to the species. It reproduced itself, thus it increased the specific life-substance of the species – for the individual itself, however, clear limits were laid down. One could claim that over that whole period the individuals were always only tools – "organs" – of the species. The species was the actual instrument – the actual "organ" – of the life flow. If the species grew, so did the life flow. It was the conflict of species with the environment constituted the actual fight. 294

In passing beyond the developmental stage "human being", the significance of the species suddenly diminished. The energons built by humans now no longer coalesced so closely: the limits for on size ceased to apply to a large extent. What is more, surpluses could be accumulated and used in any way required. This meant: energon *individuals* were now suddenly able to attain enormous size and immense power. One may for instance consider those states that unfolded as real energons (as professional entities or business organisations). They were energon individuals that sometimes had gigantic potentials of power which promoted the life flow considerably. Thus the individual was able to become an important instrument of the life flow – the significance of the species could decline.

Going further: not only the energon individual suddenly gained significance but – *and above all* – the germ cell it is built up by: the functional unit "human being".

As a matter of fact, the surpluses practically flowed into that constituting and steering unit: it was up to that unit whether the surpluses were used for the growth of the energon body or whether they were spent in another way. The individual "human being" became the key point of further development, it became the actual vehicle carrying on the life flow.

That unit often built completely different energons at the same time or one after the other, it invented *new* types of energons, it suddenly replaced the mechanism of improvement which up to then had slowed down the evolutionary flow through mutations, hermaphroditism and natural selection. The unit became the actual administrator of every surplus and used it in a twofold way for the promotion of energon development. First, the unit designed and built new energons, secondly, it created luxury items which themselves led to the formation of further types of energons by serving as new sources of acquisition.

3

We have now reached one of the most difficult points of our investigation: that is, the actual position of human beings in the evolution. Humanity became a germ cell that built energons – thus it became a functional unit. That functional unit, however, proceeds completely independently and on its own – it becomes the actual core of further development.

Following the theory of the energon we come to a very surprising conclusion: there exists only one structure in the evolution comparable to humans in this respect: the virus.

As has already been explained, viruses are structural blueprints that have become independent, as it were (Part Two, chapter V, paragraph 5). They penetrate other energons with the result that the affected cells do not "fulfil their own duties" anymore but change their work to the production of the viruses. The virus replaces the behavioural patterns which are anchored inside plants – and thus the cell’s machinery now continues to respond to someone else’s command.

Here a clear, functional parallel to a human being’s activity exists. Let us for example consider 295
a human individual who builds up the professional entities "herd", "association", "state". Its effectiveness consists in the ability to include other energons in its structure of power and to make them to serve *its interests*. In other words, it makes other energons serve as its functional units. With an entrepreneur who employs people and expands his business the same happens. Whether it is by force or by an act of exchange that this "reorientation" is brought about is irrelevant. What is important is the result: subjugation to one's own interest[2].

Yet, one difference to the virus – always seen from a functional point of view only – is the fact that humans do not induce those other energons to perform fixed and always the same activities. On the contrary, the unit "human being" independently builds new structural blueprints and behavioural patterns – and transfers that multiplicity to others.

With that we have come to an assessment of humans which differs extraordinarily from previous notions. It is of practical importance in that it signifies who it is in the second stage of evolution who holds the power and the plan. The importance of the *species* is still not to be underestimated. The shoemakers, the electrical engineers and the opera singers themselves build their respective lives just as grasshoppers, lime trees and earthworms do. True, with human professions we find special professional representatives and unions – as special instruments of the cohesion among the species. Nevertheless: the primacy of the *species* is broken. Single acquisitive individuals can achieve paramount significance. Yet, the actual significance lies with the human being as a constructive entity – with the human individual, which can now exercise special, almost limitless power.

This brings us back to the subject of the "big wage-earners".

4

Galbraith expounded the interesting view that the "backbone" of human power has shifted twice within the course of history[3]. First of all, ownership of land had been the key to power. Later – with the beginning of industrialisation – capital became the central factor of power. Finally, since about fifty years power has depended on specialisation and especially on technical organisations and planning organisations. Today capital is much easier to obtain than are suitable forces for planning and leadership. "Power always associates with the factor that is the most difficult to obtain and to replace."

What follows from that is that in the first period the best possibilities for income lay with the ownership of land, in the second period with the ownership of capital, while now, in the third period, they have shifted to the ability to coordinate and to specialised knowledge.

Following the theory of the energon I come to a similar point of view. One has to add further factors to the three factors of power mentioned, however.

5 296

The first factor of power was not land but security. Human development of power was based on artificial organs: these, however, required the prerequisite of appropriate protection. Therefore somebody who could provide such protection had – automatically – the first position of power, the first really lucrative monopoly. Automatically, other people subordinated themselves to that structure: to its domain of power[4].

This is also the reason why with the types of states I put the model "state as a communal organ" on top. Its structure is the basic prerequisite, the basic function of every state and has to be contained wholly in all other models as well. Historically, only in rare cases (and maybe not even then) was this type of state to be found at the beginning. Yet, functionally it is the actual core.

This is even more the case if one considers that weapons of defence in most cases can also be used for attacks and raids. Thus, subordination to an organisation providing security usually also means participating in the forms of acquisition which were available to individuals only to a very limited degree. The Teutons, for example, despised the activity of forest clearance. A tribe living in Sweden called its king (Thoss) scornfully "Traetelyja", the "tree feller". Their philosophy was rather to conquer areas where others had accomplished that work already.

Somebody who could both provide security and act as a robber baron had a strong monopoly of acquisition during that first period. Forces who wanted to benefit from the security and the robbery subordinated themselves voluntarily to him. They were well prepared to accept a moderate flat rate or share of the profits – while the ruler, the first entrepreneur, got the actual profit.

This position became even stronger if the acquisition structure became permanent and if the ruler managed to bring the whole domain of acquisition into his personal possession. If this order stabilised and if the subordinates got used to it, then the ruler had a perfect monopoly. Directly or indirectly he could profit from the input of every individual. Directly or indirectly all returns came from the ground – and he had in hand that central means of power.

Thanks to that secure basis it was possible to undertake wars of conquest and to take home slaves and booty. In other cases the subordinated areas were forced to pay tributes. Even big states – Rome, for instance – still based their power on such acts of robbery and flourished on the basis of forced labour performed by other nations and foreign slaves working in their own country. At its peak, the Attic population of Athens consisted of 67,000 free citizens, 40,000 foreigners and 200,000 slaves. The cities of Venice and Constantinople specialised in piracy. This kind of acquisitive activity was carried out by England up to the 17th century. The great Francis Drake was nothing more than a pirate in the service of the English Crown. As D. Campbell wrote, " almost every English gentleman on the West coast was employed in that business."[5] Foreign ships were seized and only released for a high ransom. An attack on the Ottoman merchant fleet carried out by the Grand Duchy of Tuscany is said to have brought in 2 million ducats.

Spain and Portugal stretched out particularly long acquisitive arms: they raided the subordinated countries in South America. In 1528 the organ of acquisition of Cortez brought in 200,000 pesos (approx. 5200 kg of gold). In 1535 Pizarro destroyed the Inca kingdom and extorted gold to the value of 1,326,539 pesos as ransom money for Atahualpa. With the conquest of Cuzco the booty – in as far as it was handed over – amounted to an equivalent of approx. 185 tons of silver.

If the robber state was reigned over by an absolute monarch, then the total returns were his. If a clique shared the power, then it was the core of that professional entity which profited proportionately.

Inside the states those in the positions of power had a total monopoly. If they considered – according to model four – the state as their organ of acquisition, then there were innumerable possibilities to squeeze dry the subordinated people and acquisition structures.

The common contribution – "tax" – became an internal tribute. The ground was rented out as favourably as possible and brought in not only a corresponding "basic annuity" but moreover also work for free labour (service at the front, bondage). A splendid business was "haggling over posts". At the beginning of the 17th century the post of a senior official of the supreme court cost 45.000 livres[6], that of the president of the Grand-Conseil cost 100,000 silver ecus. In 1664 there were – according to a count by Colbert – no less than 45,780 "charges" which were allocated by the aristocracy and for which produced 419,630,000 livres annually[7].The post of the vice king of New Spain cost 4000 pesos in the year 1607[8]. Each of those posts was again a monopoly of power which could be allocated by the total monopolist of the state or by the one ruling it.

What was also very lucrative was the granting of monopolies on the sale of salt, alum, mercury, coal, iron, glass, leather, paper – and even on cinders, cloth, used shoes, needles, oil, vinegar, cards and so on. The shelves of ore brought enormous incomes for the German Counts. What became the most important source of income of the Teutonic Order was the monopoly on amber. Considerable incomes for the king of Portugal came from the monopoly on spices in East Asia.

Thus those in power were in a position to manipulate money. They could force their subordinates to exchange gold money for coins of less value and could mint the latter in a higher number. For instance, the bishop of Magdeburg issued wafer-thin hollow pfennigs. They had to be exchanged after about three months with a loss of twelve per cent as otherwise they became invalid. In doing this he prevented any hoarding of money, forced the rapid circulation of money and achieved an unavoidable capital tax. Under the reign of the Stuarts new kinds of infringements of the law were invented together with corresponding fines in order to gain new income. For the pope the selling of indulgences was a profitable monopoly – in which also the princes had their shares again. They charged fees for allowing the proclamation of such indulgences. In 1517 Christian II of Denmark charged 1120 florins for the proclamation of the Peter-indulgence in Scandinavia, the Emperor Maximilian demanded 3000 florins for only two church provinces. For his war against Naples Charles VII of France used a fleet that was financed by the indulgence money for his war against the Turks.

All that are examples of the enormous possibilities that were open to the rulers – or ruling groups – as the holders of the authority of the state. In 1696 William III of England had an annual income of £700,000 of which his court requirements were less than ten per cent: he was able to use 90 per cent for his luxuries. In 1542 Francis I of France had an annual income of 5,788.000 livres, half of which were net profits. In 1685 the expenses of Louis XIV. amounted to 28,813.955 livres. 15,340.901 livres were spend on buildings alone.

Paul Getty, one of the richest man of the world, has an annual income of about $200 million. This may be more in terms of value, nevertheless, his power is far less than that of those great kings. Getty has to pay for every service. The kings, on the contrary, were able to simply to demand and get an immense number of additional services. The direct income was supplemented by rights of disposals of other people's energy, the value of which can hardly be estimated.

The only risk to that incomparable form of acquisition was that of being ousted from that position of power by others or to be eliminated by one's own nation. The more a ruler tightened the thumbscrews and the more use he made of his monopoly, the more dangerous it became for him. The more his rule amounted to model four, the stronger the internal control and structure of relations had to become – the structure of effects designed to suppress individual interests.

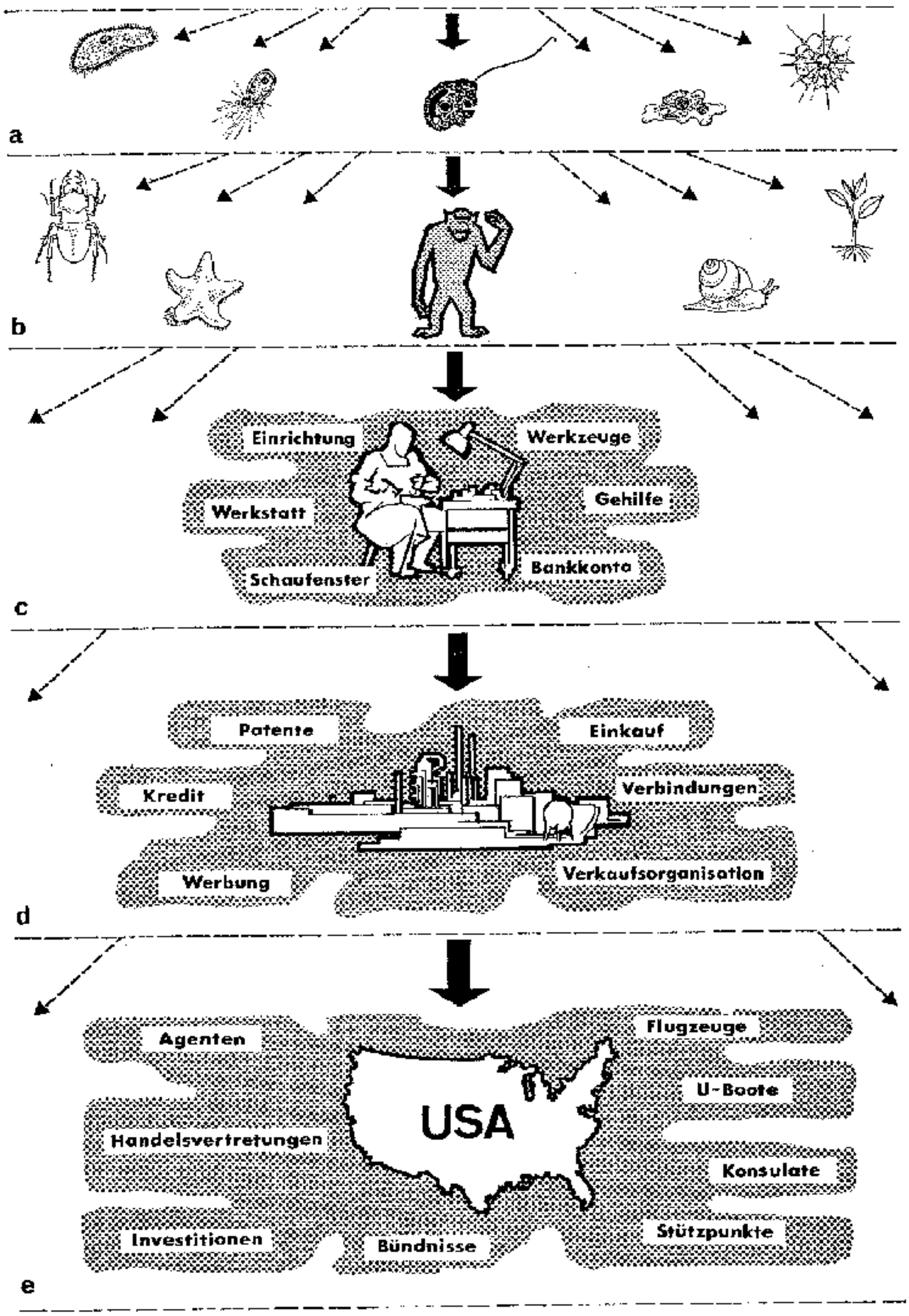

Figure 37: Main levels in the hierarchy of the energons existing today

a) First level: unicellular organisms. Organisms feeding on animals and plants both belong to these. Also viruses, which are extreme parasites on the energy of others, belong here.

b) Second level: multicellular organisms. They all consist of cells. All bigger animals and plants are in this group, also primeval humans – more precisely: the genetically built human body.

c) Third level: professional entities. They are artificial extensions of single human beings and always have a human being as their control centre. All kinds of professions and trades belong to this category. (Equipment, workshop, shop window, tools, assistant, bank account)

d) Fourth level: businesses. They consist of numerous professional entities that are each replaceable inside the whole ,with its division of labour, just as a tool or a machine are. All bigger production or service businesses that are aligned to acquisition (profit) belong here. A precise delimitation of professional entities, however, is impossible. (cf. p. 18) (patents, credit, advertising, purchase, connections, organisation of the sale)

e) Fifth level: states. They are build up by a more or less loose ("organised") association of professional entities and businesses. (agents, trade missions, investments, alliances, aeroplanes, submarines, consulates, bases)

These levels go by the proportions of size and interlocking. Because of practical considerations it is more effective to classify the energons into other groups (Part One, chapter I, paragraph 1). Also the states may be classified differently (Part Four, chapter VI, paragraph 7).

6

A completely different basis for the individual development of power came when humans started to acquire energy and substances by way of exchange. The source of acquisition for that kind of acquisition is always and exclusively human need. The latter creates some sort of field of conflict that grows in intensity with the increasing requirements and energy potential of the individual having the requirement. This is the basic principle of human economics and 300
we call it "supply and demand". According to the theory of the energon, however, it is more correct to reverse the order and instead speak of "demand and supply" because the demand is primary, since it steers the supply. Only secondarily did it happen that this relationship was sometimes reversed, i.e. that the supply changed to influencing the demand and even to steering it[9]. This, however, is a further development that took place later. In the beginning there was always "scarcity". Human requirements created the force field that led to the formation of structures of supply. It was the "lock" that had to be opened and that created a basis for correspondingly adapted "keys".

The first and original requirements of humans derived from inherited drives and was largely the same as with animal relatives: food, water, air to breathe, security, a sexual partner and the rearing of descendants. What was added to that – just as with other animals living in groups – was the urge for acknowledgement within the community and for a higher rank.

Traditional habits of the community were added as further compulsive forces. The urge for "novelties", for a change in the way of life at first only occurred feebly and sporadically.

The possibilities for acquisition by way of exchange[10] can be divided into three large groups according to their functions: First, the acquiring energon can supply an *activity*: then it becomes a functional unit (servant, doctor, general, conductor, insurance company, theatre) of the demander for the time of its "service". Secondly, it can supply a product that was produced by itself: here it produces a functional unit (shoemaker, goldsmith, business for the manufacture of soap or locomotives, inventors, writers, film producers) and makes it over to the demander. Thirdly, the energon can become an *agent* between demand and supply (hawker, department store, marriage broker, commercial company).[11] It is impossible to mark out clear borders. The dentist supplies an achievement (the treatment) but at the same time also a product (the filling). The film producer becomes a talking point – becomes a "writing point" – and thus not only produces a service (his depiction) but also contributes to the mediation between demand (cinema audience) and supply (film).

What is of interest for us in this context is whether there are any indications for the possibility of high earnings to be found here. This is not the case. In each of the three respective groups there is the possibility to build monopolies – the possibility for "big wage-earners".

However, another distinction is important. The formation of monopolies fluctuates between two extremes: either the supplier faces a single demander who is particularly potent energy-wise (for instance a king who has a special wish) or he is confronted with a multitude of demanders where the fulfilling of their wishes only brings a small gain of energy (for instance a delivery of tobacco) but which also opens up the possibility of a great profit on the basis of a high demand.

We begin with the first extreme – I hope that I will not now make enemies of my female readers.

7

For the best example of this extreme the way women acquire things. It is to a large extent grounded in an inherent quality which is called the "trigger-effect" in behaviour psychology. In normal linguistic usage a woman possessing this quality is called "beautiful", "charming".

As long as the struggle for life is very severe, this effect does not count for much. The basic relationship between men and women is determined by function. It is a symbiosis: each part needs the other one. A man needs a woman for sexual satisfaction, for the propagation of descendants – and from that there arise further functions for the woman: taking care of the offspring, attending to the home, if needs be assisting with work in the fields. The woman also needs the man to satisfy the driving force of propagation and the raising of children and furthermore she needs him as a protector and breadwinner for herself and for the young.

Originally, the relationship was mostly formed by the man: through the use of violence (robbery) or exchange (purchase). The woman was to a large extend an "object", her individuality did not count. Even today some primitive tribes still have purchase prices for women that are rather at a flat rate[12]. "Pretty" or "ugly" were not determining factors. However, as soon as the man obtained surpluses and started to build luxury items the situation changed significantly. Now the woman could make use of her "natural weapons". For her there now opened up the possibility of achieving extraordinary monopolies in acquisition.

An example would be the pretty maid Katharina who served a parish priest in Marienburg around 1700. A Swedish dragoon saw her and married her. Afterwards she became the lover of a Russian count who handed her over to his monarch, Tsar Peter the Great. In 1712 the wedding took place and in 1724 Peter the Great crowned her Empress. After his death she followed him on the throne as Catharine I.

What is particular to this kind of acquisition of power, which has not changed in the slightest up to today, is the immensely different countervalue acquired for rather similar exchanges. One of two sisters may meet a labourer while the other sister may become a beauty queen and wife of a millionaire. Ultimately, each of them offers to supply the same: herself for a relationship. Many an ugly woman might have considered that as unfair just as is the case with men who are born without means – in contrast to those who are the sons of rich parents. In both cases the fundamental basis for acquisition is unfavourable.

The effect on individuals of the opposite sex is in so far a particular one in that it is closely tied to the individual performing it. Financial power can be transferred but not individual appeal. For somebody who longs to have Brigitte Bardot there is only one possibility to fulfil this wish. That is, to win Brigitte Bardot. The particular "market" for that kind of monopolies are men who have obtained big surpluses.

With growing surpluses the urge for a higher rank – in general – becomes increasingly predominant. The other drives can be satisfied easily. Air to breathe is available for everyone. One can only eat and drink up to a certain point. Sexual partners are supplied for the prosperous in abundance. Yet, what is much more difficult to satisfy is the striving for social acknowledgement and for a high rank. Through the formation of an enormous luxury item – a house, servants, a motorboat, an aeroplane and so on – many people can be impressed immensely, but not everyone. Even honours and glories can be purchased. However, in the competition for a particular woman there is – at least for a particular period – only one winner. If the woman concerned knows how to make use of that possibility of power – or if her family helps her with it – then her possibilities of acquisition are almost limitless.

Among all functional units which help energons to get power and prosperity there is not a single one whose potential effect can be compared to "beauty" and "sexual appeal". Use has been made of this not only by attractive women of all times but also by others who made such girls and women their organs of acquisition. The family made the start. Pretty daughters were decked out and through an expensive upbringing their stimulating appeal was even increased – investments in order to catch a golden fish. If the girl was also clever and cunning, then positions of power that could hardly to achieved with weapons could be taken in a surprise coup.

In China around 650 b. c. a girl called Wu became the Emperor’s concubine. She strangled her own baby and blamed the Empress for the deed. Her power was already great enough: the Empress was deposed and later executed. The Emperor increasingly became her puppet. Directly or indirectly she succeeded in murdering five sons of the Emperor (among them two of her own). Furthermore she achieved the elimination of two of her brothers, one sister, a niece and of more than hundred other relatives. After the emperor’s death she ascended the throne, deprived the ruling Chang dynasty of their rights and founded the "Chu dynasty" which was named after her[13].

The monopoly that autocratic rulers had conquered for themselves could thus be usurped by a monopoly of a completely different kind. Here the main weapon was a very passive effect: a trigger effect which only one particular person can exert upon another one and by which the latter becomes helpless and defenceless and finally submits to the will of the other.

On the other hand, men can of course open up eminent sources of acquisition through exactly such trigger effects. Catharine II. gave each of her lovers 100,000 roubles in gold and also a monthly appanage of 15,000 roubles. Count Orloff and Potemkin got much more, especially in the form of rank and power. Today handsome playboys lie in wait for rich heiresses. An additional possibility for handsome men was supplied at all times with others who had homosexual predispositions.

We find similar positions of power on the basis of individual trigger effects in art.

8

Here the situation is similar. The "weapon of acquisition" here also only gains more importance with humans with appropriate luxury items. Here, too, the sexual drive is in the game and here, too, the display drive plays a decisive role. 303

With all artistic development two very different roots have to be distinguished. Either "art" – the artificial creation of something that is "beautiful" and "impressive" – is performed for its own sake: as a luxury that gives pleasure. In that case it is an *emission* of energy, a way of using surpluses. Or: "art" serves acquisition, then it aims for an active energy balance just as every other kind of profession. In practice the two motives – as is known – are often disguised beyond recognition or intertwined with each other.

The energon theory is only concerned with art as a form of acquisition. Again it is a process of exchange. Particular performances (dancing, singing, music) or particular products (paintings, necessary items that are aesthetically fashioned, palaces) have a corresponding "market" and satisfy an existing requirement – they are keys which can open given locks.

In the following I would like to put down on paper a rather heretical view. The area of conflict into which this kind of activity emerged , might have in the first place been the human urge to display. As soon as rulers or others in power had the right surpluses at their disposal they usually strove to differentiate themselves from others, to surpass them, to express their power and superiority in the most apparent way, to induce the others to admiration and astonishment and to intimidate them. But how did this happen?

A rich man was able to build a house that was twice or ten times the size of others, to surround himself with twice or ten times as many guards, servants, women, necessary items and so on than others could. This way of impressing others through sheer size, however, soon reached its limit. How should rulers with the same power impress each other? How could one of them distance himself from the other and distinguish oneself from the other one?

In my opinion the possibilities for that were already "marked out" for human beings. If we trace the phylogenic development of higher animals, and then all areas where the struggle for life did not force extreme rationalisation and specialisation we find the influence of evaluations that derive from the sexual area. We find the development of striking colours, patterns and shapes, "magnificent" clothes made of scales and feathers, impressive extensions to the body and series of movements. Here, sexual selective breeding[14] became the competitor of natural selection. If the shapes deriving from that – and which are delights to the eyes when we see them in a zoo – are not only preferred by the sexual partner but even by us humans, then this points to the common development. The central nervous system of higher animals – and of humans – is designed in such a way that it is impressed by particular combinations of shape and colour. That was – so it seems to me – the actual starting point for *both* roots of human art: art for its own sake with the aim of personal pleasure, and art for the purpose of acquisition.

No matter whether it was about intimidating ghosts, or compelling religious groups to abject subjugation – or surpassing rival rulers: the means were marked out. They arose from the difference in value which originally was only meant for the sexual partner, thus from an evaluation as "better" or "worse", which is innate with us – and which can be influenced by manifold ways in cultural tradition and fashion and probably also by moulding and by the innate disposition for learning. Somebody who had achievements which appealed to somebody else on the basis of such an evaluation was the original "artist". That ability, a special trigger effect, gave him a monopoly of power – just like beauty and charm – which if it is naturally present and artistically improved allows one to achieve special position of power with other people independent of the sexual drive.

If you visit museums where the oldest tokens of human activity are exhibited, you can see clearly how early decoration and embellishment occurs and how early the rulers tended to distinguish themselves via aesthetically effective weapons, necessary items and symbols. Why? Partly because they liked to do so and because it was appealing to their personal feelings. But mainly because it called for evaluation by rivals and subordinates. Expressed rationally, this means that art is not primarily nourished by the pleasure it gives. Its main root – the actual area of conflict – is the possibility to impress others, to increase one's own ability to impress and, in so doing, one's own power potential.

Now the tendency for the new which lay dormant inside humans came to light more distinctly. What is new also baffles and impresses. The senses get used to the old and known – the new not only creates a possibility for improvement and progress, it is also a means to impress. Thus in art this element also constitutes a form of acquisition.

The courts of kings and counts, as the holders of large surpluses, and furthermore the centres of religious organisations were the first markets for art. Here a constant requirement for tools to impress existed – and the artists supplied them.

Within the framework of this development – and considering the significance that was attained by the arts – increased and refined appreciation of art came about, and hence individual positions of power: monopolies. Somebody who wanted to see Theodoros act or Caruso sing could not get that from anybody else. Somebody who has set his or her mind on decorating a salon with a real Picasso can only do this in one way: he or she has to acquire a real Picasso.

Thanks to technical progress, especially through the mass media the sources of acquisition for those monopolies increased significantly. Here the artist is superior to somebody who is merely sexual attractive. The beauty queen is only able – at least per unit of time – to obtain one or a limited number of the source of acquisition "man". The scores of Verdi, Lehar and Gershwin were duplicated a thousand times and often resulted in incomes from dozens of places. A film with Clark Gable could be shown in thousands of cinemas at the same time. Through film, radio and TV it has become possible today for millions of people to enjoy trigger effects simultaneously.

With the technical improvement of the mass media the possibility of artistic acquisition is constantly increasing.

With other achievements, products or agencies, the possibilities are much more limited.

With spaghetti, refrigerators, cars, soaps and electronic brains it is considerably more difficult to attain monopolies, that is to tie the supplied achievement to a particular form of achievement.

Doctors, lawyers, toreros, managers, glassblowers and tightrope walkers can obtain pre-eminences in certain areas and at certain times – but these are not real monopolies. Production companies, insurance companies and commercial enterprises can drum the names of their companies into the environment at high cost – but they do not thereby attain real monopolies either. At the end of the day in the wide field of non-artistic forms of acquisition it is achievements that sooner or later can also be produced by competitors which count. Here there is a different way to achieve a monopoly.

It is called "market control" and the way to it is usually thorny and long. Here a natural trigger effect – as with the girl Wu – does not exist. The competitors have to be worn down slowly and persistently and trust in one’s own achievement has to be built up slowly and persistently. The bigger the business and the turnover gets, the more likely it is to be able to supply the same product cheaper and faster. Furthermore, the greater the possibility becomes of harming the small competitor and driving him to the wall – and in the end of swallowing him. As Benjamin Franklin used to put it, the main way to wealth is work and thrift. This is also the way to the building of monopolies in business (unless it is prohibited by the state). Good achievements, enthusiasm and thrift mean that the surpluses must not flow into luxury items – they have to remain in the energon. By that they grow – and the *capital* grows.

This exerts a magnetic appeal similar to the power potential of autocratic rulers. Capital also provides security and the possibility of acquisition. Small structures of acquisition are incorporated – on a completely voluntary basis and to their advantage – into growing organisational constructions of power.

Here the top achievements are vehicles of monopolies in a small way – but eventually they are all replaceable. In the framework of those economic systems only the devisers of new structural blueprints and behavioural patterns can attain real monopolies: the inventors. As long as there was no protection for their "mental product" they only had the possibility to get their product used if they produced it themselves. However, wherever it is protected by the state with a "patent law" their possibilities of acquisition are no smaller than those of artists. They can block their competitors with the authority of the state for up to twenty years and can rent out their ideas to many others. Their risk is that their patent is overtaken by another one – just as artists take the risk of being swept away from their pre-eminence by the stronger trigger effect of something else.

There are further factors that can support the building of monopolies: market weather, luck, prevailing disorder and risk.

Through their knowledge about connections, production companies and commercial enterprises have earned enormous sums. Here, energons attained pre-eminence often only for a short time but nevertheless producing remarkable surpluses. Particularly favourable are times of war and disorganisation. For people who have flair, who have zeal and are inconsiderate, better possibilities are opened up and they are not forced into a predetermined network of power relations. Many a person has become a millionaire through luck: if, for instance his or her property had oil wells. Risk also creates a possibility to eliminate the competitors. This is true for more or less all forbidden forms of acquisition. Through robbery, extortion, forgery and so on one can earn millions – however, the risk of the acquisition is increased correspondingly.

However, the only real power potential– apart from the invention that is protected by the state – is capital. It can – given the ability to transfer it – go where the best chances for acquisition exist. It can participate in almost every form of acquisition – if it is needed for the construction. It is of such an immense importance that it can demand appropriate protection. It is the actual pulse, the actual stream of force that is circulating in the economy.

Capital is the only functional unit that became a self-employed and largely independent quantity. It gathers together and grows by itself. From underdeveloped countries the surpluses flow to where there is the greatest security – to the biggest centres of capital. Today in the positions of power in the economic area are to a growing extent tied to innovation and improvement. Research and the increase of power cost less and less. Just as once property was the actual key to power, through industrialisation capital became that key. As Galbraith rightly said, the production factor "capital" dethroned the production factor "land".

10

Now Galbraith has shown how this power has subsided again. In large enterprises in America it is not the shareholder, the capital anymore that leads the business but the inner steering structure (the "techno-structure"). The latter ensures that the surpluses largely remain in the business itself and that they are used for expanding and strengthening it. Thus it provides the necessary capital to a large extent – what is more, today capital has not been scarce for a long time. Surpluses that look for a safe and lucrative investment are becoming increasingly more frequent.

However, I do not agree with Galbraith's conclusion that this development has led to a new factor of power which is comparable to "land" and "capital". The techno-structure is not individually involved in success. It is true that those who are part of it obtain high wages but they cannot attain real monopolies.

According to the theory of the energon it is not difficult to recognise what is happening here. The surpluses are not shifted to individual luxury items anymore – but they remain with the energons. That means that there is only one real beneficiary: the life flow. If this development gains ground, the individual interest of single persons moves into the background again. He is swallowed by large organs of acquisition and then only the latter's effectiveness dictates the further proceedings. While for the classical entrepreneur it was always up to him to transform the acquisition structure into an organ of acquisition – by starting to put the surpluses into the personal luxury item even if the business thereby suffered – with "matured businesses", where the capital loses its freedom of steering, this permissiveness is again lost. Then the development returns to the situation of animals and plants in whose big structures each unit, including the germ cell, only has functionally determined "rights".

I rather think that the power factor "art" which Galbraith does not touch upon will gain in significance and influence compared to the power factor "capital".

Capital will and has to remain in power – no matter whether we find it in the shape of state capital (as in Russia) or as private capital (as in the USA). The bigger the enterprises are, the more complicated the products are, the longer the testing takes, the more capital is inevitably required. Someone who has a share in that capital is sure to remain a part of the power factor.

If humans – as is to be hoped – succeed in regulating their problems: birth control, avoidance of wars, matching of interests, then there is hardly a limit to the human formation of surpluses. Then more and more and increasingly powerful artificial organs can be created and more and more of the energy of others can then be put at the service of human interests.

But what happens to the surpluses then? Both for the increasing the commodities one owns as well as for the eternal striving to make an impression art – in the most general sense of the word – always remains the most important and the ultimate way. Through the constantly improving means of communication, the possible monopoly effects are even continually increased. Furthermore, they are intensified through advertising and manipulation. I do not think that artistic monopolies can be replaced by financial monopolies. Yet, as capital becomes more easily available and financial structures lose more and more of their monopolist power, the individual monopolies of art will gain in power: individual skills that have a particular trigger effect which increasingly influences luxury items, will make them defenceless and exploit them.

Just as at the beginning of history the providers of security and the owners of property and at later times the owners of capital became the really big wage-earners, so eventually the creators of the "beautiful" will become the big wage-earners.

Comments:

[1] Already Aristoteles pointed out that the "general secret of large fortunes" consists in the attainment of a monopoly. he considered the acquisition of money to be beneath the dignity of a free man, yet, proudly referred to the philosopher Thales from Milet who, foreseeing a rich harvest, bought all the oil presses of his town. At harvest time he sold them for fancy prices. ("Politics" I.)

[2] More precisely: the virus activates someone else's energy. This, however, is also increasingly characteristic of human activities. The acquisition of energy through the digesting stomach remains in the background and growing amounts of someone else's energy which serves us directly is made useable. Our money – the aim of the acquisition of the energons built by us – is a symbol for that. It is a dependence on someone else's achievement. "Our" progress relies on making them utilisable – the progress in the second part of the evolution. "Die moderne Industriegesellschaft", p. 62-75.

[3] "Die moderne Industriegesellschaft", p. 62-75.

[4] C. L. von Haller might have seen this connection when he wrote, "that every rule, no matter of what kind it may be, is based on a natural superiority, that every dependence or servitude has a need as its foundation." He continues: " Both does not even depend on the human will; on the contrary, it is a general and necessary law of nature that the more powerful one rules as soon as his/her power is required; and wherever in the world power and needs coincide, a relationship necessarily emerges and by virtue of this the former comes to rule and the latter to dependence or servitude which, however, is nonetheless concluded to the advantage of both." (" Handbuch der Allgemeinen Staatenkunde", Winterthur 1808, p. 33.)

[5] W. Sombart, "Der moderne Kapitalismus", München 1921.

[6] Approx. 31,5 kg of gold.

[7] Approx. 295. tons of gold.

[8] Appoxr. 104 kg of gold.

[9] This reversal also exists in states with a planned economy. Today, in Russia or China it is only possible to demand what is supplied – there also the supply steers the demand.

[10] Generally, it is only referred to as "exchange" if no money is involved in the trading ("barter economy"). Yet, every sale of a product or a service for money is an exchange – only for the universal allocation of someone else's energy, namely "money". In order to stress this functional principle constantly I even use the term "exchange" where it is common to speak of "sale", "rent" and so on.

[11] In economics a distinction is made between businesses of service and businesses of production. The work of agents also belongs to services. Practically, this is what they are, even though there is a difference in the principle of acquisition.

[12] For example with the Ndorobos, an East African tribe, in 1948 the purchase price for a girl was 5 pots of honey, 5 beehives, half of a female elephant including the tusks and also two cattle. If the bridegroom was too poor, then he could also pay off a part of the price by serving the father-in-law as a hunter. (N. Mylius, "Ehe und Kind in abflußlosen Gebieten Ostafrikas", Vienna 1948, p. 80). With the Afghans, according to Elphinstone every girl was rated at 60 rupees. With this currency it was also possible to pay off penalties: one owed 12 girls for a murder, 6 for a nose, 3 for a toe. (R. Heymann-Dvorak, "Der international Menschenmarkt", Berlin 1904, p. 69.)
[13] The latter, however, only existed for 15 years and after that the Tschang dynasty came to power again.
[14] This term was coined by Darwin, who was the first to show the particular significance of that process ("The Descent of Man and Selection in Relation to Sex", 1871).

V

THE COLOURFUL GARDEN

Since three centuries instead of the objects
we have been studied their signs, instead of the terrain
we have studied thethe map.
Hyppolyte Taine (1828-1893)

The manifold forms and kinds of performance within an enterprise can somehow be attributed to the relation between the return from factors and the use of factors. This relation is a relation of productivity. By making it the starting point of our analysis of the production process we more or less reduce our research to the core function of industrial production.
Gutenberg (1951)

1

All vivid nature with all of its animals and plants is similar to a colourful garden. Similarly, the entire human economy with all its innumerable employment structures is like a colourful garden. If we pursue our usual way of thinking, these two "gardens" have nothing to do with each other. According to the energon theory, however, there are not two gardens: there is only one.

On the surface the economy as well as vivid nature seem to be edifying and peaceful. Here and there abilities and productive and busy activity develop. However, things are different, if we make a closer examination. In both cases the colourful garden in reality is a battlefield. In both cases the individual partners in employment, these "brothers" and parts of the same stage of development are enemies in a bitter battle. If one of them shows his weakness, the other one seizes his position. Between some of them there are alliances for mutual protection – but not so much out of kindness as of self-interest. Human emotions – which are so important for our "ego", but inappropriate as far as a valuation of the world is concerned – are no criteria for the assessment of these processes. The life flow has as it were millions of tentacles, indeed it does not consist of anything else. They blaze like flames and often they devour one another.

It is not that every "tentacle" threatens existence of the others. The predatory energon threatens its prey, but – as we have seen – predators and prey necessarily achieve an equilibrium. If the predatory species destroys its prey, it destroys itself. Much worse is a combat between "rivals", aiming at one and the same prey. But here, too, there is not necessarily a rivalry between the groping tentacles.

In the professional sector the work of a doctor or a tailor does not interfere with the activity of a baker. In the "garden" of plants and animals it is just the same. The activity of the lions does not disturb that the worms, the activity of the fir trees does not interfere with the activity of the viruses.

In commerce and business we distinguish between "homogeneous" and "heterogeneous" competition. For suppliers of chickens not only other suppliers of chicken are competitors, but also suppliers of geese and ducks and even of beef. In the carneval season fancy-dress balls reduce the number of cinema tickets sold and the sale of popcorn and coke in cinemas. Indirectly, one supplier takes profit away from the other, i.e. he influences an area of tension where there is otherwise a greater demand. In the kingdom of animals and plants there are also many forms of indirect impairment. If parasites spread, disturbing the breeding of a particular species, then they simultaneously impair the "market" of all predators which live on fully-grown animals of this species. Where the curtain fig (a plant, which climbs on plants and suffocates them) spreads, it destroys the source of energy for all plant-eaters which live on these kinds of trees[1].

In commerce and business, structures of *very different sizes* are often competitors at the same source of acquisition. Ice cream is produced by tiny professional entities (the proprietor and his wife, an apprentice, a shop, a few ancillary means), but is also produced by large industrial corporations. In the sea tiny fish live on the same plankton as bearded whale. In both cases the large energon is (mostly) not able to displace the small one. The larger one functions in a more economical way and it has considerably more power. But (most of the time) it is not able to reach the entire source of acquisition. There is enough space in between to guarantee a livelihood even for the smaller competitors[2].

All acquisition structures which are created by human beings need resources for their growth. Economic corporations either buy raw material (and the energon integrates them in its structure by itself), semi-finished products or functional units which are ready to be used (e.g. machines or a new labour force). When it comes to organisms, the situation is no different. In the form of water, gas or salt, etc., they gain raw material. In the form of stolen molecules they gain semi-finished products, e.g. eaten proteins are not broken down completely, but only up to the amino-acids – and with these the organism produces its own proteins. It rarely happens that finished products can be acquired. The hermit crab acquires the empty snail shell, some snails which eat coral polyps integrate the nematocysts of these polyps in their own system of defence. Ocasionally also assistants (organisms) are won, for example in all forms of symbiosis.

An interesting difference between artificial organisms and animals and plants is that enterprises also are able to acquire "recipes". They can buy them as a patent or by employing professionals in order to rent their expertise. They can use the entire scientific literature for the free acquisition of recipes. Plants and animals are not yet able to do so. This possibility – which lead to an immense increase of power within the life flow – was created by the "acquisitive tentacle" human being.

Are these superficial parellels and trivial differences? From the perspective of evolution certainly not: whether a bird has this appearance or that, whether an organism stays in the same place or is swimming around with flippers is no absolute criterium for its capacities or its biological value. These are minor points which only impress our senses and our brain. However, connections which can be found in all groups of energons bring us a lot closer to the nature of these structures and to the problems which were and are decisive for the "to be or not to be" of each of these "tentacles".

2

The key has to reach the keyhole. If the keyhole gets to the key by itself, the key can stay in place, otherwise it has to be mobile, it has to be able to find the moving keyhole.

If the keyhole is defenceless (like the leaf of a plant which stays in one place), then contact of the key with the keyhole is sufficient. There is no essential obstacle to the acquistion process. When, however, the keyhole is able to defend itself and does so (as, for example, when an animal flees or bites, or when a customer has no intention whatsoever to buy a product someone is trying to palm him off with), then certain measures of pursuit or fighting become necessary.

In our usual way of thinking it is hard for us to compare the teeth of a predatory fish with the cries of a street vendor. Such comparisons have already been made quite often – but more because they are amusing than in order to get closer to the truth. On a functional level, however, these connections are more important than the external difference between a fish and a street vendor. Looked at from the perspective of the life flow – and in the end this is the only valid criterium – the *external* differences are irrelevant, trivial. What is really relevant is the functional power, the result. The appearance of the individual tentacles of the life flow is of no importance, and in principle does not affect their competitive capacity. However, the fact that the key has to fit in the keyhole *affects the competitive capacity*.

The productiveness of the source of acquisition can vary. In the evening the leaves of plants are filled with sugar and protein; during the night they are mainly busy transporting these materials to consumers and storage places; in the morning the leaves are exhausted. Consequently they go much further when eaten in the evening than in the morning. In spring the young leaves are soft, full of nutriments, poor when it comes to cellulose; in autumn the stroma is predominant. The larva of the leaf miner in spring only need two to three days from egg to pupation, in autumn they need a few weeks. For a prostitute acquisition is much easier after dinner than, for example, in the morning; also the period at the beginning of the month is much better for acquisition than at the end of the month. Is this really not comparable, inessential? From the perspective of the life flow it is unimportant whether an acquisition tentacle looks like a leaf miner or like a prostitute. It is essential however that these energons periodically have to deal with varying sources of acquisition – and they have to be attuned accordingly. From the perspective of the energon what causes these variations is not important, as that is not a factor which affects the competitive capacity.

In both cases there are sources of acquisition which are unusable for a longer period or become inaccessible. This requires reserves for the size of which there exist optimal values. It is very important for such energons to reach *this optimal size*. If the reserves are too big, then this is superfluously bound capital – which reduces the competitive value. When they are too small, the risk becomes too high – which reduces the competitive value just the same. The best balance can be found in the average variations in the periods without possibilities of acquisition. These values, too, are important in order to be able to determine the competitive capacity.

Another solution is closure. Winter sport hotels are closed in the summer, in the winter the marmot "hibernates". By these measures the regular costs are lowered to a minimum. The optimal average value for necessary reserves is thus reduced.

A third solution lies in an additional acquisition activity on order to compensate for the loss in hard times. The ice cream vendor rents his shop out to a trader of coals, songbirds fly thousands of kilometres to another place of acquisition. To overcome flat periods many enterprises include additional products in their production programme. A prerequisite for this kind of "reserves" are additional structures and recipes which allow such changes. In this, organisms are dependent on genetic blueprints; in human acquisition structures, being able to get rid of certain parts and gain entirely different ones, the development of these blueprints is very sophisticated. "Flexibility", "adaptability", "flexible structures", "ease in changing structures", in short "elasticity of the enterprise": in modern industry – facing rapidly changing markets – all of these blueprints count as particularly important competitive factors.

Something new was brought into the world by human beings: the anticipation of death and provision for old age. As far as the life flow of plants and animals is concerned, such provision was neither important nor was it an advantage. If an animal or a plant loses its acquisitive power, it also loses its right to be because it inhibits further development. Human beings, who otherwise are a prime example among the energons, in this point rebel against "highest interests". We are born with the ability to experience fear; in addition we have foresight which comes from intelligence. The result are unnecessary reserves which are useless from the perspective of the life flow – and equally from the point of view of economy[3].

The large community facilities for the provision of old age (retirement, insurance, private insurance) are in this regard of considerable importance for economy and the life flow. By combining functions this way it becomes possible to get by with a much smaller amount of blocked capital. In addition, the state or any civil law facility is able to refer a large part of the amount which is paid for these insurances back to economy – and thus to the entire flow of development – by means of safe investments.

3

An essential aspect is the *concentration* of the source of acquisition per unit of area and time. How productive is it? How much energy and material can be won from it on average at a certain point? How long does the source need to restore its "capacity"?

When we ask these questions, a problem becomes evident which affects every energon equally – without exception.

Most plants on land do not suffer any shortage of sunlight; for them the limiting factors consist in the acquisition of materials which are necessary for the acquisition of energy as well as climatic circumstances. Accordingly we distinguish "good" and "bad soil". It is possible to determine at an experimental level – and such experiments have been done abundantly – how many "organic substances" a certain kind of plant can produce in a certain location. In principle we could develop a world map for every kind of plant with the average amount of production per area: on the one hand for the situation where there is no competition (e.g. if competition was removed in an artificial way), and on the other hand for the competitive situation at a certain site. The richest soils (or waters) could be marked with darker colours, those with lower average values in lighter colours. The areas where a certain kind of energon is not able to perform any acquisition activity are white – that is, there where this key does not find a matching keyhole.

A similar map can be made for every animal species in water or on land - and also for every "kind" of business organisation. The more "prey" or the more "need" there is in a given area, the "darker" the colours of the concerned area for these species.

What has to be investigated in this case is the average potential with which the respective kind of energon has to deal with – a specific, energetic area of tension.

In 1935 in Silesian meadows almost ninety thousand individual animals were found on a surface of one square metre(up to a depth of 25 cm) (mites, springtails, enchytraeides, threadworms and rainworms, snails, isopods and spiders) were found. Protozoa were not included; there could be about 100,000 in one milligram of soil. For sea animals the best areas are those where warm and cold streams meet (like the Dogger Bank or the Galapagos islands). The consequence is a never ending flow of dying organisms (which cannot cope with the variation in temperature): a never ending source of food. Immense numbers of small living creatures gather around this easily accessible source, larger ones live on them and even larger ones subsist on those.

Some trees – in particular elms – secrete nutritious sap at places where the trunk is injured. Also large numbers of organisms (bacteria, mushrooms, worms, mites) and others gather around these so-called "synuses", which in turn hunt them.

In the area of human economy large cities or places of pleasure are zones of similar productivity. The more human beings frequent a particular spot – and the more money, i.e. available surplus they have their pockets – the more productive – and thus the more valuable – this place becomes for supplying energons. And here again there is a good field of activity for the employment bodies, which are specialised hunters.

If these optimal zones are the same for several energons, this acts like an avalanche for further optimal zones for other kind of energons. Each exploiter itself is another possible source for exploitation.This is the same in the kingdom of organisms as in the economy[4].

4

Some sources flow spasmodically, but when they flow they provide a sudden and large 314
possibility of acquisition. For energons which gain access to such sources it is important to use this rare opportunity as well as possible. Whether it is an organism or a human acquisition structure: the problem which results is the same.

In the gastronomic sector this problem occurs during holidays when there is an increased demand for free rooms or meals. Then the question is: what is the maximum numbler of people who can be accommodated and fed? This problem occurs also in industrial corporations when there is suddenly a high demand for their products. In this case it becomes important that, expressed in economic terms, a "capacity reserve" is available. A certain "elasticity" concerning services offered by the business enterprise can lead to an major increase of the degree of suitability and of competitive capacity. "Adaptability" is of considerable importance here.

A python is able to devour an entire goat or wild boar because of its special ability to expand its jaw or stomach. Some deep-sea fish are able to swallow other fish which are bigger than they are themselves.The leech is able to take in all at once an amount of blood up to ten times its own weight. These are examples for solutions of the same problem in the animal kingdom.

Spiders save up and store surplus prey by spinning a web around it; many animals hide parts of their prey in the earth. In these cases digestion is postponed. If the producer succeeds in tying the demanders to his own product (which gives him some sort of monopoly position), than he has the possibility to put them off if there is an overly great demand because of longer delivery periods. In this case too, a spasmodically available source of acquisition is secured, and also in this case the actual acquisitive acttivity is performed with some delay.

5

In economics the "turnover" is very important. The supplier of bread – in relation to the working capital of his enterprise – has a large turnover and thus can work with a low profit margin. The antique dealer selling old paintings or the distributor of jet airplanes, however, make a sale much less often.. Therefore the real profit has to be higher in order to secure a livelihood for this type of energon.

With animals this is no different. For example the earthworm has a big turnover with a low profit margin. It shovels large amounts of soil through its body; the amount of organic material in this soil which is useful for the earthworm is relatively low. But since there are large amounts of soil at its disposal, this kind of activity still is profitable. Also feeding on algae and mud "requires much food to cover the need". In the case of the cup-and-saucer limpet which lives in our creeks and rivers it was determined that while feeding it excretes 110 times per hour; its excrement in the form of small sausages reach a total length ten times that of its own body[5]. Twelve minutes are sufficient for this energon to transport the food through its intestine.

The tick, which subsists on the blood of animals, carries off such concentrated food that one single successful acquisition activity can be sufficient for its entire life. In economics, money, gold and jewelry are particularly concentrated vehicles of energy. The thief who succeeds in stealing large amounts of this booty has not actually acquired enough for a lifetime – but nevertheless for a long period.

It is clear that each of these extreme examples of acquisition presents special functional conditions for the individual energons. These are, in all cases, the same. The energon which depends on a large turnover always has to be at the source of acquisition, it has to "work on it" tirelessly. The energon which is specialised on concentrated acquisition has to be able to wait. What matters in this case is not that this is a steady activity which should be performed as efficiently as possible, but that it is a single activity which is successful, no matter what it costs.

6

To gain access to any protected source requires a certain strategy and suitable weapons. Most animals are born with both – the human acquistion structures mostly have to acquire both. For the energon this difference is of no importance. It is merely important that the energon disposes of the necessary structures – tools – and the necessary behavioural norms - techniques.

The best strategy is in both cases to obtain control over the co-ordination centre of the prey. If this is successful, all measures for protection and defence measures lose their value.

If the anger fish moves the worm-shaped end of its fin across its mouth, then the prey is acquired by this activity. An innate mechanism of reaction in the brain of the other fish is activated – "deceived". The end of the fin evokes aggressive behaviour, "they take it for food", attack it – and end up in some stomach or other.

In this and similar ways, predators turn *the functional units of their prey into their own*. This way they break through the protective mechanisms of the others ,thus leading them to their doom.

Intelligent human beings use many more such "deceptions". In each of these cases (swindling, misusing the power of the state misleading competitors, ruse of war), innate or acquired reactions are used, an energon gains power over the co-ordination centre of an opponent.

Also in forms of acquisition by exchange this techniqu is applied in every way one can think of. The exchange partner is deceived and taken in – that means: he does what he actually does not want to do. The highest form of this weapon is advertising, which aims at opening up a market. Nowadays this weapon influences human beings – in an entirely legal way. If the human being influenced is at the centre of a professional entity or of a company, then this weapon, so to speak, aims at the core of the core. In acquistion structures human beings are the control centre, within this centre it is the central nervous system which is in control. And this most important and vulnerable point is attacked.

In extremely complicated ways – they have been well described by Vance Pakkard[6] - parts of these complex mechanisms are influenced. The conscious "I", which is the top command post, is avoided at all costs. It is often suspicious and defensive. The target of the influence is the parliament of drives the power of which is often not acknowledged by the I – or the I does not want to admit that power. There, in this babble of voices of instincts and habits, new "calls" and opinions sneak in. In these "subordinate" centres, which to a large extent are not accessible to the conscious part of the mind, associations are made which later lead to very specific decisions. There wishes are evoked which allow for wishful constructions being developed within the large projection room of "imagination". Camouflaged as information, as friend and helper, this kind of advertisement begins to direct the inner parliament and to work against some coalitions while developing new ones. The influenced human being thus becomes subject to manipulation. He is convinced that he wants what he wants – and he is wanted.

This turns him into a "demander" – to the interest of others. Just like the prey of the angler fish which goes for the bait and ends up in the angler's stomach, the person who is manipulated to feel a want comes voluntarily in order to perform an exchange and acquires something he does not really want and has never wanted. Since only a part of his potential ends up in the stomach of the producer he usually does not realize this. Besides, he does not want to admit it. Since the "I" took this decision, it considers it as its own decision. And since the "I" often was not able to make a decision of its own, it prefers this one – rather than no decision

However, these are relatively small profits which can be reached through manipulation of the other co-ordination centre.The most effective and elegant way is to replace the other centre completely by one’s own will. In organisms this rarely occurs[7] - it does, however, in the world of human beings where the acuisition structures have not grown together. This is happens almost always in a violent way. An example is the already mentioned "coup d’état". Those who command the army – the most powerful entity within a state – hold the necessary reins.

Here, the actual centre of control either consists in the will of the absolute monarch or in the book of recipes which is the "constitution". These entities have to be replaced by co-ordination regulations of one’s own. The monarch is overthrown or the constitution is abolished. This way an entire kingdom can be captured by the will of an individual and thus becomes its professional entitiy – or organ of acquisition[8].

All forms of corruption – within the state or within companies – are small offshoots of this process. Here, too, it is a matter of subjugating controlling centres to the interests of other acquisitive structures. In this case the weapon is not a ruse (as in advertising) nor is it violence (as in the coup d’état), but it is an act of exchange. Functional units of the other energon are after adequate compensation covertly turned into functional units of the recipient’s own acquisition structure. Here, the natural conflict between self-interest (of an employee or a clerk) and the superordinate interest is utilised. Since the state places the largest orders, it is possible to acquire quite eminent acquisition sources in a roundabout way.

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7

Within the economy as well as in the kingdom of plants and animals there are specialists and universalists. At both extremes advantages and disadvantages are involved. The specialist is able to provide a certain form of acquisition more efficiently, but this is only profitable if the acquisition sources are in a constant flux Otherwise the universalist who is less tied down has an advantage[9].

In the economy as well as in nature, the size of the individual energon plays an important role. In competition and for defence against enemies it is an important weapon – on the other hand there is a maximum limit which cannot be crossed. It is easy to understand that a wolf which is ten times as large as another creature is not able to run ten times as fast. In spite of the advantage his size offers, it would not be possible for him to catch ten times more prey. Equally, in economics, the optimal size of industrial enterprises is limited by the length of the necessary routes for delivery and sale (as well as the related costs of transportation). In marginal utility analysis minute research has been done in order to determine the "maximum size".

In the economy as well as in the kingdom of animals and plants we can find higher numbers of the species in areas favourable to acquisition. If many kinds of energons find a livelihood, then selection is less critical. In tropical areas we are more likely to find ten individuals of *different* fish or butterfly species in one region (biotope) than ten individuals of the same species. In the favourable area of acquisition of the city it is the same. If we ask ten people on the street what their profession is, we are is more likely to find ten individuals with different professions than ten with the same. In the countryside, however, where the range of possibilities is far more limited, it is the other way around – as it is in the kingdom of plants and animals in places less good for acquisition.

In the economy as well as in the kingdom of organisms, the individual energons are connected with each other as far as acquisition is concerned, they depend on each other in manifold ways. The varying degrees of success in the acquiring activity of some "key species" lead to "conjunctures" and "depressions" for other species of energons.

Animals in particular are often linked in never-ending and interconnected "food chains". Every predator depends on its prey – and other predators hunting it are dependent on it in turn.

In the economy this is no different. Filling stations and garages depend on the car industry, the producers of lighters and of drugs against a smoking addiction are dependent on the cigarette industry. Here there are similar never-ending interconnected "food chains". The shoemaker makes money from the tailor (because he needs shoes), the tailor makes profit from the lawyer (because he needs a suit) and so on. Also here variations of the individual "key acquisitions" can lead to "conjunctures" and "depressions" for many other acquisition structures.

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8

Almost every economic aspect also has legitimacy in the kingdom of organisms – vice versa. Here, the differences are no less informative than the similiarities.

In industrial enterprises there are two possibilities: production takes place depending on the number of orders or on stock. The advantage of the first option lies in the fact that the energy (capital) which is necessary for the immediate production is only called upon when a sale is guaranteed. The second option has the advantage that the product is available when there is a –foreseeable – demand.

What is the equivalent in the world of organisms?

Since acquisition there takes place through robbery and not though exchange, it is a little different. However, strictly theoretically speaking, we find the same difference here. Normally, first the acquisition organs are developed, then the organs start their acuisition activity. This corresponds with the production of stock: first there is an investment – then the energon starts looking for prey, for the acquisition source. But there also are some animal species which function following the other principle. First they secure the prey, then they develop the organ which is neccessary for acquisition.

It is the same with the parasite crab *sacculina*. It swims in the sea as a larva and looks for a fish on which it can settle. Until this happens, its body is merely a mechanism for looking for prey (so to speak the "investment capital"). Only when the *sacculina* has found its prey, it sticks its nutrient-absorbing tubulae into the fish. In principle this is comparable with production to order. The acquisition organ is only developed when the prey is secure. And this parallel goes even further. In the principle of production to order there are advances. Also, *sacculina* draws energy and material from the host body and uses them to build up the increasing acquisition organ, its suckers.

In the economy and in the civil service transportation is an important phenomenon. In organisms there is hardly any preliminary stage.

Young pike, when they are 5 to 9 mm long, mainly live on rotifers Then they mainly live on nauplius larvae and when they are twelve cm long they subsist on "copepods". Later they change to eating fish. Here, too, we can observe a change of resource – which however cannot be compared with a change of source of transportation within larger business organisations.

The essential difference is the overcoming of the limitation of the "species". All organisms – even if they change their source of acquisition – are tied to spatial-temporal structures. Only at the point in evolution where "human beings" appeared were these bonds loosened.

Human beings slip from one acquisittion structure into another. They reject the functional units and tie others to themselves. For the phenomenon of transportation such rigorous rebuilding is not necessary, additional behavioural blueprints are decisive here ("abilities", "experiences"). Also here there is a change of energons. In military structures the lieutenant is a different energon from the lance-corporal and the general is a different one from the major. In an enterprise the manager is an energon differing from the foreman, the general director differs from the director.

The only paralell for "transportation" can be found in insect colonies – for example in bee colonies. Until the tenth day of its life the "worker" works as a domestic inside the beehive: it cleans the honeycombs and warms the breeding cells. From the tenth to the twentieth day (the wax glands have developed by now) she builds honeycombs, takes on the nectar of the other workers, fills the nectar in the pantries and cleans the beehive. In the third period of life until her death she works as a collector. But, here too, there are different conditions. The "promoted" bee does not get "higher wages". Here, like everywhere else in the kingdom of plants and animals, there simply is no individual use of spare material (nor any incentive for this) – precisely because of the dependence on the species and the lack of a self-conscious intelligence.

We separate "economy" and "state" from vivid "nature". But this wall, constructed within our own brain, is not justified, it has to be overcome – "pulled down". The same goes for a second wall which is not any lower: the one between "organic" and "inorganic" phenomena.

Comments:

[1] An unusual kind of impairment (which does not affect individuals, but the species) is decribed by W. Kühnelt in his “Grundriß der Ökologie” (p. 278): The crustacean species gammarus zaddachi is impaired by other species of gammarus as the males of the latter copulate with the females of the first. This results in unfertilised eggs – which signifies a considerable loss of energy for this species. In this case the competitive effect is extremely indirect. Through errors in their effort for reproduction the other species is impaired.
[2] In economy the “marginal analysis” shows that the last customer which was attracted with the utmost effort is the dearest. An increase of production reduces the production costs, true, but this also leads to a rise in the marketing costs. The market area of enterprises is limited. Which size is the best for a certain enterprise has to be determined by what it offers: it depends on the time and the place.
[3] For those biologists who determinedly look for a selection criterion everywhere it should be added that this process is not completely detrimental. The intellectual potential of human beings can still grow, even after their acquisitive power fails. In this way it is possible that – as a protection of the age reserve – recipes can still be set up which help the flow of life along. Furthermore capital is developed in this way, which – if death strikes early –helps the heir to a better starting point. Finally, provision for old age has also provides motivation in the period of acquisition activity. Hence almost everything has two sides. But these advantages surely do not offset the disadvantage of systematic withdrawal of capital.
[4] Here we speak of an "agglomeration orientation": where enterprises are established, others soon will follow, mostly those which offer additional services. Industrial corporations are followed by such who offer services and repair shops. Banks and maintenance institutions are the next.
[5] R. Hesse, “Tierbau und Tierleben”, Jena 1943, part II, p. 278
[6] “The Hidden Persuaders” (1957, currently out of print).
[7] Only in viruses, for example, which attack unicellular organisms.
[8] The amazon ants (polyergus rufescens) are specialised on this process, they are even dependent on it. The young female of this species forces its way into a colony of the ant species serviformica fusca, kills their queen and is then adopted. Her brood is raised by another species of ants. The amazon workers which emerge this way do no work at all within the ant colony. The existence of this species is based on a permanent “social parasitism”. (More can be found in: K. Gösswald, “Unsere Ameisen”, Stuttgart 1954, pp. 72)
[9] There is a very appropriate aphorism about the human specialist which says that he knows “more and more about less and less”.

VI

DEVELOPMENT

Everything flows.
Heraclitus (540-480 B.C.)

Mass is energy divided by the square of the speed of light.
Einstein (1906)

1

I will now try to forge a link between modern physics' conception of the world and the theory of the energon. This link forges itself.

The highly revolutionary findings which have been attained by physical research during the last seventy years were proved with the explosion of the first nuclear bomb most impressively – and are now put into question by hardly anybody. Nevertheless, those discoveries did not find their way into the general way of thinking and assessing – the consequences deriving from them were not drawn.. It is as if in practical life we have proceeded from the hand-axe to the bulldozer but wherever our thinking and our emotions are concerned we prefer to remain with the hand-axe.

Modern physics has clearly proved that practically everything in the world is basically different from the way it is depicted by our senses and our brain. Everything we call matter or "substance" is indeed a manifestation of energy. If one operates with the term "materialism" today, then this is hardly justified any more. For exactly what matter seems to be, something huge, clumsy and very different from our emotions and feelings, has no real basis. It is merely an interpretation by our highly faulty senses. That huge, clumsy thing that is "blindly obedient to primitive laws" in truth is a manifestation of highly differentiated forces. What we call matter consists wholly of the same mysterious something which also forms the basis for the most subtle processes and also for our processes of thinking and feeling. The most important of those great discoveries are called to mind here.

2

First discovery: everything we see around us, whether it is a stone, the air or a chicken simmering in a pot, consists of the same minute particles[1]. Today their sizes and their qualities have already been explored in detail. They have a diameter of 1.2 to 1.4 times 10^{-13}cm. That means they are about a billion times smaller than a millimetre. If such a particle had the size of a cherry – then the cherry, on the same scale, would have a diameter about as big as the distance between the earth and the sun.

Despite that tininess it became possible – by means of highly refined technical facilities – to experiment with those "elementary particles" (protons, neutrons, electrons and others).[2] With that the amazing view of Einstein, that matter is an equivalent of energy, could be confirmed experimentally. In 1932 C. D. Anderson achieved the proof that an electron (with its anti-particle the positron) can "de-radiate" completely – so that matter is fully transformed into energy. Since then such a "de-radiation" could also be proved with protons and neutrons. The transformation of energy into an elementary particle – thus of free energy into matter – was first observed by Blackett and Occialini (1933). In that case there was an electron and a positron built out of a radiation quantum – this is called "formation of a pair". For this, too, the Nobel prize was awarded. Since then proof for the formation of protons and neutrons out of pure energy has also been found[3].

So this is what first has to be hammered into the brain which does not want to grasp it: all matter in the cosmos consists of the same minute units – and they are manifestations of energy. They can be built out of energy and can transform themselves fully into energy. The transformation-proportion is as follows: each gram of matter corresponds to $9x10^{20}$ (square of the speed of light) erg energy. To convert this value into calories, one has to multiply it by 2.39 times 10^{-8}. An example: if it were possible to "radiate" the whole matter of a human body of 80 kilograms, then this would produce $1.7x10^{18}$ calories This corresponds to almost the total world demand for electric energy for seven and a half months.

Here our brain says: that's all very well, that may well be but how should that change my ideas?

It should already change a lot, but let's move on.

Those tiny elementary particles build up the atoms. Some of those particles (protons, neutrons) build the "nucleus", others (electrons) circle around the latter and thus build "shells". One imagines these to be like systems of planets but it is not as simple as that. Atoms are static-energy structures where our perceptual imagination fails. At any rate, the diameter of atoms can also be clearly determined. It lies between 1 and 5 times 10^{-8}cm. That means hat atoms are about 100,000 times bigger than the elementary particles of which they consist. A hydrogen atom consists of only two elementary particles; an uranium atom consists of a few hundred. Practically this also means: what our senses perceive as stable matter is to the largest degree only "empty space". If an iron atom were as big as the earth, then its actual matter (mass) would correspond to approximately the size of ten pyramids of Cheops, the rest would be "empty space".

The single "shells" of atoms are built up by the circulating electrons: the atom is spherical and presents itself as something "stable" and "hard" to influences from the outside. The energies which on the one had hold together the nucleus and on the other hand build the "shells" surrounding the nucleus are enormous – however, they are by far not as big as the energy equivalents of the particles themselves. These "nuclear powers" are found today in nuclear fission ("smashing of atoms").[4]

Thus: all atoms (there exist about a hundred different "kinds": the elements) in the end consist completely of energy. The actual matter which is contained in those structures only builds the quadrillionth part of their volume, the rest is "empty space" and energy. Also, the tiny particles of matter themselves are again energy.

If one forces the brain to deal with that fact that is so contrary to "reasonable thinking", then the answer is: that's all very well, that, too, may well be but what does it change in the end? Why should I be interested in those tiny dimensions with which I practically have no contact? What does that change in my life, concerning my feelings, my job, my pleasure? What does it change concerning the bed in which I sleep, concerning the friend to whom I talk?

Our brain simply puts that aside, packs that new knowledge neatly and tidily into one of its many drawers – and then carries on as usual. That has happened with almost everybody familiar with those facts – including a large number of physicians.

Yet we should make our brains draw an important conclusion from that. It is the following: we should not rely so steadfastly on our "reasonable thinking". The world is indeed different than the way it is depicted by our senses. We live in a world of imagination which is suitable for the "macroscopic field" – and thus for everyday use – *which, however, does not correspond to reality in any way*.

A further consequence: we also should not rely so steadfastly on our senses, on our logic, on our "healthy reasonable thinking and assessing", on our "healthy feeling", on our "common sense" also with other judgements.

These are – in my opinion – the consequences concerning the conception of the world which we have to draw from the discoveries of modern physics.

3

The atoms on the other hand build up "molecules". Thus we reach areas which we can perceive with our senses and which we can imagine pictorially with the tool that is our brain.

Today the biggest molecules, which consist of hundreds of thousands, even millions of atoms (for instance the genetic blueprints) can already be made visible with the most powerful electron microscopes. Also with every molecule the atoms which build it up are held together by forces. The amount of energy needed for that is about ten to a hundred times smaller than the that of energy bonding the electrons to the nucleus of the atom. These forces are those which the main subject of "chemistry". Classical chemistry is practically the science of molecules.

Atoms are separated from molecules through chemical "reactions" and those atoms then build up other molecules. Today the structure of a great number of molecules – even of particularly big and complicated ones – is very well known. In 1962 M. F. Perutz was awarded the Nobel prize for having solved the structure of the haemoglobin molecule (which consists of more than 100,000 atoms).

All rocks and metals, all animal and plant bodies consist of molecules – and they are built up from about a hundred types of atoms. Every type of atom consists of the same elementary particles – and they are manifestations of energy.

Further phenomena that exist in this world are the manifestations of light, of sound, of smell, of heat, of electricity, of magnetism, of bodily movements and of gravitation.

All of these are also manifestations of energy and most of them can be measured directly in terms of one of the units of energy. Electromagnetic vibrations are energy units which fly through space. Every bodily movement is energy – I deliberately do not say it *has* energy.

Heat is the vibration of molecules and atoms – also a type of energy. Electricity, magnetism and gravity are also manifestations of energy.

According to the discoveries of modern physics there are no scientifically provable phenomenona in the universe at all which neither derive from energy, nor have their roots in energy nor are caused by energy. Even space and time are, according to Einstein, nothing absolute. They are not a "something" in which "matter" and energy develop – but also another 324
function of energy.

However, what "energy" is *we do not know*.

4

The life process had its beginning in the molecular field What is strange and special about that process is that it is manifested in structural formations which enlarge themselves by some sort of auto-catalysis[5].

Crystals also "grow". However, they represent states of balance which atoms achieve by means of energetic effects ("valences"). Molecular structures which are called "living things", on the contrary, are build up in such a way as to increase their content of free energy on average. "Living" structures manage in one or the other way – and with that we come back to the subject of this book – to seize free energy and incorporate it into themselves and there with the loss of a considerable part (which escapes as "heat") a smaller unit is lifted to a "higher level of voltage", to a higher "level of intensity".[6] What is more, they are constituted in such a way that with the help of that energy the process continues, the structure draws further substances to itself and incorporates them into the structure and by that enlarges or increases it.

Admittedly, all that does not explain the development of life in the least. However, this is where the energon theory comes in. It explains: whatever is the cause for the continuation of that process: *it does not have any influence on how the structures that are necessary for its continuation have to be constituted*.

More precisely: no matter whether coincidence, a special "mechanism", human intelligence, a supernatural "life force" or a personally created god generates those structures: in any case they have to have a particular construction. The type of "originator" no doubt influences how fast or how slow such formations take place and even what formations can be attained by the process – but either way: the result has to have certain qualities as *only then can it continue the process.*

That necessary structure – this is what the energon theory claims – derives from the qualities belonging to "matter" and energy. If some god changed them, then also the structure would have to be constituted differently. However, under the prevailing, observed and measurable conditions in the cosmos the structures where the life process can continue are mapped out, as it were. They are a necessary consequence. Should a similar process have developed on another planet, then the energons which carry it on – if there the co-operation of environmental conditions is different – may appear different *on the outside*. However, also there the inner construction – necessarily – has to correspond to the same laws.

This is the central point which makes this theory so difficult to understand. Our brain is aligned with looking for explanations of all phenomenona via their *direct causes*. The energon theory on the contrary says: no matter what those direct causes may look like, they have – through selection and causality of steering – to lead to a certain result. Only something which is capable of achievement and which is competitive can exist and carry on life process. Structures which do not have that ability cannot exist – no matter how they have been generated.

Thus, the energon theory explains – in its essence – that life process is built up on an invisible basic structure which has been mapped out on the basis of the given physical effects which forms the basis for its development. It is a "value-structure" which cannot be perceived with the senses but can be expressed in numbers. It is the basic structure that is necessary for the capability of acquisition and competitiveness.

That invisible value-structure is the "hidden common feature" that is characteristic of all energons. It is based on categories that on the one hand summarise environmental effects and on the other hand problems that occur inside the energons[7].

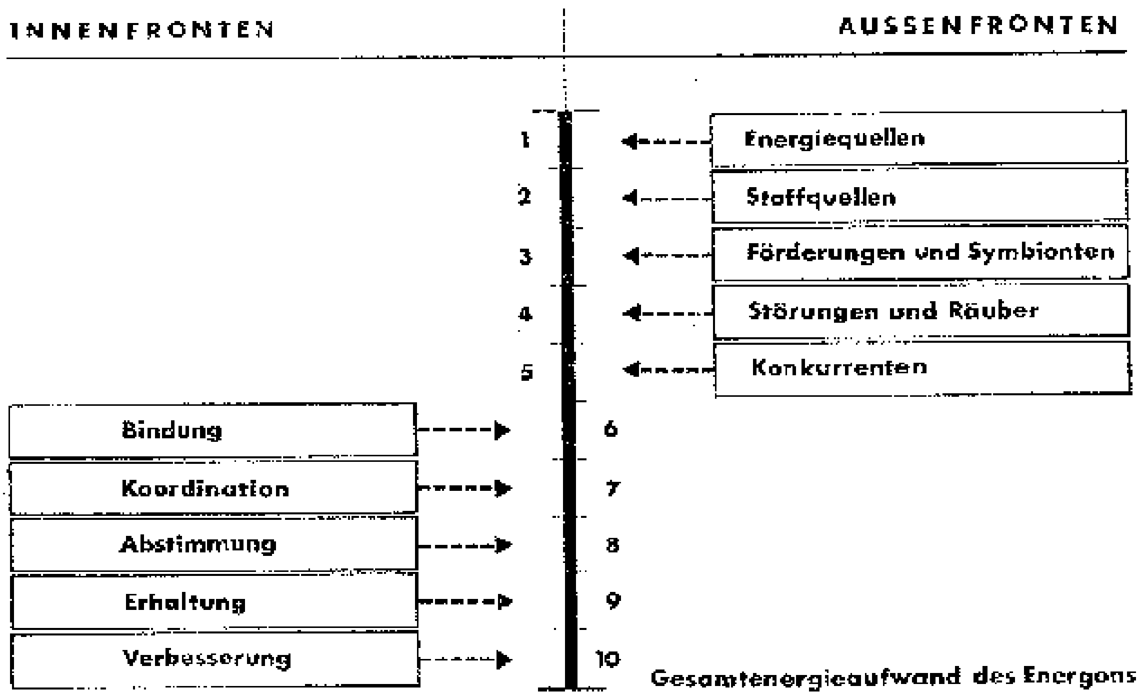
The most important alignment is always the one towards an acquirable source of free energy. With that every energon – even if it lives on the Andromeda nebula – has to correspond as a key does to its lock. Every energon in the first place has to be constituted in such a way so as to be able to "unlock" a source and to achieve an average active balance of free energy.

Further environmental conditions dictate further necessary features. According to the effects one can distinguish between hostile and supporting environmental effects: the former includes rapacious energons, unaimed environmental disturbances and competitors, the latter includes all energies from the outside which the energon forces into its service violently and others which it subordinates by way of exchange.

Thereupon every energon also has to "cope with" problems inside itself – thus it has to be built so that it is still able to fulfil further demands. Each of its parts – of its "functional units" – has to be linked to the others in some way. Furthermore, parts that have active functions have to be co-ordinated in their activities. In addition to that, the individual effects should not disturb each other but instead should support each other wherever possible. In order to maintain the effect, maintenance and often also repairs are necessary. Many functional units have to be supplied with amounts of energy and substances and have to be relieved of the produced waste. Finally, for many energons it is important that they adjust themselves to constantly changing environmental conditions, that is that they are able to change and improve their structures .

In each of those categories – which build "parts of the front" of the energons, as it were – three standards of assessment are important: the respective costs that arise, the precision of the achieved effects and their speed. The first two criteria, namely the costs and the precision, do always and in all categories influence the total degree of suitability of the energon. The respective speed of the effect is often influential but not always.

That already results in about a hundred measurable values which build up the inner structure of values and which have to be taken into account in every calculation of competitiveness. 326
Those values also influence each other: their correlations also play a role[8].



INNER FRONTS	OUTER FRONTS
	energy source
	substance source
	promotions and symbionts
	disturbances and robbers
	competitors
bonding	
co-ordination	
matching	
maintenance	
improvement	total expenditure of energy of the energon

Figure 38: *Main fronts which all energons are confronted with and with which they have to come to terms.*

The *outer fronts* (1-5) depict environmental influences which can be summarised into these categories due to their similar kinds of influence. They necessitate functionally related facilities within the energon and burden its balance in a comparable way. Each of those outer fronts directs the evolutionary developments of the functional units that become necessary because of them and thus influence the time and space structure of the energon.

The *inner fronts* (6-10) depict further demands which the energon has to fulfil in order to exist and to work successfully. Those "influences", however, come from the inside. They can also be summarised in groups – i.e. those five categories – according to the functional facilities that become necessary because of them. They also force corresponding functional units onto the energon. They also direct the evolutionary development of the functional units and of the whole body.

Line 1-10 graphically depicts the total expenditure of energy of the energon. The sizes of the single sequences are different for various energons as they depend on the expenditures which become necessary due to the respective fronts. This scheme can also – for the assessment of the degree of competitiveness – be set up separately for the construction period, the phases of acquirement, the phases of rest and the miscellaneous closed-down phases. Such a classification then builds the "visiting card" of the respective energon. It provides clues for the inner value structure which is relevant for its competitiveness.

Finally, there are still the three different "levels" of the assessment: the energon individual, the energon "species" and the life flow. With energons that occur in interlocked form other levels of assessment also come into play – for instance between professional entities and the life flow these would relate to the individual business, a group of companies, the state, or a confederation of states.

In my opinion these are the most important elements that build up the invisible value structures of *all* energons. They are certainly augmented by further elements. What is important here is that this is a system of assessment and a system of terms which is not only valid for all energons but which also for every energon, in relative terms.

Only if all those values and their correlations have been determined for many individual and many different types of energons d – a gigantic task – will it be possible to distinguish the main lines of tension within that complex network of effects and to recognise the main phenomenona. Only then will it be possible to determine the actual backbone of competitiveness – and with that the common backbone of various big groups of acquisition – and finally the central backbone of all energons. It is impossible to do this with ordinary arithmetic, however, computers can manage this task.

We will then view plants and animals in a new light: not in the light of their outer, colourful, confusing shapes but in the light of the "value structure" hidden inside – "underneath". In order to assess types of professions and businesses in particular, that value structure is of not inconsiderable significance. Only from this can one determine the key points and key relations for the necessary time and space structure.

We will then also reach the point – and this seems especially important to me – where we arithmetically determine rational and fair matchings between energons with different levels of integration (for instance between employees and their firm, between citizens and the state, between an enterprise and the state). Today this happens by rule of thumb, experience and judgement – but to what degree views differ is shown in every argument between employers' associations and unions or between professional associations and the state. Even more significant – seen from the standpoint of world politics – are the arguments between different state structures. Here, too, we could make better progress if we can replace polemics and war by determining values mathematically.

What unforeseeable consequences one single emotional, incorrect assessment can have is shown by the recipe with which Karl Marx burdened the whole communist world. He saw deplorable states of affairs and thought that they could only be rectified by the eradication of a whole branch of functional units: with the eradication of entrepreneurs. He failed to see the major functional importance of those organisationally enthusiastic and venturesome units. The idea of a "surplus value" produced by the worker which unfairly flows into the pockets of the entrepreneurs blinded him so strongly that he failed to see the complementary "surplus value" that is produced by the entrepreneur. Particularly that latter "surplus value" is of not inconsiderable importance – not only for the individual business but over and above that as an impulse for the total economy of a nation.

If one could determine the value structure of energons and gain control of it, then ideologies and endless disputes would not be necessary any more to eliminate such conflicts of interests.

Rational research – with the earthworm as well as with industrial businesses – together with a computer could achieve this.

5

It is quite important to ask what measures should be used in order to measure all this.

If we compare the competitiveness of closely related energons, then the comparison of single relevant values may already be sufficient to determine the key points of difference. Here no new and universal measure is yet necessary.

If, on the contrary, we have general comparisons of very different energons, then the value of their competitiveness is depicted as the sum of degrees of effects and what we then practically determine is the degree of adjustment to a given task. If the optimum is 100%, then the respective degrees of "efficiency" are correspondingly lower. The resulting value could be called efficiency value (EV) – unfortunately, this combination of letters is already used for the electron-volt. Therefore I would suggest OV ("organisation value") instead.

Another necessary measure creates by far bigger problems: namely the one used for the extent of "differentiation".[9] It derives from the necessary number of functional units, as it were, necessary for a key to be able to open a lock. Only the highly differentiated structure "lion" is
able to achieve what a lion is able to do. Only the highly differentiated structure of the IG- 329
Farben company or jet aircraft can achieve what IG-Farben or a jet can accomplish. The fact that those numbers do not derive from a linear juxtaposition (as with the key bit) but from a complicated hierarchic grading most likely does not affect the basic problem. We also measure "information" linearly in *bits* although news broadcasts are not linear processes in that later announcements are often based on earlier ones and can only be understood in relation to them. Also, with every complicated transmission of information – just as with every complicated organisation – we find hierarchically constructed complexes.

Whether the degree of organisation can accordingly also be measured in *bits* remains to be proved. Should a separate measure become necessary, then the term *org* would be possible. With that measure one could then also determine the "total achievement" of differentiation within evolution.

6

There are a number of parallels between modern physics and the theory of the energon.

Modern physics has put the "individual" effectiveness of inorganic phenomenona into the background in favour of effectiveness that is only statistically determinable. If the energon theory turns out to be true, then it also leads to the primacy of statistical values concerning the field of life-development and the development of humanity.

Modern physics has found the same mysterious something, "energy", repeatedly in all phenomenona. The energon theory considers all evolution as a manifestation, as an development of energy. The briefest definition of the energon is "the necessary structure of the energetically actives".

Thus, eventually: "a structure capable of acquiring what develops within itself".

Modern physics goes against our senses, against our brain's natural forms of assessment and transforms the formerly concrete world into a highly inconcrete one: the energon theory– in the organic field – takes a similar direction. Sensual ways of assessment move into the background and also organisms, especially humans of course, become inconcrete.

The energon theory finds itself in sharp opposition to classical biology.

The latter considers – and nothing has changed in this respect since Aristotle – the limitations of every living thing to be where its coherent structure ends. The cat ends with the tips of its whiskers, the oak tree with the last runner of its roots. It is true that in ecology there has always been a deep interest in the interrelations between organism and environment but so far the concept "living being" – as far as I know – has never been questioned by any biologist. To be precise: never before was there any doubt that the genetically created organic structure justifies the limiting term "living being", that this term not only derives from obvious experience but that it characterises *reality as such*, that "living beings" which are defined in such a way are what make up evolution what carry it on and depict it.

The energon theory, on the other hand, considers the organisms to be effect structures which do not necessarily end with the obvious boundaries. They end at the boundaries of the "functional units" connected to them – and they do by no means have to be tightly joined with the rest of the entity of effect.

The relations which according to the energon theory are important cannot be forced into the scheme homology–analogy. What becomes significant here is neither the phylogenetic connection nor a similar external appearance. An antibody in the blood, a sting and a recipe for the behaviour of escape are neither homologue nor analogue (and also not "convergent") – nevertheless one has to assess them together. They serve the same complex of effects: the repulsing of robbers. They are "related concerning their effects". In the balance that shows the existential backbone "capability of acquisition and competitiveness" they belong to the same category.

The energon theory is the science of the structures of effect, of the functional units, of the *relations of effects*. It says: these are what finally count.

Ernest Solvay came very close to defining the energon. He defined organisms as "energy-transformers in potential states".[10] He explained that humans cannot judge "within themselves and for themselves".[11] He also considered human communities as energetic structures[12]. He saw all evolution in its inner relations[13].

Wilhelm Ostwald, who dedicated his book to Solvay, applied the term "energy-transformer" to organs and tools (including machines) of the human bodies of power. Their significance lay in the fact "that they make possible a favourable transformation of the rough energy that was worked on with their help and that they consequently bring about a better production of utilisable energy". Accordingly, what is called "means of production" by the economist he calls "means of transfer".[14]

For Ostwald the energy balances were the central phenomenona (p. 60). Animals he called the "parasites of the plant kingdom" (p. 52). The sphere of activity he called "energetic area" (p. 73). He emphasised the fact that with the use of "outside energies" through humans "they do not stem from his body but that they are taken from the outside world". The direct utilisation which does not take place via the detour of the body he considered to be "the decisive step towards the rule of the earth" (p. 81).

Ostwald summarised the phenomenona of the human increase of power with the term "cultural activity". That was a serious mistake because the term "culture" stands for many things that do not permit purely economic assessment. So especially for the sociologists to whom he addressed his book[15] it became extremely difficult to understand its actual meaning. This was partly the reason why I made a clear distinction between the activity of acquisition and "luxury". 331

Kurt Wieser[16], some of whose ideas also came close to the energon theory, suggested adding a third law to the two basic laws of thermodynamics. He called it the "law of the increasing effect of single sources of energy". He formulated it as follows: "In individual cases single elemental forces structure other elemental forces around them." Wieser hardly dealt with other authors; his explanations are difficult to read. However, they contain remarkable ideas and especially the above suggestion seems to me justified in a certain way.

The first law of energy says that energy is indestructible. It divides itself, melts into something but is always maintained. This is a basic phenomenon for which still no "explanation" has been discovered. The second fundamental law says that the amount of free energy is diminished with every transformation of energy[17]. The intensities are balanced. This is also a fundamental phenomenon that was discovered empirically but for which no further "explanation" is available so far. Now if Wieser adds to those two basic phenomenona a third one, namely that energy masses together, differentiates and manifests itself in ever more powerful potentials – the vehicles of life process – then this does not seem unjustified to me. Again we are confronted with a basic feature of the special something, "energy", which cannot be explained any further. In the end, the whole of evolution is based on this basic feature. Mind you: the structures cannot be explained with it – however, it can explain the fact that such structures could come into existence.

The physician – for whom organisms are outside his "competence" – may hardly be inclined to add such a basic law to the two earlier ones. From the viewpoint of the energon theory, on the other hand, I find it is a reasonable suggestion.

The most amazing foresight indeed has to be attributed to the Greek philosopher Heraclitus. From his writings only about a hundred "verses" have been preserved and parts of them are rather obscure, even banal. Nevertheless, there can be no doubt about the fundamental view – summarised in the saying "everything flows" – of this thinker.

Consider: at a time when scientific thought had only just started to develop, surrounded by motionless rock, by soil, tree trunks, houses, metal this man was so bold as to explain that in the end everything is motion – that is "fire" as he said. Considering the phenomena known in those times he could not have chosen a better symbol for *energy*.

8

Many a theory has suffered from the fact that its founder mixed it with attempts at explanation and with the conclusions resulting from it. This was the case with Darwin. What he presented as such was in no way *one* concept but two concepts that were completely independent from 332
each other. The first one, the actual theory of evolution, said: all living things are related; they are, as it were, branches of one and the same big development. By now overwhelming evidence has been produced for that.

Additionally, Darwin tried to give an explanation for that process. He believed – just as his predecessor Lamarck – that acquired features can become inheritable, however, he put the "selection of the more useful through natural selection" into the foreground. This is a quite different, *second* theory that has remained disputed until today. As by this "coincidence" becomes the actual originator of all organic phenomena many people opposed it strongly. Furthermore, since the two theories were presented as a unity they at the same time came up against the theory of evolution.

I would like to avoid making a similar mistake in this book. Also what has been presented here is – strictly speaking – not *one* concept but several.

The *energon theory* as such does not say anything about how energons come into being, it does not deal with their evolutionary development. What it rather explains is: no matter how an energon comes into existence, its shape in time and space is prescribed by a particular value-structure. Thus, if I have also tried to give explanations for the development of energons, then this is something additional.

The first such explanation – and thus the second theory presented by me – may be called the *extended theory of evolution*. It says that the evolution of animals is directly continued with the bodies of acquisition built by humans. The main arguments for that are the science of "artificial organs" (of "functional units that have not coalesced") and the science of how the central nervous system (cf. appendix IV) takes over the construction of blueprints (especially blueprints for the building of structures). This theory does indeed spring from the same way of thinking to which the energon theory leads but is not part of the latter. If the extended theory of evolution were wrong – assuming that indeed the original theory of evolution were wrong – then the energon theory would not be affected. Even if – as Linné surmised – every single species of animals and plants were a personal construction of god, even if it turned out that all acquisitional structures created by humans were founded on an immaterial "soul" that was innate to humans (which still many people believe) – even then, says the energon theory, energons would have to be constituted just as they are now.

As another attempt at explanation I presented a view (Part 1, chapter VII) which I would like to call the *theory of steering*. It says that the effective outer and inner factors themselves are what has directed (and directs) the evolutionary development of the energons by way of "steering-causality". That steering takes place according to the same principle that also forms the basis for steering processes within the bodies of organisms and with human technology – however, it happens in quite unaimed, "unintentional", "unwanted" fashion. This concept, too, is merely an addition. If it is wrong, the energon theory – precisely because it does not deal with the development of energons – will not be affected.

The fourth concept I have presented I call the *theory of functional cyclical processes* (Part Two, chapter IV). They present a set of rules showing how the sequences of functional changes can produce progress and higher development. It is also an addition and does not affect the energon theory directly.

The fifth concept – the theory of the four basic types of the state – is an attempt to apply the energon theory to the types of states. If there should be any mistakes in the logic, then the principle of the energon is not affected directly. Nevertheless, these two theories are closely related.

Let us now – to conclude – turn our view to the future. Do these theories make it possible to make any predictions about the further development of humanity?

Comments:

[1] This is largely confirmed by the fundamental philosophy by Democrit us(460-371 B.C.)
[2] Whether they are in fact the smallest material units cannot yet be determined. Today in physics there are theories that are taken quite seriously which suppose a further inner structure of the elementary particles (e. g. the so-called quark-model by Murrey Gell-Man).
[3] Already in 1887 Wilhelm Ostwald formulated the opinion that matter was “a secondary product of energy”.
[4] I give a few examples for energy values in appendix V.
[5] Catalysts cause chemical transformations without getting involved in the final product. Auto-catalysts (“self-catalysts”) lead to the increase of their own structure –also without being included in the newly generated substance themselves. One example is water. In order to generate water out of oxyhydrogen

one needs – at least in traces – water. The latter, as it were, is the necessary inducement for H and O atoms to combine to form H2O-molecules.

6 Goethe characterised "organic beings" as follows: "They process the food that has been taken into particular organs and they only use a part of it, while secreting the rest. The former they provide with something exquisite of their own." (From: "Vorträge über die drei ersten Kapitel des Entwurfs einer allgemeinen Einleitung in die vergleichende Anatomie, ausgehened von der Osteologie", 1796). Goethe probably thought of the formation of organic structures in the first place. Yet, his formulation is also applicable to energy. Here, too, one part is provided with "something exquisite of their own" ,while the rest is secreted.

7 Goethe wrote: "Therefore this is where a suggestion for an anatomical type is made, for a general picture where the possible shapes of all animals are included and according to which every animal would be described in a certain order. That type would have to be set up with the strongest physiological orientation possible." This last sentence is significant for the direction of Goethe's thoughts: "physiological" means according to the function, to the effect. ("Erster Entwurf einer allgemeinen Einleitung in die vergleichende Anatomie, ausgehend von der Osteologie", Jena 1795). Later, a basically similar way of thought was pursued by W. Roux the founder of developmental mechanics. He defined it "as the science of the constitution and the effects of those combinations of energy which produce development". He searched for the "reasons for the forms of living things" and considered the developmental process as a causal event. (W. Roux, "Gesammelte Abhandlungen über die Entwicklungsmechanik der Organismen", Leipzig 1895.) The energon theory follows up both these lines of thought.

8 I do not provide comparisons of measurements in this book. From economic data and already existing measuring of organisms a number of comparisons can already be made but their meaningfulness is very limited. It remains for pure research to be undertaken according to the new criteria.

9 B. Hassenstein deals with this question in "Kybernetik und biologische Forschung", Handbuch der Biologie 1/2 Frankfurt 1966, p. 634.

10 "... transformateur de l'energie qui a l'etat potentiel..." in "Notes sur des Formules d'Introduction a L'Energetique Physio- et Psycho-Sociologique", Brussels 1906, p. 4.

11 "D'autre part, il apparait avec la meme evidence, que l'organisme "homme" ne peut plus etre envisage en lui-meme et pour lui-meme exclusivement. Il doit etre considere dans ses rapports energetques avec la societe." (p. 7.)

12 „Chaque groupe humain particulier, l'espèce humaine tout entiere, doivent etre considerés comme une reaction chimique organisée qui se continue et tend a se développer sans cesse, suivant sa loi ineluctable, malgré les obstacles de touts ordres et l'intervention de facteurs intellectuels toujours nouveaux." (p. 25.)

13 „En somme, et au point de vue le plus general, l'être vivant serait une réaction organisée spécialement pour oxyder à froid, de manière continué et avec dégagement final d'énergie, un milieu propre : sa raison d' être initiale, sa loi, son but, son interêt seraient la production et la continuation prolongée de cette oxydation dans les meilleures conditions possibles."

14 "Die energetischen Grundlagen der Kulturwissenschaft", Leipzig 1909, p. 149.

15 It is remarkable that this book which got hardly any attention was published in the same year Ostwald was awarded the Nobel prize (1909).

16 This is not the biologist Prof. Kurt Wieser who also dealt with organisational questions (for instance: Organisman, Strukturen, Maschinen", Frankfurt 1959) but his father, who was a constructor and owner of a factory. The only book he published was "Das Gesetz der Organismen", Budapest 1943, furthermore he deposited two scripts with the National Library in Vienna (see bibliography). Ing. Wieser hardly got any response to his ideas. He left a number of unpublished writings.

17 Thus, while energy as such is indestructible, "free energy" – as Ostwald put it – is "destroyed" constantly (p. 33).

VII

TODAY AND TOMORROW

Somebody who never dares to go beyond
reality will never conquer the truth.
Friedrich Schiller (1759–1805)

Our children won't get freedom dropped into their laps,
any more that it has ever dropped into the lap of any nation on earth.
Pestalozzi (1746–1827)

1

Within the framework of all evolution human activity shows a double, an ambiguous face. On the one hand the "human being" is the most successful energon: it becomes the germ cell for numerous bigger energons in whose structure it becomes an increasingly smaller unit. It is tied by those bigger entities, subjugated and deprived of its own liberalness. On the other hand its striving for "freedom", an individual way of life and for enjoying life individually grows: thus it concentrates itself individually on itself. That second tendency brings the energon – first only insignificantly but in the course of development increasingly so – into conflict with the interests of the life stream which has generated it.

Within this divergence three complexes can be distinguished.

First complex: the human struggle against suppression by other human beings. This primarily concerns what in colloquial language we call "class struggle" and "struggle for liberation" (against suppression by other nations or by imposed governments). Single humans build up successful professional bodies, create positions of power and strengthen them by bequeathing them to their descendants. Thus other human beings, germ cells, are hindered in their "free progress", this or another possibility of acquisition is not open to them. This is also how they are turned by others – through force – into functional unitsor into milch cows.

That development is observed by the life stream – if I might be allowed this personification again – indifferently and without any interest. Such struggles for power, suppressions and exploitations have belonged to the daily routine from the beginning of evolution. It was precisely these processes which carried forward development overall. If in the case of human beings germ cells of energons turn against other energons, then this might be new – yet, at the these human turning points many other things changed, too. At any rate, such processes do harm overall development. They drive human beings towards new achievements and new ideas: accordingly, they serve progress and are fully in the interest of the life flow.

Second complex: human beings strive for individual luxury. This is also, at least to some extent, a new tendency within evolution. Suddenly the individual is put into the foreground, compared to the species. The individual suddenly no longer supplies its surpluses for the formation of other energons but it builds and surrounds itself with luxury items – sometimes with exceptionally big and versatile ones. One could also regard this as a way of casting off previous chains. All human culture (in terms of an expenditure of surpluses in order to increase convenience) is a huge proliferation of such luxury items. Partly they belong to individuals (e. g. yacht, harem, collection of paintings), partly they are common organs of luxury (e. g. magnificent buildings, first-class hotels).

This tendency, too, is mostly advantageous for the life flow – thus for the total development of energons. For it is precisely those luxury items which become fields of acquisition for other energons which make such additional requirements the basis of their acquisition. Indeed, they become the strongest motor for that second phase of the evolution which began at the turning point "human being".

Third complex: some people "become pensive", become "modest". They also strive for "pleasure" but it is of such a kind that it only requires small expenditures of energy. Such types enjoy "existence as such". They explore and develop subtle stirrings in themselves – their activities are no longer aligned to conquest and radical change but to their own existences.

Seen from the viewpoint of the life flow they are "renegades", as it were. They receive the present of an enormous developmental capital and instead of paying it back with interest, *they are delighted*. The structure which is adjusted to a particular purpose becomes some sort of a musical instrument for them. They play on their inner strings, as it were – they are happy in themselves.

In an individual case this also would not be anything new: the life flow had to accept many failures. With humans, however, such endeavours spread and condensed into traditional life recipes which were particularly strengthened by most religions. The earthly struggle is replaced by the dream world of an effectiveness in *another* world. The reflating drives are fought as something mean. Christianity teaches modesty, tolerance, concentration on a hereafter. Buddhism teaches liberation from all innate and acquired urges, to let oneself be taken up by the Nothing, extinction. *Freedom* here is the final aim.

The life flow is strongly affected by those endeavours. Here people in fighting against the motor activity which urges that process. Furthermore, as those tendencies spread like infections and hold their ground extremely persistently they constitute a serious counter-force and a serious damage to the total interest of the energon.

The power of those phenomena has such an extent that they also form a block to the forces striving progress. With Christianity’s fight against enlightenment and science this became particularly clear. However, this block was removed. Seen from the viewpoint of the life flow those were barren periods: the flow faltered, slackened. Now it was set into motion again.

What followed was the era of flourishing science and technology, the beginning of industry. In the language of the energon theory this means: humans concentrated on the development of new functional units and on new behavioural patterns. Organised in big common organs (universities, research facilities) they were concerned with an extension of power – the power of energons. Increasingly bigger energons, which worked increasingly faster were built (enterprises) and external energy was forced into the service of those acquisition structures to an increasing degree. New functional units – machines – served as mediators between these forces and the aims to be achieved.

Thus, the tendencies which were directed against the interests of the life flow retired into the background again. In a few individuals they remained active, but their organised influence decreased.

With that we reach the period in which we live.

2

Through the progress of technology and industry supremacies that were based on ownership of property were broken. What became a new factor of power was accumulated, joined surpluses (capital). This power factor, too, led to suppression, it also resulted in struggles for "freedom". In one part of the world (the communist one) this power, too, was broken.

Yet it was there that types of states came into existence where freedom was denied in order to provide freedom. While the interest of the individual is no longer limited by any class, it is limited by the state itself. Seen from the viewpoint of the energon theory particularly centrally steered energons came into being which were similar to animal organisms. The germ cell human being who does not work becomes a parasite in those structures. Duties and profits are determined to a large degree. Consequently, the individual's call for "freedom" rings out again.

In states with a market economy the individual has freedom from the state. Yet, here another process takes place – which also leads to a lack of freedom.

Through the improvement of means of transport and of communication the markets for energons that acquire through exchange was extended. The acquisition area which could be profitable became larger – practically this means that the sources of acquisition that could be tapped got larger. Especially production businesses – but also suppliers and agents for services – thus had the possibility to enlarge much more than previously and to work correspondingly more profitably as a result. That possibility was utilised – this is self-evident. That lies in the nature of the development of energons, ever since the genesis of the first "living" molecule structures. If such opportunities were not taken, then this would be something new, something going against evolution as it has been so far.

Even in communist states where businesses are nothing else than functional units they become larger. This is a direct consequence of the improved means of transport which is a relationship that can be expressed in numbers.

In states with a market economy the extension of space acquired led to the increased importance of extolling the achievements supplied. If a new greengrocer opens a shop, then this gets about in the area that constitutes the potential circle of acquisition fairly spontaneously. If, on the other hand, a business in the Ruhr area manufactures a product which could be sold around half of the world, then an appropriate announcement in those areas becomes important: advertisement.

What follows closely behind, as a second function, is that this process becomes a decisive weapon in competition. Thirdly – as another extension of the function – advertisement becomes a tool for the "creation of markets". This means: through that functional unit it becomes possible to manipulate sources of energy – even, to create them anew. Strictly speaking they are not "created" but transformed. They become acquirable for other "keys" through other measures.

Today this process can be experienced by everybody. The big suppliers of products or services (an example for the latter: centres of tourism) fight for the human surplus of energy – they fight for the golden calf "vehicle of energy" ("vehicle of surplus"). They try to reach people with advertisement and thus to attract them. From all different sides wishes are implanted into humans who are looking for luxury. Today the influence has already become so subtle and effective that the majority of people accumulate more wishes than they can manage. The result is a growing restlessness and dissatisfaction with what one already possesses: the ideal breeding-ground for the growth of the economy – the ideal breeding-ground for the interests of the life flow. The respective surpluses do not suffice for the fulfilling of wishes any more: therefore the speed of acquisition is increased. Turnover grows in volume and speed. There is also an advantage to the state, higher tax income, so it supports that development. Advertising – as a further strategy – starts to devalue what has been acquired by the demander as fast as possible[1]. Through fashions and through ever new models and new examples the flame of wishes is not only fanned but led in ever new directions. The consumer – the golden calf – does not have time to think but is constantly kept on tenterhooks by organised bombardment. He or she hurries to produce surpluses in order to fulfil wishes – which are implanted into the consumer[2].

Also, all existing habits – especially the common habit of "tradition" – are harnessed. They are "commercialised". Christmas becomes a time where it is a duty to give presents, a holiday becomes a time where there is an obligation to travel.

"Underdeveloped" countries become areas of expansion which are capable of development. There the feeling of inferiority is produced while the previous values are destroyed. The "underdeveloped person" who was content with his or her previous "luxury" now becomes dissatisfied.

Within communist countries humans are shielded from those capitalist influences. However, they are also artificially set into faster motion. Regulations are a means for that. Another means is the artificial fanning of the human instinct for community. People are also bombarded with triggers that stimulate the desire to purchase just as happens within market economies. What is attained by advertising with the latter, with the former tries to attain via propaganda. Honours and participation in common success give strong feelings of satisfaction. Here, too, the appropriate manipulation of young people can achieve effects of moulding which remain with the adult. But satisfaction in being able to serve the community, however, is exhausted faster – the driving force that is activated here is less profitable than the individual striving for satisfaction.

That is – seen from a slightly different point of view than the usual one – our situation today. Now, how do we proceed?

I will depict four possibilities of future developments with four models. This is an attempt to pursue the course of evolution so far, presented itself from the viewpoint of the theory of the energon.

3

The first model is well known and unfortunately it has a considerable degree of probability. It is the possibility of a nuclear war which ends with the partial or total destruction of life.

What is particularly alarming is that wars have always been advantageous for the course of evolution. Of course humans have condemned them for some time now but they are fully in the interest of the life flow. The value that results from those processes for the life flow could – with some effort – be determined arithmetically using the example of the last two world wars and the technological progress to which they led. The actual and true human "capital" consists in the total possession of behavioural patterns for the construction of functional units and their use. They are the backbone of our power potential – and their real value is, as has been said, a quantity measurable in principle. Although today we are not nearly as yet able to carry out such calculations, if we were able to do so, then we could depict that part of the human increase of capital with a graphic curve.

But even without being able to do this we know that it is a rising curve – and that it rises more rapidly in periods of conflict. Under the pressure of the threat of a war humans work harder and – driven by fear and the instincts of community – apply more intelligence.

Since the beginning of evolution improvement was always tied closely to fighting and destruction. Many of the animal instincts are aligned to that and exactly those instincts are also still strongly effective inside us. In addition, there is our biggest strength, which at the same time is our biggest weakness, our imagination. By cunningly influencing it the demagogue can all too easily cause fear, indignation and readiness to attack. As Lorenz showed very clearly, human aggressiveness which in an orderly state is denied realisation only too keenly looks for an opportunity to react[3]. Likewise dangerous – as Arthur Koestler rightly pointed out – is the human willingness to identify with a group and to sacrifice oneself for an idea. This noble characteristic, the subject of many songs, almost constitutes a greater source of danger[4].

Today we have – abruptly – reached a point where weapons of destruction could devastate the whole world. Against their use there only stands the fear of those weapons and our reason. All other mechanisms of the life flow are on the other side.

If this were the end of the development of life, then from the standpoint of world development a not inharmonious picture would be produced – if one disregards our regrettable destiny . Energy develops until it reaches a certain potential and then this process destroys its own structure.

4

Second model: Communism – or a similar totalitarian philosophy – gains power over the whole world. 340

According to the theory of the energon then the following further development seems to be mapped out quite clearly: the outside enemy who is opposed by that system no longer exists. What remains is one huge energon which assigns everyone's functional place in the world and determines one's duties, one's earnings and one's possibilities of luxury.

Past experiences of human history suggest such a forcible suppression of the striving for individual development is not possible over the long term. Only as long as there exists an enemy of the system can it be maintained. With communist states this can be seen clearly by how often and how extensively the bogey of an enemy has to pay for it. If such bogey does not exist any more, then – in my opinion – such a totalitarian system must sooner or later break apart.

Then it changes into another forms of system and eventually into the system of market economy, entirely of its own accord. Why does it change into that system in particular? Simply because it is only in that system that the diverging interests of humans and of the life flow are balanced.

5

Third model: the consumer-economic end.

This possibility arises from the logical further development of the tendencies that today prevail in countries with a market economy. The influence that the suppliers have on the demanders becomes increasingly more effective and more perfect. Every human being is led – making a detour via his or her wishes – by others. The "I" of human beings eventually only consists of parts that have been built by others or on which others at least have put a bridle. Here humans attain a state of high satisfaction because they are manipulated in such a way that they are satisfied with that state.

This model is the culmination of applied psychology, of applied ethology – even a culmination of science and technology. With this model finally all political and philosophic opposition is dismantled – because it would disturb the flow of the economy. Birth control is regulated in such a way as to ensure that humanity reaches the optimum volume for the economic process. The interests are adapted towards each other (perhaps using the theory presented here) so that there exists a perfect balance of interests, so that everybody can be sure that he is supplied with a volume of pleasure that is appropriate within the framework of the community.

Human labour has reached its maximum with this model – the amount of leisure time on the one hand is adjusted to the recuperation that is necessary for the activity of acquisition, on the other hand to the time required for pursuing wishes for luxury. Dissatisfaction does not exist insofar as the supply is always ahead of the demand. The mechanisms of innate and acquired driving forces have been identified and can be predicted statistically: they are always met with a corresponding supply. If there is a defence reaction against such manipulation, then there are situations available where humans can give rein to it freely. They are supplied with tools and toys to work off their irritation.

This system is perfectly productive and perfectly reasonable. Once things are sorted out satisfactorily, it can last for a long time. Children are brought up according to values which later will be accessible to them, all unclear and vague aspects of drives are dismantled or directed into clear market channels.

In this model the interests of the life flow finally have gained the upper hand. Humans are wrapped up in those interests and the tendencies of human individuality – insofar as they are opposed to the interest of the total development of the energon – peter out. Thus a maximum of preservable biomass is reached. The whole planet Earth is made accessible for life process and its structures pile up in ever higher constructions and levels. Now external energies (nuclear power, etc.) operate this process to a gigantic extent. More and more functions are taken over by machines but also the functions of steering and development have been shifted to artificial organs (computers) to a large degree. The indispensable functions of humans in that gigantic block of life is to have wishes and to fulfil those wishes. A way of thinking along other lines is hardly possible anymore; it is simply pointless. as the world now has become the optimum fulfilment of one’s "own" wishes.

The result for development overall is the following: in the first period the energon species ruled. Up to the humans they carried on the life flow. In the second period the energon individual – through humans – stepped into the foreground. This process is powerfully driven on in new ways. The third and last phase is the one where the total stream dictates. It swallows, as it were, species and individuals: it does not require their services any longer.

Here one may object that also with the second model – the world as one big energon – such a manipulation of humans would be possible. Today much is said about technical influence – for instance through drugs, surgery etc. In some states and organisations already the initial stages of brainwashing can be found.

Nevertheless I think with the second model a perfect manipulation and de-individualisation of humans is unlikely to occur. Here the measures are too clear and the interests directed against the individual too transparent. Not via force but only via exchange – via the fulfilling of wishes – can a human being perfectly manipulate another one. Only in the process of total mutual manipulation can – I think –individual tendencies be stamped out.

6

Fourth model: still without a name.

This development is exactly in the opposite direction. Here the endpoint is the total control of the life flow through humans.

This model can be also derived from today's developments, as it also is a market-economic structure which, however, is curbed.

The development has its starting point with the spreading of a growing dissatisfaction and restlessness without quite knowing why. The movements among today's youth could maybe interpreted in the following way: what they, too, have in common is that they do not quite know what they are opposed to. Eventually they are opposed to the establishment and the existing structure. Here one fights against this, there one fights against that but the this and that are not the actual enemies but merely some of their many shapes.

The development in model four begins with the fact that the differences between the interests of the life flow and those of the human individual are becoming increasingly obvious and that humans are starting to investigate the question seriously and rationally. It is a widely held belief that an individual human being does knows best what is favourable for himself – but already this belief is part of the mutual manipulation. The supplier not only directs the wishes of the demander into his "stable" but also takes looks after his well-being there. The demanders also has to believe that they has acted correctly and to their own advantage – otherwise they loses trust and that makes the next deal more difficult. Therefore the supplier not only attracts the demanders but also constantly pats them on the back admiringly.

Thus it all depends on de-manipulating humans – a by far more complex task than it might seem at first sight. In the following comparison I give a few examples for the divergences that have to be taken into account here.

Personal interest	*Interest of the life flow*
Drawing great happiness out of little.	Drawing happiness out of the most expensive goods and services possible. Insatiability.
Long durability and usufruct of the artificial organs.	Fastest possible wear and tear especially of the luxury item. Getting out of fashion, becoming worthless.
Satisfaction due to friendships.	Friendships that lead to consumption (eating, drinking, travelling, entertainment etc).
Modesty, happiness with one's own self.	Presumptuousness, no happiness *at all* from one's own self. Drawing happiness out of activities that support consumption.
Diminishing unpleasant work, enjoying one's work.	Increase of all work, turnover, and of the national product.
Pacification of the world, low taxes.	Feeling of insecurity that justifies high expenditures of the state on the defence.
Matching luxuries to one's own abilities.	No such matching. Everybody should long for something that he does not yet possess until his death.
Development of one's own interests.	Development of one's own interests so that they flow into channels that support consumption.
Having one's own opinion.	Having no opinion *at all*.
Character, honourableness.	Character and honourableness only in so far as they do not lead to stagnation of wishes to increase one's power.
Making one's own decisions	No independent decisions. Ready-made ones are taken over, and lead to consumption
Reliable communication of news	News become a means of entertainment and influence.

Inconspicuous management by the state	Conspicuous management by the state.
Easy-going	Increasing speed. The journey from Europe to the USA should not last five but only two hours. This is immensely important.
Control over human technology. It should be a servant, not a master, which one calls upon when one needs it. It should not perpetually make its presence felt by boasting about the services it offers	Control of humans through their technology. Continuing, rapid growth of the economy.

An important motor for this development is the mistrust especially of all luxury which is extolled. What becomes the guiding principle is the question: which values actually serve to increase one's own well-being – and which values serve the interests of acquisition of others?

The ability to differentiate between supply and extolling becomes significant. In economics there has always been the following discrepancy: are the suppliers satisfiers of the requirement – or are they acquirers? Hypocrisy occurs if an acquirer pretends to be the satisfier of a requirement – even though he does not satisfy the requirement but just wants to create it.

In this development war is declared on all hypocrisy. Nobody has to be ashamed of his activity of acquisition: the activity of acquisition is characteristic of all evolution, it constitutes the normal and central activity of each energon. It is quite appropriate that this activity gives satisfaction and thus feelings of happiness. Successful work is one of the most original and natural sources of joy. Exchange is also acquisition. Wherever the exchanger pretends to be a donor while he is an acquirer there exists hypocrisy

What has an enormous power – due to innate "fixed" reactions – is the infectious effect of activities of other people. Anyone wanting to de-manipulate himself pays special attention to exactly those effects. Likewise, the property of others – instinctively – instils the wish for similar property. Both reactions clearly serve the life flow – and not the individual. If the value of one's own house gets smaller and it provides less happiness when somebody else builds an even more beautiful house just next to it, then the loss of is not the fault of one's house – it does not change its services at all. The loss of value only consists in one's own reaction – influenced by the environment.

For the individual and its optimum well-being the matching of own talents and additional functional units that are not innate are important. How many objects should a human being possess? By how many units should he extend his body? This can only be answered individually because one has strength enough to cope with joining up a whole kingdom with himself, whilst for another already a little property and a little responsibility are too much. What we are dealing with here are questions of bondage and co-ordination – and also of protection and upkeep. The wishes of a human being may be insatiable, however, there are practical limits on the possibility for joining additional units to oneself. Thus, each individual has to explore for himself or herself what is the optimum size of the body of acquisition and luxury should be, i.e. optimum in the sense of the individual's convenience and satisfaction.

Similarly, also human pleasure has its limits. If one forces ten times more pleasurable activities into the same unit of time, then this does not necessarily mean that ten times as much pleasure is thus produced. Attaining an optimum here is an art of living which is not given one on a plate but which requires training. Currently it is not taught in any school.

Thus, the direction of this development requires a considerable occupation with one's ego and with the forces of which it consists. Here two findings are significant: the world of the emotions for humans is the most precious – and at the same time vulnerable to the influence of the environment. The imagination is the actual centre of humans and their strongest weapon – but simultaneously also the gate through which external influences reach one's own "I". There is no easier way for external influences to gain a purchase over us I than through our emotions and our imagination.

A particularly dangerous instrument of influence is the use of moulding – because it is effective at a time when humans are not yet ready for defend themselves. Therefore with this model it is important that the children are not injected with sets of values (especially ethical ones) which will limit their ability to make assessments later in life.

Many common views that have been traditionally passed on also are a form of moulding. Therefore in this model all evaluations, even the most self-evident ones must be scrutinised.

For example: the problem of the brotherly love – which is made into a an ethical duty especially by religion – requires scrutiny. For humans it is obviously completely out of the question to love all the enormous variety of other human beings. The larger part is not worth that love. On the other hand a co-operative relationship and even one of guilt and obligation concerning all humanity is both justified and in place. Certainly, the individual only occasionally owes something to all the variety of people currently living. But practically everything the individual is, what it has, and what its achievements are based on, it owes to humanity.

The similarly promoted slogan "all humans are the same" also does not pass the critical test. Far from it. Yet, it is appropriate that humanity uses its power in order to help less capable ones. This, however, is not a duty but a free decision, much more a partial paying off of the guilt of gratitude to past generations.

In this model birth-control is dealt with much more strictly than in model three. The intention in this case is not to change the surface of our planet until it has reached its possible maximum of bio-structure but to provide the human individual with a maximum of possibilities to develop and search for happiness.

Concerning the surplus of humans in this model a firmer treatment of law-breakers – especially with capital crimes – appears probable. Here the term "punishment" is no longer justified. Society certainly has – on the basis of the immense values which it gives to the individual – the right to determine behavioural norms. Somebody who trespasses by an illegal form of acquisition (a thief) or through an illegal gratification of an urge (sex murderer) must reckon on a corresponding countermeasure. If somebody has a unfavourable disposition – then this is regrettable for him. Society by no means has the right to "punish" him, however, it certainly has the right to protect itself from him via countermeasures as tough as it wants.

In this model, scrutiny of the values "good" and "bad" in relation to drives plays a role. They are innate or acquired mechanisms – thus they are neither good nor bad but a reality. In this model humans will look for ways to cope with those forces as well as possible, to tend them, to refine them and – if they are directed against the interest of the community – to curb them. Those mechanisms are also organs like all others.

Thus, model four is typified by a kind of human beings who are characterised by a purposeful and non-hypocritical egoism. Their main interests consist in individual self-development within the framework of the possible and in remaining free from direct (forcible) or indirect (via creation of desires) influences. Their flags again say "freedom", however, maybe for the first time this is justified. Their central striving is: to be masters of their own houses. It eventually results in liberating the "I" from all units that serve some exterior interest – so that any act serving other people is one wanted by oneself and thus is a free one. The final aim is here the "freest will" possible.

Incidentally, this picture of development is similar to the one of model three in many respects. Many similar structures of acquisition and luxury are built. Here, too, one strives for progress and growth of the economy – but not in the form of an imperative that breathes down one's neck. The speed is lower. It is accepted that with this way *no* optimum of economic flourishing, *no* maximum living standard can be reached. Less attention is paid to quantity but more to the highest possible gain of convenience. Power and possession are no longer the ideal but to derive who the highest value for oneself from one's property and fortune, no matter how big or how small it may be.

Such tendencies are not new: they have occurred in the course of history repeatedly and everywhere. In model four they become the actual substructure.

The difference between rich and poor here loses some of its significance.. Similarly, also differences of race and intelligence become less important. This model is pluralistic – in the widest sense of the term. None of the possible developments of luxury is absolutely better than another one. Somebody who harms other interests gets restricted (not "punished" as there is no legal basis for that). Generally, everybody is his own master. Education is designed to provide the best possible support for that.

According to the trends so far, the realisation of this model is less likely than of model three. If model four is realised, then it also carries the prerequisite for long durability within itself.

Seen from the viewpoint of the life flow this model is curious insofar as in this case a process itself is tied and re-directed by a structure which it produces itself. In that case overall development is only divided into two periods. In the first one the species are responsible for development. In the second period power shifts to the individuals – and the overall interest of the life flow becomes subordinate to individual interests.

7

I used a quotation by Goethe at the beginning of this book because he saw or foresaw the principle of the energon in nature – so it seems to me – as nobody else did. The second quotation by Servan-Schreiber I added because it seems to be symptomatic of the stage of development today – and because it is ambiguous in its meaning.

In his widely read, and rightly so, book "The American Challenge" Servan-Schreiber describes how American companies today are advancing into the European economic area whereby they use European capital to a large degree. There he analyses the qualities that make American companies superior: flexibility, adaptability, boldness, a stronger "conscioussness of power", a better co-ordination in the organisation, the ability to "accept and cause changes" and to "put reason before emotions", higher expenditure on research, more support from the state, etc. Therefore, for Europe it would be vital to adjust to the global competition, to break down the routines of its countries, to combine the divided means and to submit to "new and strict rules of management". One should not support the weak but the strong. "Speed is necessary."

Nothing can be said against this line of argument if one considers the world as developing towards model three. Servan-Schreiber believed that: he talks about an "obviously incontrovertible development towards a consumer society without humanist aims". From the point of view of the theory of the energon this depiction, which does not lack in demagogic power, agitates very effectively for the interests of the life flow.

Europe should take up America’s challenge and fight back with the same weapons. Indirectly this means: it should take America’s economic structure as a model.

Should the world develop towards model four, then this advice would not be a very good. In model three the USA without doubt remain at the top, showing the way to follow and those who do so will remain close to the top. Contrastingly, for model four the federalist Europe forms the natural basis. Here lies the cradle of individualism. Thus, if the world’s movement changed and strived towards model four after all, then Europe, if it "hurriedly" makes an effort to become an American star pupil, would have to turn around at a some point in order to achieve the leading-role prescribed for it.

Servan-Schreiber sends out an even stronger signal by taking over predictions of the futurologists Kahn and Wiener and by describing the advantages of a "post-industrial society" which the USA would reach in ten years. The average income should then be ten times higher than in France today and human leisure time would amount to 218 free days per year. If Europe does not manage to catch up, it will become a second-class power and fall back.

Galbraith, who is very familiar with the American situation writes: "No social order has been able to reach such a high living standard as the American one and therefore none has been as good as the American one. Occasional doubts, even if they may be completely justified, go unheard."[6]

Concerning leisure Kahn's original report does not sound so confident. Servan-Schreiber only mentions in a small footnote that the coming land of milk and honey is not for people in leading positions.

Yet, now one has to consider that within the framework of automation it is especially the rough work of humans which is most often replaced and it is especially co-ordination, that is management, which will most often remain a human function.

Whether the economic superiority of the USA really places them at the top, on the other hand, also depends on whether the world eventually turns towards model three or towards model four. In model four humans only buy what they want. Yet, this automatically breaks the positions of superiority of the organisations of acquisition which are based on influence and the manipulation of opinions.

It is interesting to read in Servan-Schreiber how important it is that there exist certain big projects – "no matter which". Only through them it would be possible to "force thousands of different technologies out of their relative routine, to join teams whose ways otherwise would have never crossed". Such intentions trigger off "a whole whirl of investigations, discoveries and productions around one stimulating idea". Here that mechanism of progress is described very cogently which has always been immensely supported by wars. If there is no "grand design" the citizen will not be willing to give more money and to make a greater effort than for overcoming a national enemy. Today, when wars become suicidal, space research – as Galbraith pointed out very correctly – forms an almost ideal replacement for the cancelled "grand design" of war.

In model three grand designs are important because the state needs to have at its disposal the biggest possible financial means for the reflation and the steering of the economy. These, however, always derive from taxes. But citizens only pay – voluntarily – if grand designs compel or inspire them to do so.

The calculation is an easy one. If citizens have to pay lower taxes, then they achieve the same surplus with less work – and thus work less. This, however, diminishes the turnover and harms the growth of the economy. Thus, as long as "the steady growth of the national product" forms the common aim (according to model three), grand designs – "no matter which" – are very important measures against idleness and laziness.

In model four everything is different. The fight against being manipulated at the same time means the fight against every one-sided ideology. That, however, deprives the fire of tension of its actual fuel. Within a de-manipulated society the economic and political conflicts of interests can be solved with the pen (or nowadays, with the computer) – and this with a large degree of fairness for all sides. High expenditures for arms are rendered unnecessary and the functions of the state can be limited in many respects.

As every economist knows, this would – especially if readiness to consume and to pay high taxes declines at the same time – mean a disastrous shock to today's economic development. This is the prize, though, which humans in model four have to pay for their individual development. The living standard can then not be raised as fast anymore – but on the other hand there will be no striving for one that is so "high".

The joining together of Europe – in the sense of an integration of all interests – is certainly as important as a later integration of the interests of all countries. The question, however, whether Europe should emulate the USA, whether it should take up their economic "challenge" and respond to it with the same weapons in the meantime remains completely open. If humans decide to take the way towards model three, then Servan-Schreiber and all the others with the same line of argument show the right way. Europe, if it does not decide to take fast action, will become a satellite. If, on the other hand, humans decide in favour of model four, then this track – in the light of my theory – would be fundamentally wrong. Then Europe, predestined for leadership, would become a satellite simply through the pursuit of Servan-Schreiber's ideas.

Comments:

[1] This was analysed very clearly by Vance Packard in his book " The Waste Makers ", UK, 1964.
[2] In order to avoid misunderstandings: by advertising I do not merely mean posters, commercials on TV, shop windows and so on. Far more effective advertising is the increasingly commercialised total orientation of newspapers, magazines, of radio and TV but also of everyday conversation with others who consider their opinions as self-evident and therefore convey them with particular persuasiveness. One's fundamental philosophy concerning one's summer activities, one's housing conditions, the way one talks, what is the best way to "organise" one's life, all constitutes advertising in the broadest sense of the term. What lies directly or indirectly behind all this are interests in selling. It is that influence which today is becoming so overpowering and at whose mercy the rising generation finds itself almost helpless – but to which they are evidently starting to oppose. The whole "establishment" is an advertisement for itself.
[3] "Das sogenannte Böse", Vienna 1966.
[4] "The Ghost in the Machine", 1967. I do not agree with the biological premises that are articulated there but the conclusion arrived at by Koestler is both correct and significant.
[5] This technique of comparison is taken from H. Kahn and A. J. Wiener ("Ihr werdet es erleben", Vienna 1967).
[6] "The Modern Industrial Society".

POSTSCRIPT

My investigation is thus completed. What I would like to add is something separate from this, a small detail. I believe that in order for my work to be complete it is necessary to add this, but without any critical considerations.

The attentive reader may have noticed occasionally that in some cases there is only a very minor difference between an "energon" and a "functional unit". Evidence of this is seen specifically in human professions. A baker with a small business of his own is an independent energon. If he accepts employment in a big bakery, then it is possible that his work will be nearly the same, and it remains an acquisition activity – however, he is not an energon anymore, but a functional unit within an energon.

While discussing the digestive strategies and the symbiotic algae we encountered an analogous case (Part One, chapter II, paragraph 4). Both categories of organisms are actually independent energons, but in the body of their "hosts" they become functional units.

What about the acquisition of energy in this context? The energon which within the body of another energon becomes a functional unit, gains energy and substances via service exchange. It produces a very specific effect which the host needs – and in return is provided with food. If we now look at a cell or an organ within a multi-cellular body, we find the same energetic relationship: the organ or the singular cell acquire energy and substances. It is as if they were "remunerated" for their service or performance. If an organ is not necessary any more, we see how the species gradually declines in the course of evolution. As it does not provide any service any more, it has lost, as it were, its right to exist. Its place of acquisition has ceased to exist, its source of acquisition has dried up.

This way of thinking can also be applied on each component of a machine. There, too, its basis for existence always is a function, an effect which is needed. When such an effect becomes superfluous, the functional unit – sooner or later – disappears from the scene... I shall not pursue these thoughts any further.

Ultimately this brings up the question whether every functional unit itself also should be seen as an energy acquiring system, i.e. as an energon – insofar as it is only built, maintained and taken care of as long it provides the required service or performance in exchange.

When an energon gives up its independence and becomes a functional unit within another energon: what becomes different then in the various sectors of its inner and outer fronts?

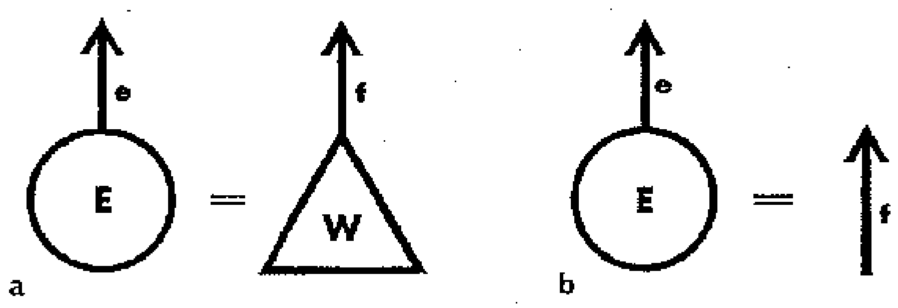


Figure 39: General energon theory

a) It says that not only all plants, animals, professional entities and business organisations, but also all functional units of which they consist are energons. The functional activity of the functional unit (f) would then be its "acquisition activity" (a). Because it acts that way – because this activity is needed – it exists.

b) Consequently this theory considers whether the functions – i.e. time processes – are not also "structured" according to the energon theory. Problems in space and problems in time would then be closely related (cf. Figures 28 and 30).

This theory is only alluded to here as a possible further development of the energon theory. If it is correct, the structures which in this book are called "energons" should have the title "independent energons" in order to distinguish them from functional units, which then should be called "dependent energons". When functions, too, are energons, these should be called "time energons" – in contrast to "spatial energons".

At the inner front hardly anything changes. The subordinate elements have to be bonded, co-ordinated, tuned and maintained. Some of these functions, e.g. giving orders or maintenance, can be fulfilled by the higher energon – but they have to be fulfilled. Also, protection against enemies is in most cases offered by the "host" of the functional unit – or better by its "employer" –, but when neighbouring organs cause disturbances further protection becomes necessary. Also coalitions of mutual support with other organs can be made. The only thing that really changes is the form of acquisition. This no longer consists in an immediate search for energy and substances – but the fulfilment of a function leads *indirectly* to acquisition *via an act of exchange*.

This brings up questions with serious consequences: are not all functional units built according to the structure of the energon? Is not the same inner value structure valid for them? Can they not also be discussed, even studied within this concept ? Are they not also – without exception – energons?

This practically means that the energon theory – beyond what is presented in this book – possibly can be developed considerably further. In that case we have to distinguish between "independent" and "dependent" energons.

Hence there arises a further field of application for the energon theory – maybe even the most interesting. For we are then confronted with a further question: whether the functions which exist in movement sequences (effects) are not also built according to the energon principle – whether these *time* structures have an energon structure, in a different dimension.

This sounds confusing, but it can already be seen in our common everyday language. We use the word "organisation" for a spatial structure – for example a factory – as well as for time structures – for example the organisation of a campaign.

A simple example: lighting a cigarette. This is a purposeful movement sequence which consists of subordinate units: to put your hand in your pocket, to search for the lighter, to take it into your hand, to bring it to your mouth, to click it with your fingers, to bring it close to the cigarette, to inhale the air, etc. Just as the functional units consist of a *juxtaposition* of certain spatial entities, the purposeful movement, the function, consists of a sequence of individual stages *one after the other*. Just as the functional units of an animal (e.g. eyes, mouth, bowels, etc.) only have the required effect when they are placed in a certain *spatial* order, also only a very specific *temporal* order of the individual movements leads to success. When I click first and only then put my hand into my pocket, my cigarette will not be lit.

If we look any further to see whether we can find the outer and inner fronts, which are essential for the energons, here, too, we find astounding parallels. Are there any disturbances? Yes, of course. Let us assume it rains. In that case the order of movements has to be adapted. The hand needs to become a protecting roof – that is an extra sequence of movements which becomes necessary because of these environmental aspects, which is *steered* by them. Is there any bonding, any co-ordination, tuning in, maintenance...?

This comes close to what Bogdanov, Feyerabend, Wieser, Stefanic-Allmayer and other organisation researchers were thinking of, even though some of them focused more on time processes and others more on spatial structures. Generally speaking, *functionality* becomes the basis of existence for these subordinate units which are partly physical and partly can be found in movement sequences. In any case they have to be functional, effective. Only then do they have an existence. Only then are they built or realised – only then do they *acquire energyin this sense*.

This, however, is not a proof, but merely an indication. Only the concept of "independent" energons is open to criticism.

I

THE WORD "SOUL"

If the words "soul" and "mental" have been avoided in this book as far as possible, there is a good reason for this, which I will briefly explain.

I do not think that there are many other words which have so many different meanings, or, I might say: not many words are used so much as a label to put terms into order in so many different "drawers of our brain".

According to many ancient religious ideas the personality of the human being departs from the body after death and continues to live in an invisible form. Christianity teaches that the soul of a human being is breathed into it by God and is immortal. The soul is able to suffer and to experience changes. It gets "sullied" by sins and then is cleansed, it has to do penance or it goes to heaven. According to Buddhism, the soul inhabits numerous bodies, even those of other living beings. It belongs to the ego, the consciousness: after the death of a person consciousness leaves the body, too. Pythagoras also believed in "a journey" of the soul. While the soul, according to this idea, is something created by God or something which came into the world in some other way, which turns up connected to physical bodies and then dissolves from them, the soul is, according to another idea, part of a "roundabout ghost", an indivisible "world-soul", a part of God himself.

According to Spinoza, soul and body are one and the same thing, a "form of expression" of "divine essence". According to multiple ideas, the roundabout soul manifests itself in the whole world, even in the rocks and the stars. As Plotinus said, the physical "emanates" from the spiritual. "The soul is more real than the visible body", the body is a "tool of the soul" (Schubert). According to Emerson and Suabedissen, the human being is therefore an instrument of this "superior soul".

Aristoteles and many others after him, though, regarded the soul as something else: The soul is not a living thing, which exists separately from the human body, but a force which makes the body alive. This force is a forming principle, even plants benefit from it. It is a shaping principle: body and soul are like substance and form (Duns Scotus). Critolaos called the soul "quinta essentia".

According to E. Becher it is the "leading factor" in the world of organisms. H. Driesel took over the term of Aristoteles, "entelechy": the soul is a completing, arranging power, the human being is only aware of one part of the soul – the "I".

Plato however, regarded the body as a "vehicle" of the soul, which controls it like a "helmsman". This idea seems similar, but it is entirely different.: a helmsman just controls a ship, but he does not construct or build it. Thus we have already four completely different terms, which are described with the same word. Firstly, the soul is something, which slips into the body and leaves it again. Secondly, it is a part of an inseparable "roundabout soul", a part of God, which manifests itself in the entire world, also in the stars. Thirdly, it is force, which points toward the order, which builds the organisms. Fourthly, it is a controlling force which directs the body.

Many thinkers regarded the soul as the principle of all movement. Thales of Miletus stated that even the magnet had a soul, because it is able to move iron. Some Pythagoreans recognised the soul in the "sunbeam or in the movement of the sunbeam". Heraclitus regarded the soul as "most delicate matter, a part of the prehistoric fire". Here, the soul is equated extensively with the term "energy". Alcmaeon regarded the soul "as a self-moving number, which has its place in the brain".

Xenocrates too, called it "the self-moving number". Agrippa spoke about a "substantial number".

In glaring contradiction to such subtle views of the soul, Doctor Virchov stated:" If I examine what is summarised under the term soul, then I get a row of organic activities, which tie themselves to specific parts of the body located in such away that it is impossible for the force to get away and leave the organ". As soon as this organ is no longer present, the activity "cannot be found", "cannot be proved". Hobbes stated that soul and brain were identical.Not very sympathetic to other ideas of the soul, the zoologist C. Vogt provocatively stated a "materialistic" point of view. He said: "The brain dissects the soul like the kidney the urine".

Another conflict over differing points of view concerns the relation between soul and spirit. In their textbook on anthropology, R. Martin and K. Saller cite Fischel as the author of a modern definition of the soul. He regards the soul as "the experiencing determined totality of all reminiscent, controlling and creative super-physical movements (in my opinion this demonstrates that definitions of the soul have not become any clearer since the time of the Greek philosophers). About spirit he says that it is independent of the soul , represents the unity of all the higher contents of the brain, of all ideals and all the requirements of everyday life, which together make up experiences. If I understand him correctly, this means: the soul creates – at least to a large extent – the spirit.

Teilhard de Chardin – whose conception of the world I will explain later in appendix two – explains very clearly that an increased intensification of the spiritual (which is in all matter), leads to the development of the soul.

There are many people, who share Cicero’s opinion that the soul has to have a material nature, "because only material is able to act and to suffer".

However, the Viennese psychologist H. Rohracher writes: "Who is happy or unhappy? Maybe the mind. To ask this question, means to deny it." The ganglia cells and the atoms are not able to suffer, matter is not able to feel either fear or hope: "The human being is more than its mind." Democritus taught that the soul consisted of very distant, movable, round atoms, which are stored between the body atoms of the organism. However, Descartes explained that the soul was unexpanded. According to Reinhard Lotze and Hans Sihler, the processes of consciousness are "spaceless" and thus "entirely and substantial different" from physical events, which happen in the nervous system and in the brain. It is not possible to compare them. "We call this new thing mental."

Many thinkers regarded the soul not as one phenomenon, but as two. According to Numerius, the human being has two souls: a reasonable soul and one without reason. The Manicheans distinguished between a "light-soul" and a "physical soul"(the same did the early Augustine); William of Occam distinguished between "a sensitive" and "an intellectual soul". Such ideas go back very far. In Buddhism, there is a difference between "vitality" ("akegerun"), and the "spiritual soul" ("erkin sunesun") – very similar to the Bible, where "nephes" (a principle of life, existing in the blood) and ruach or n`schama, are distinguished. Aristoteles added to the psychological principle of creation within the human being, which belongs to all organisms, the spirit, which is separable from the body and immortal: "another kind of soul".

Kant explained, that the "soul" was only "the subject of the processes of the consciousness" and not "a thing in itself". That means that our brain is used to summing up phenomena as "terms" and eventually thinks that these terms – the result of its own activity – are reality. An example: we call a multitude of trees a "forest". But what we call a forest, is just a large number of trees, which stand next to one another. However, we describe this mental summary with a noun, we make it a subject and we add characteristics to it. The forest is dense, it changes its colour, it becomes deforested. In this way we turn – as Wundt said – the unity of our psychological experiences (that means, our inside experiences), to a "subject, to which we add all the individual facts of psychological life, as predicates". Therefore the soul is – as L. Knapp said – an "abstraction of the processes of the consciousness" and consists only of phenomena consciousness, "which the metabolism produces inside the living nerve". Jodl puts this point of view particularly clearly: It is not the "soul", which has "conditions or activities such as feelings, imaginings, sensations or wishes, but the totality of these functions of a living organism is its soul".[1]

Schopenhauer and Nietzsche also shared this point of view. The word soul is only a word: a collective name for our inner life. Hume spoke about a multitude of perceptions which are constantly changing, and movement without real carriers. Most of today's natural scientists share this point of view. The word "soul" or "mental" comes from the functions which happen in the organisms. It is, as R. Eisler defines in his "dictionary of philosophical terms", the "organisation determined from inside, which experiences itself immediately in its own quality, on which the individual states of consciousness are dependent, but through the interaction of which it is constructed and characterised".

This leads to the question, to what extent animals and plants can be granted such an inner experience – a "soul". R. Woltereck said concerning this that one should only use the term "mental processes" for the higher animals (warm-blooded animals): "It is absolutely in bad taste to call the experience of an intestinal cell or a potato psychological."[2]

At this point one has to ask, which functions that convey inner experiences should be called "mental". All of them? Here too, there are various levels of compartmentalisation into "drawers". The main categories usually given are: sensations, feelings, wishes and thinking. But there are many that do not include the "mental" in the actual acts of thinking, but only the "emotions". In this sense, Helvetius said, the soul was "only the ability to feel", ("la faculté de sentir"). If we consider everyday speech, then we see that it is generally rather the emotions, than the "mental", that we refer to when we talk about the soul. It is possible for a genius to be completely soulless, whereas a mentally rather limited person can have "the soul of a human being". Normally, not all emotions are regarded as "mental", but mostly the positive ones , regarded as pleasant by fellow creatures: having artistic sense, a sense of tact, brotherly love, kindness to animals, charm,the ability to love, fidelity and similar qualities are "mental values"- whereas rage, jealousy, ruse, maliciousness, sadism, etc. Are not. Nobody has expressed this point of view better than Goethe.

Das artige Wesen, das entzückt,
Sich selbst und andre gern beglückt,
Das möchte ich Seele nennen

This exegesis – leaving aside the spedific theme of the soul – is intended to show what a feeble tool words can represent. Their function is to promote understanding between humans. If one human takes one as a label from a chest of drawers containing ideas and uses it as a symbol, whilst another uses a different chest, then both use the same word, but 'talk past each other', rather as if they were using different languages. At all times there have been numerous such discussions, and they continue still today. Here to, I would like to end by quoting Goethe:

Mit Worten läßt sich trefflich streiten,
Mit Worten ein System bereiten,
An Worte läßt sich trefflich glauben,
Von einem Wort läßt sich kein Jota rauben.
(Gespräch zwischen Mephistophelese und Schüler, Faust, 1. Teil)

Comments:

[1] "Lehrbuch der Psychologie I", 1909, p. 109.
[2] "Grundzüge einer allgemeinen Biologie", Stuttgart 1932, p. 532.

II

TEILHARD DE CHARDIN

Father Teilhard was not a seeker of the truth in its narrowest sense. He did not seek truth for itself, at least not a specific truth, whatever it might look like. He went on a kind of crusade for the Christian faith.

The "tepidity" of modern Christians depressed him. On his journeys to many parts of the world – he lived in China for a long period, for example – he experienced the spiritual "unrest in the hearts of the priests and the monks": There is something, he wrote, "which does not work out between God and humans anymore". He regarded the neglect of the findings of natural science by the church as a serious mistake – even as a disregard of God.

Since the world – in the sense of Christian faith – is a conscious and therefore deliberate good deed details of this creation cannot be inconsistent with the divine revelation. Therefore, he explained theology must no longer neglect the results of research, "theology must no longer neglect the least of the received truth".

Teilhard came to the obvious conclusion and moved without prejudices and consistently to the other camp: There has to be a bridge, a synthesis between the Christian faith – the Christian truth – and the results of research. Father Teilhard's lifework consisted in looking for such a connection. He found one, which gave him personal satisfaction and he defended it until the day he died.

What kind of relation is this? Teilhard's first concern was to restore the central meaning of the planet earth and its inhabitants. Since Copernicus and Galileo, it had been known that the universe does not rotate around the earth. The earth was only a speck of dust in the never-ending multitude of other celestial bodies. The human being itself was – since Lamarck and Darwin – not something unique, separated from nature, created by God for the purpose of some kind of test: the human being was a relative of the ape – a relative of the crayfishes, worms and bacteria. Teilhard developed two concepts which changed this very unhappy situation dramatically. First*: in toto* matter has consciousness- consciousness is "a universal attribute common to all particles". Secondly, it is not the dimensions 'small' and 'large' which turn the planet earth into a dust particle inside the universe which are decisive. Another one, a third dimension, is decisive: that of increasing complexity. With increased "density" of matter, there is a "rise of consciousness...." Teilhard called the human being the most "complex", the deepest "centred of all molecules".

The stars are – so to speak – "laboratories", where there is an evolution of matter. But here only rather simple atoms or combinations emerge. However, the planets are places, where – in the third dimension – a further development of the spiritual is possible. The "spiritual" aspect follows immediately. As soon as the atoms accumulate to become molecular structures of hundred thousands of stars and millions of atoms, "the physical corpuscles are given a soul and vitalised". Teilhard wrote: "Without the biological evolution, which built up the brain, there would not be a sacred soul".[1] Eventually, the "supreme psyche" is reached in the human soul.

With that, Teilhard gives the dust particle "planet earth" and the dust particle "human being", which lives on it, their meanings back. This process, willed by God, could only and definitely happen on the earth.

Within human society, there is then a further "compression" of the spiritual-mental aspect. A process of "continuing becoming one" happens here. A "super-body" builds a new "storey in the building of life". As Teilhard says, here " a hyper-complex, hypercentred and hyperconscious super-molecule develops". At this point, after the phases of vitalisation (development of life), of "humanisation" (development of human life), there is a third phase: the "planetisation". With the act of united "universal love", there would be a process of complete becoming one – a "total reflection" of the consciousness. The thus developed, overall soul eventually removes itself from the planet earth – its place of birth – "it dematerialises"; the critical point of maturity is achieved and the psychological joins the "irreversible essence of things". At the "destination of assembling and totalisation in itself", the stars and the earth return to the "fading mass of initial energy", and the psychological enters into God – to the "point Omega", as Teilhard put it in terms of natural science. So eventually "all in all" there is just God. This phrase of St Paul was apparently the lodestar of the thoughts which Pater Teilhard represented, convinced and convincingly. Even on the last page of his diary, three days before his death, he mentioned it.

Father Teilhard, who probably thought more consequently in terms of natural science than any other priest before him, could hardly fail to note that the signs for a "uniting in love of the humanity" were poor. He spoke about a "planetary compression": The increasing "collectivisation" probably diminishes the individual, but it is an unalterable process: a "crisis of birth". Because he believed in a world willed by God, Teilhard even saw something positive in totalitarian states, in the excess of births over deaths, wars, even in the atom bomb. A "phase of freedom" would follow the present "phase of compulsion": The increasing compression of "humanity" favoured through all these means, though unpleasant to us, would not lead to an "absurd enslavement". It is rather the "sprouting of a bough", which one day will have "stronger members". Teilhard wrote: "Real union does not suffocate, it does not melt the elements: it super-differentiates them within unity."[2]

He thought, that this – from a rational point of view – rather implausible process was created by extraterrestrial influence. From point Omega –and therefore from God – rays are emitted which can only be recognised by "mystical persons". This influence will become stronger– "a mighty field of inner attraction would develop in this way, and would seize everybody from inside".

The question as to what extent this theory helps Christianity with its current problems, is not discussed here. However, Father Teilhard regarded evolution as a whole, as a development, which proceeds beyond human beings, which has its origin in the organic and leads with continuing compression and complexity to higher and higher unities – the bodies of life – and with that, to a higher and higher consciousness, to an "overall soul", which includes more and more layers. Teilhard spoke about a self-unfolding, "thinking layer" of the earth, of an "aureole" of earth embracing, "thinking energy". When Teilhard talks about the "spirit of the earth", this is not meant poetically, but in the sense of these values. He called the totality of matter vitalised by human beings *the Noosphere,* and saw in it a, "zoological layer".

Following this path, Teilhard came to conclusions similar to those presented in this book. He also came to the opinion, that the structures artificially created by human beings should not be regarded as something separate from the process of life. Our "artificial" actions are just a "transformed extension" of the natural actions of other living things. "On a higher level and with other means", the human being continues with the "interrupted work of evolution".[3] The tool is "the equivalent of the differentiated organs in the animal kingdom It is – and here, Teilhard makes his point of view clear – "the real homologon and not a superficial imitation, which comes from a trite convergence".[4] Teilhard writes: " One and the same individual is able to be a mole, a fish or a bird, alternately". Among all the animals, only "the human being has the ability to bring some change into his work, without finally becoming its slave". He can transform himself, "without tying himself somatically".

Teilhard also saw in every individual within the world of plants and animals, a "mediation organ"- a "placer of passage" in the development of life. The human being is dominated by "another, superior level".

Teilhard regarded this higher level as something different from the thoroughly aimless-causal process of the developing of energy in which the energon theory perceives the origin of all forms of life. Teilhard could hardly – because of his basic attitude –arrive at another point of view. Incidentally, he evaluated the human being similarly: *as a mediation organ and a place of passage*.

Comments:

[1] "Die Zukunft des Menschen", München 1963, p. 37
[2] "Auswahl aus dem Werk", Frankfurt 1967, p. 85. This book can be recommended specifically as an introduction to the thoughts of Teilhard.
[3] "Auswahl aus dem Werk", p. 40
[4] Ibid., p. 53

III

MARSHALL McLUHAN

In his widely read and controversial book, "Die Magischen Kanäle", the Canadian sociologist Marshall McLuhan presents a number of thoughts, which – regarding the theory of energons – are remarkable.

McLuhan – so to speak – skips the theory of evolution – in so far as he presents the extension of the human body by the totality of technical means virtually as taken for granted. His interest is in the repercussions of the effects on the "psychological and social structures" of human societies, and mankind as a whole.

After the "technical age", marked by the division of labour and increasing specialisation, we have now entered the "electrical age". Because of electricity, the human nervous system experienced an immense widening: because of this new medium, the human being became more and more closely connected with all humanity. McLuhan writes: "After 3000 years of the extension of specialisation by the technical extension of our bodies, our world seems to be compressing in an opposite development". Because of broadcasting, television, and so on, space and time are almost abolished. "Electrically contracted, the world is only a village any more."

A main thesis of McLuhan is: " The medium is the message". It is not the respective "content" and the respective applicability on the media which is decisive, but the media per se has influence and regulates the forms of the social life of humans. It is not important whether a machine produces cornflakes or cars; the machine per se "changes our relations with one another with ourselves". It is the same with a film "without the relation to its content". The "media" – the extensions of the human body – create a "new standard", they "shift the emphasis in our sensory organisation". The railway led to a "completely new kind of cities, as well of work and spare time". The airplane, with higher acceleration, led "to the elimination of this kind of railway –created cities, politics and society. Every medium – per se – has the power to "impose its postulates on the clueless".

Where is the connection of this concept, here only briefly mentioned, to the energon theory? It is not a question of the repercussions of the artificial organs on the individual to which they belong, but on the whole of society. This is a problem which was not mentioned in this book. Human inventions per se have an influence on society's ways of thinking and hence the behavioural patterns of society which pervade the human beings through tradition and education. The essence of every artificial organ is the basic principle of the totality of its inherent possibilities. *It is the essence*, which has an effect on the society, which deeply influences and changes it.

McLuhan distinguishes between "hot" and "cold" media: the hot ones have a strong influence, the cold ones a weaker one. About the "hot ones", McLuhan says that they have "destructive power". One of his examples shows clearly what he means by this. "When the Australian aborigines got axes of steel from the missionaries, their culture, which was build upon the axe of stone, broke down. The axe of stone was not only rare, but always a fundamental symbol of patriarchy. The missionaries supplied loads of sharp axes of steel and gave them to woman and children. The men had to borrow them from the women, which led to the loss of their masculine dignity."

Here, the artificial organ "steel axe" turned out to be "hot" – with the major ability to influence and change ways of living.

However, the "hot media" – and this is McLuhan's next thought – experience, as soon as they pass the critical limit, a reversal of their effects. The pendulum of their influence swings to the other extreme. With that, the Western world would move eastwards, the Eastern world would move westwards.

Next, McLuhan deals with the interactions of the different "extensions". It is a "civil war", which happens in our society as well as in the soul of every individual. The artificial organs influence and increase one another. With the combining of different organs, "enormous energy was set free"; there came a multitude of new developments.

Each human extension- – one more idea of McLuhan – leads to a form of numbing of the human being – it makes him dazed, deaf, blind and dumb.

For the central nervous system this extension would have a shock effect, against which it would protect itself with this reaction. The process of self-knowledge would be made more difficult, even impossible. It is a matter of regaining the balance disturbed by the extension.

McLuhan presents his thoughts in a way which justifies many criticisms. The examples he uses to emphasise his thesis are partly far-fetched, too confused and often not suitable to justify his point of view. The natural scientist is made suspicious or is even repulsed by continuing, untenable assertions and generalisations.

Almost on every page, there are thoughts where the association of cause and effect leaves one baffled, to say the least, but which cannot be taken seriously. One often gets the impression that McLuhan deliberate seeks to baffle so as to gain attention.

But I tend to think that McLuhan just presents the world as he sees it, without taking the trouble really to explain his thoughts to an interested person. Thus as well as presenting the "extension of human nature" as something natural and given – although almost everyone until now has seen the limit completely differently – he also leaves out in his descriptions the repercussions of the simpler correlations of and immediately focuses on the more extreme ones, which appear mostly –at least in the way he represents them–not only dubious but also contestable.

If the energon theory should ever find disciples among students of sociology, I would recommend them to make a precise and sober examination of the first 70 pages of the above-mentioned book. I think they represent the right starting point to study the repercussions of artificial organs on human societies, as a key to the connections of their behaviour.

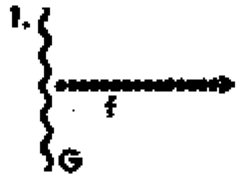
The thought of a "implosion" occurring now and the development of a collective consciousness reminds of the ideas of Teilhard de Chardin, but here it is not based on the hope for a "union in love", which is unfortunately an Utopia, but on the concrete fact of a world-wide extension of our sense organs and therefore our central nervous system. In my opinion, it is only fair that after a period of constant increase of power with the addition of additional units to the genetic body of primeval man, now other phenomena are coming to the fore. The repercussions of these artificial extensions and their mutual interactions are becoming more and more decisive for human ways of living, because everybody is becoming deeply and directly connected with everybody else because of the electric mass media. "In the age of electricity, all humanity becomes our skin."

IV

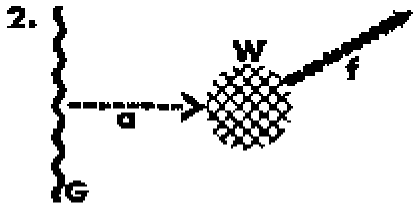
THE EXTENDED THEORY OF EVOLUTION

The evolutionary development of the regulation function is shown graphically below, in 10 main steps. One can see from this scheme how the functions of the construction of physical units and of behaviour recipes pass from one carrier of effect (genome), to another (central nervous system), in a completely continuous transition. The separation of the first part of evolution (steps 1 to 7) from the second (steps 8 to 10), which manifests itself in the hitherto radical separation of biology from the liberal arts is, as this sequence of steps shows, artificial, and distorts our evaluation of reality.

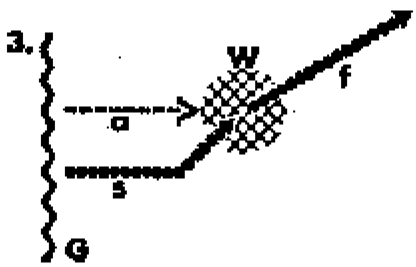
First step: The genome G (genetic blueprint) has a direct effect (e). Within the cells, this happens a thousand times.



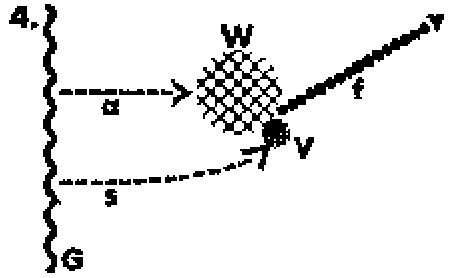
Second step: The genetic blueprint causes the building of an functional unit (FU), which performs a certain function itself. This function is "passive", it does not need further controlling. For example: the construction of the inner skeleton or shell of an unicellular organism. Without further influence from the genetic blueprint, this structures provide supporting and protective measures.



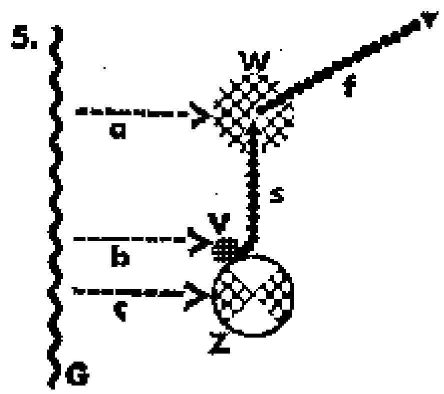
Third step: the genetic blueprint builds up an "active" functional unit and provides the necessary regulation as a separate function (s). For example: the construction of flagellates and the transmission of orders to them.



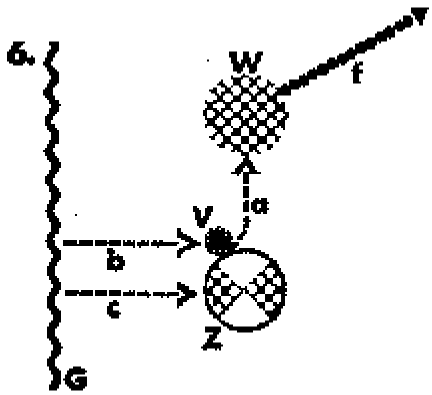
Fourth step: the same process as in step three, but in this case the genetic blueprint builds up an additional structure (BP), belonging to the functional unit, which causes the regulation of FU: a behavioural pattern.Whereas the genetic blueprint in step three has to ensure the regulation of the functional unit, it is "independent" in step 4. Because of unit BP (whatever it might look like), the functional unit is able to regulate its functional movement itself. This might be the cause with some organelles within cells, for example the centriole.



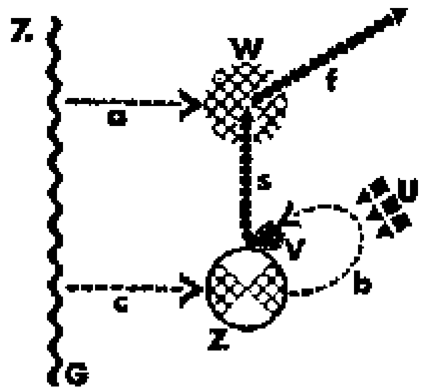
Fifth step: the genetic blueprint builds up a special steering organ (SO), and provides it with behavioural pattern BP needed for the steering of FU. In this case, the genetic blueprint already performs three different building functions (a,b,c) , it forms three different physical structures (FU, BP, SO). This stage of development is achieved by all animals, which have a central nervous system.



Sixth step: the central nervous system undertakes the construction of the functional unit, (a) either by taking it from the environment ready made (for example: the hermit crab, which takes a snail-shell of another crab as its protection organ), or by steering the artificial construction of a further functional unit (for example: the construction of the honeycombs of bees and wasps, the construction of the spider`s web and the beaver`s lodge.) In this case, the behaviour is innate, it is caused by the units BP and SO, which are built up by the genetic blueprint.



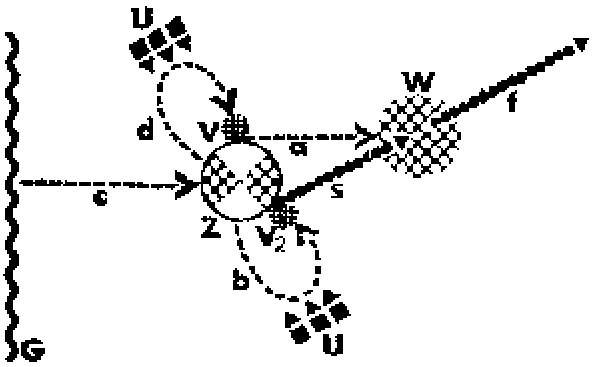
Seventh step: The central nervous system takes over another of the effects a, b and c exercised on step five by the genetic blueprint, in fact, effect b: the construction of the behavioural pattern BP. This is a typical process for all animals which have the ability to learn. In an individual confrontation with the environment (En), they build up the behavioural pattern, which is necessary for the steering of their functional units, themselves. With the "learning animals", this process happens during the course of "playing" and "learning". In this case, the behavioural pattern is not "innate", but "acquired". In this way, the behavioural pattern



can be adapted to the respective environmental conditions.

Eighth step: The central nervous system does not just take over one, but two of the functions performed in step five by the genetic blueprint: first, it builds up a behavioural pattern (BP), in an individual examination with the environment, which then causes (a) the build of the functional unit (FU). Secondly it builds, as well in an individual confrontation with the environment (En), the further behavioural pattern BP_2, which regulates the active function of FU. (for example: the production and the use of a spear. The formation (a), as well as the "handling"(s) of these functional units, have to be "trained". This scheme marks the transition between animal performances and human intelligence. This applies to all our tools, arms and equipment produced by the consumer himself.

8.



Ninth step: Here the functional unit (BP) does not build itself, but another energon (H) sees to its building. With force or with a process of exchange (EX), the "producer" is forced to cede the result of his efforts, this means the functional unit. The behavioural pattern (BP), which is necessary for this, is

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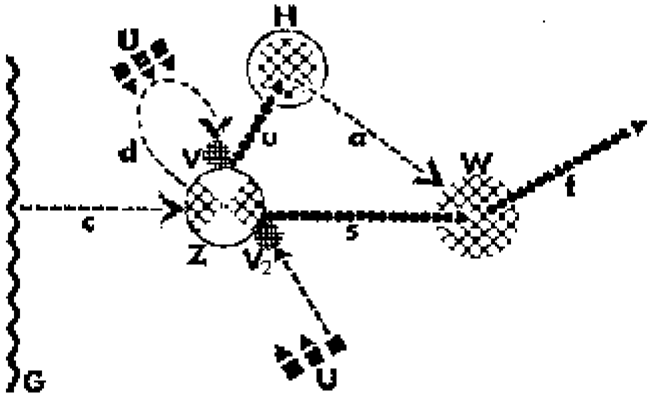
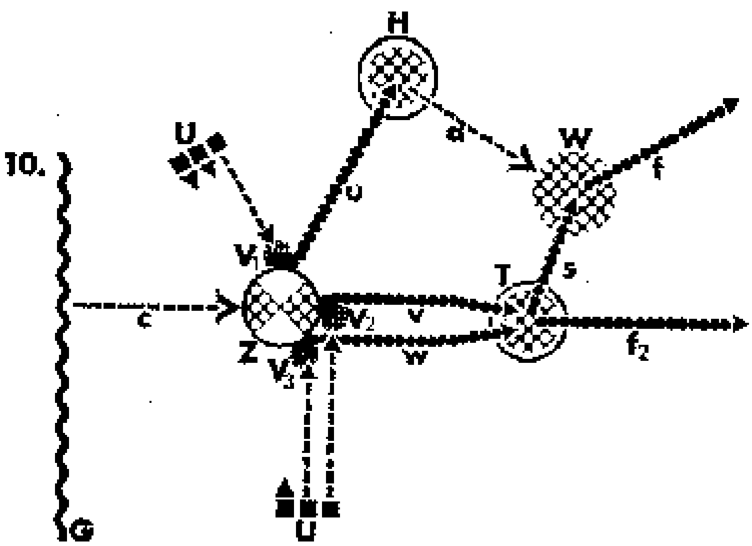


self-built by "learning" and "experiencing". A concrete example: someone realises, that someone else produces spears and steals one or acquires one by exchange. The additional behaviour recipe (BP_2), which is necessary for the use of the functional unit, is not self-acquired in the diagram, but built up by environmental influence. This process happens when children are educated and also with every influx of traditional knowledge, via language and writing. A promoting environment intervenes here: the "educator". This marks every production of goods inside societies practising the division of labour. Individual energons ("producers") specialise in the development of required functional units and hand them in by an act of barter (commerce, industry, trade).
That is, why an immense multitude of artificial organs can be acquired.

Tenth step: The central nervous system not only comes under the control of an functional unit (FU) produced by another energon (H), but by force or exchange (EX) ensures that this functional unit (s) is appropriately utilised by another energon (T). That can be an animal (like a bullock, which pulls a plough (FU), a human being (such as a driver) or an organisation (such as a building contractor). Both behavioural patterns (V, V_2), necessary for the utilising of strange energons are constructed by the environment (society), and are transferred in the form of education and tradition. The same goes for a third behavioural pattern (BP_3), by which another energon (in the diagram T again) is induced to perform an immediate function. Examples: the service of a hairdresser, of a lawyer or an insurance company. This basic pattern represents all organised interweavings in human society. It is always a matter of forcing the energons to increase the size of their own effect structure by building and transferring functional units (H), or by producing a specialized activity, which serves their purpose (T). The latter can be an immediate activity (f_2), or an operation or a regulation of a functional unit (s), which belongs to the



own effect structure. The necessary behavioural patterns can be (as in the diagram) built free of charge by the promoting environment (educators, tribal members), or the acquisition of the behavioural patterns is carried out by robbery or exchange, that is in accordance with the relation to the energon H, which in this case, as an functional unit, builds and passes on a behaviour pattern.

V

ENERGY

Below I give some examples of the different forms of energy and energy values which represent them. While the individual forms of energy are mostly measured in different units, – but can all be converted into one another – here every value on the CGS – system (centimetre – gram – seconds system), is referred to the unit called the erg.

This gives a better overall view of the phenomena and their extent.[1]

1.) ***Energy of stationary mass:*** Every matter is a manifestation of energy. Every kilo of any matter, this means 1 kilo hay, 1 kilo diamonds, 1 kilo records, represent the same rest mass energy unit, namely $9 . 10^{16}$ J

- a person of 80 kg . . . . $7,2 . 10^{18}$ J
- the planet earth . . . . $5,4 . 10^{41}$ J

2.) ***Kinetic energy:*** every body has it, which moves (relatively to another).

- Kinetic energy of a pistols bullet with tha mass of 3 grammes and the speed of 250 meters per second . . . . $9,4 . 10^{1}$ J
- Kinetic energy of a person weighing 80 kg, who runs at a speed of 18 km per hour . . . . $2 . 10^{3}$ J
- Kinetic energy of the planet earth within the solar system (speed of rotation around the sun is 30 km per second) . . . . $2,7 . 10^{33}$ J

3.) ***Gravitational energy (gravity):*** this is small in relation to other forms of energy

- mutual attraction of two atoms in one atomic nucleus . . . . $6 . 10^{-50}$ J
- mutual attraction of the particles of which a human being is built, altogether . . . . 10^{-7} J
- attraction between earth and sun . . . . $5,3 . 10^{33}$ J

4.) ***Electromagnetic energy:*** Under this category, modern physics summarises (on the basis of quantum theory), a multitude of forces: electromagnetic waves (from radio waves to visible light to gamma radiation); electricity; all chemical energy, forces of deformation, surface tension, Van der Waal forces, and so on.

- bond energy of the electron to the atomic nucleus in the hydrogen atom (it consists just of one proton) . . . . $2,2 . 10^{-18}$ J
- chemical energy content of one kg of coal (calorific value) . . . . $3 . 10^{7}$ J
- basic conversion of the energy of the human being (storage of approximately 1000 calories of chemical energy in ATP molecules and of their decomposition into ADP molecules). . $4,2 . 10^{6}$ J
- surface tension of Lake Constance . . . . $4 . 10^{7}$ J
- sunbeam per minute on the illuminated side of the earth . . . . $1 . 10^{19}$ J
- annual production of electric energy on earth in the year 1965 . . . . . $1,2 . 10^{19}$ J

5.) ***Nuclear energy:*** this is the bond energy of the nucleons (protons and neutrons) within an atomic nucleus.

- average bonding energy of a nucleon . . . . $1,3 . 10^{-12}$ J
- amount of energy set free when the atom bomb was exploded over Hiroshima . . . . $8,8 . 10^{13}$ J
- energy of the hydrogen bomb, which does not get its energy from fission, but by the creation of a new element (fusion) with associated "mass-deficit"[2]: Fusion of 1 kg hydrogen into helium . . . . $6,7 . 10^{14}$ J

Comments:

[1] I owe the elaboration of these values to Prof. Gerhard Ecker from the Institute of Theoretical Physics.

[2] Such fusion is the main source of the energy of the sun and the stars.

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