

## Information – from an evolutionary point of view (DRAFT)

W. Kofler

### Abstract:

“Information” is indispensable for the modern understanding of processes within cells, tissues, organs, the organism, but between individuals and social structures too.<sup>i</sup> Is “information” the mathematically applicable substitute for the omnipotent and in all living entities identical *Vis Vitalis*, but applicable to machines, too? *Vis Vitalis* was falsified by evolutionary theory. Its power was not “saved” with an alternative hypothesis. So the causal explanation of that what could be handled former with *Vis Vitalis* remains as “white area” in the landscape of sciences. Therefore an analysis of “information” from an evolutionary view can be helpful even for information sciences: There are gaps which could not be bridged sufficiently, especially between the different evolutionary levels to the “hierarchical structure” of a person as a social being.<sup>ii</sup> The analysis is presented: The meaning and the indispensable carriers of “information” have changed within the evolutionary processes. Incompatibilities between different levels (and the related scientific disciplines) have to be expected and can be the consequence of semantic incorrect use of identical terms.<sup>iii</sup> Such incompatibilities can be handled with an extended understanding of the terms – in our case “information” - with respect of the evolution of its contents. Such an Extended View is presented with modified epistemological and ontological tools. Some proposals were offered, e.g. to explain “information” as the result of a process thanks to the use of an “ability to deal with information”. This ability is understood in complementarity (N. Bohr) to the “ability to deal with energy” on the basis of a neutral substance monism. Another proposal is to discuss “neuronal modules” as a “genome-analog” system to store, modify and recall basics for meanings. Options and restrictions for an evolution oriented use of “information” are discussed and applied: Doing this it seems to be able to bridge not only the gap between the layers within the biological, emotion, cognitive and intellectual hierarchical levels within a person, but between persons and machines too.

INTRODUCTION: Is “information” the substitute for “Vis Vitalis”

“Information” is indispensable for the modern understanding of processes within cells, tissues, organs, the organism, but between individuals and social structures too. Is “information” the mathematically applicable substitute for the omnipotent and in all living entities identical Vis Vitalis, but applicable to machines, too?

Vis Vitalis was falsified by evolutionary theory. It is obvious: There cannot be anything omnipotent and unchanged if all is only to understand within an evolutionary based changing world. It is correct to accept the falsification of the understanding of “Vis Vitalis”. It is correct to accept the falsification of the understanding of “Vis Vitalis”.

But its power was not “saved” neither with an alternative hypothesis – as “Popper” would allow nor thanks another theory . So the causal explanation of that what could be handled former with Vis Vitalis remains as “white area” in the landscape of sciences.

Now “information” deals with similar aspects: For special aspects with great success:

But there are gaps which e.g. the so interesting and relevant concept of the General System Theory could not bridge sufficiently: e.g. the different evolutionary levels to the “hierarchical structure” of a person as a biological and social being! Why not?:<sup>iv</sup>

Information” is a term which is used with identical wording – and often identical formulas - for machines and humans. The use of the term is in any case in agreement with the definition: “Information *is a difference which makes a difference*” (N. Wiener)

Who makes the difference and thanks what kind of ability? “Vis Vitalis” was a comfortable explanation for that, but finally incompatible with the given facts of evolution and was just wasted.

So it is correct to ask: Is this extremely general definition of “information” and its “identical” application from a machine to the person really in agreement with our understanding of evolution, too?

And if not: Then we are in a situation similar as Einstein has been, when he recognized the logic incompatibility between the two indispensable theories of Newton and Maxwell. And we can adapt his epistemological tools to save the given power and extend it with a more general understanding. This I will sketch within this presentation.

But the position of Darwin is limited on the evolution of species of species. We need a much wider view including social structures and inanimate systems, like machines or www. Therefore I use the model of the Extended View for our analysis.

## THE EXTENDED VIEW – some aspects

The “Extended View” is a model to deal with material and immaterial aspects of a person as a social being and its interactions with and its expectations on its environments on a causal level.

Therefore the model must allow to bridge unlinked gaps, e.g. between “body and mind”. This is possible with the help of a set of additional epistemological tools, e.g. thanks the natural philosophy of Einstein.

The “basic assumption of the “Extended view” is: Incompatibilities between different natural- and non-natural scientific based disciplines need not be the consequences of incompatibilities between the nature of the research objects. They can be based in techniques to generalize research problems on special aspects with the inherent consequence to skip out other aspects, which are not relevant for “classic” problems of a discipline – but maybe for “extended ones”. Einstein could confirm this on with the Relativity Theories!

His problem was the incompatibility between the identical wording of the term “movement” in electromagnetism and mechanics. His solution demonstrates a natural principle too, which allows understanding of the power and restriction of the identical use of the term “information”: What is relevant on one level can be irrelevant on another level and vice versa.

The differences between the diffraction calculated with “Newton” and “Einstein” and the naive phenomenon are significant but not relevant for daily life. The differences between “Newton” and “Einstein” are irrelevant for problems adequately to handle with mechanics (e.g. to calculate the need of fuel for a missile).

They are indispensable to deal with atomic energy, GPS, WWW....

Natural entities are valuating actors! They (can) simplify that what is constitutive for their precursors on older evolutionary levels and are unable to attribute meaning to that what is emergent on “younger levels”.

Therefore the general content of “information” can be sufficient for related problems – WITHIN the same level” - esp. for “machine view”

**BUT NOT TO LINK DIFFERENT EVOLUTIONARY LEVELS.**

Such incompatibilities should disappear if the terminology and ontology of the former distinct frames are adjusted within ONE unifying model, which allows to see both former different positions now from the same “Extended View” – with semantic correctness .

## SEMANTIC CORRECTNESS – AS SIMPLE AS POSSIBLE BUT NOT TOO SIMPLE

Einstein developed a technique for that and invented a so general definition of movement, that both terms are covered now with the new one: The Relativity Theories was created. I modified this technique for the “Extended View” and apply this for “information”.

I focus on a related aspect: We need terms to be able to communicate “differences, which makes differences”. Therefore we have to create a term if we can observe or conclude differences.

But the creation of the term is not enough within science about our world. We have to postulate characteristics which can be proved to see: Are they “in agreement” to our given world, is there an increase of scientific power to expect to deal more appropriate with daily life problems? Only such inventions of terms can be accepted.

## ANALOG HANDLING OF THE SHIFT OF MATTER WITHIN GRIDS

Please look at this slide with the man carrying the picture: The explain the shift of the position of matter (which remains itself unchanged) within time and „Euclidian“ space..... ...we are used to explain this with the ability of the person to move itself – thanks physical and biochemical power. But in which way we explain the shift of the meaning of the picture in semantic correct way? Can you distinct three faces)

DO YOU SEE THE OLD LADY? If not then I help you with the temporarily use of color. Can you change to the girl? With same help it should go! And now to the old father.

You see: the form/structure is all the time the same. It is just a carrier for information. But your but your information shifted. YOU CREATE THE INFORMATION: you attribute meaning to structure.

## AN “ABILITY TO DEAL WITH INFORMATION” IN COMPLEMENTATITY TO THE “ABILITY TO DEAL WITH ENERGY”

If it is correct to explain movement of matter with an “ability to deal with energy” (power, fields...) then it is correct, to explain the attribution/ shift of information to matter with an “ability to deal with information” For that “ability” we have introduced the term “discrimination ability” as complementary ability to “energy” as the expression of one substance (a neutral evolution bases substance monistic position) and to attribute to the postulated ability characteristics which can be proved empirically and logically.<sup>v</sup>

We characterized this ability in such a way that empirical proving is possible. Excuse, but there is no time to explain that and the philosophical aspects with more details. See the literature within the Stockholm-Project.)<sup>vi</sup>

#### WHAT DO YOU PREFER: A MACHINE MODEL OR “SYMBOLINTENTIONS” OF THE ACTORS

We can ask: Is it enough to accept, that information is all the time the result of a process thanks the ability of the observer to attribute the information to an observed matter?

You can answer: Yes – if you deal just with machine models: Then you accept an automatism between the perception, the attribution of information to the matter and the consequence, that anything happens. This is a stimulus response mode – sufficient to understand machines.

But any machine needs a planning person with the intention that the machines should do anything regarding to the intention of the creator. No machine without a creator who knows that the reaction of the stimulus will be the intended response.

But I remind Bertalanffy: Please no machine models for life and persons! We have to introduce intentionality and – for persons – free will. Can we handle this appropriate?<sup>vii</sup>

Again a critical look to Darwin and his evolutionary theory: He generalized the intentions of any living being on that, what is the fundamental prerequisite of any individual intention: To survive.

To be alive is indispensable to realize individual intentions. Individual intentions are in principle “individual” and cannot be known by an outside observer. Predictable are the agreements about the prerequisites which are common and constitutive to be “member within a subset of entities. All “members” will intend these “symbol-intentions” as prerequisite to be able to realize the individual intentions. This can be predicted by the outside observer. Darwin was interested in a predictable general model for evolution. Therefore I can not see any incompatibility between the assumptions of DARWIN ( who included the progress of immaterial aspects – e.g. the emotions of earthworm – in his evolutionary understanding) if I attribute to any single entity intentionality – on the level which was reached by the entity: They are different between the earth worm and Mozart, but both have/had the fundamental intention to survive.

Inanimates up to photons have no genes, but are to understand as expressions of and precursors for an evolutionary process: Therefore we have to attribute to them intentionality too..

Therefore we have to extend our understanding of “information”. We have to attribute to the actors not only the ability to link information with matter, but to attribute “meaning” to the information.

And if our actors are not omnipotent and ideal, then we have to attribute to them that they attribute positive and negative valuations to the meaning. This links our discussions with the natural principle of enforcement and inhibition. Sechenov and Pavlov have discovered them in physiological systems. I have reported shortly that this principle can be understood as a natural principle which can be observed in any level of our world.

Now I will present to you a very short sketch about an extended understanding for the autopoietic process we call “evolution” but not restricted to the evolution of living beings, but for the unique autopoietic process from inanimates to animates and from the living entities to abstract structures as our societies and related tools up to science and communication technologies. We have to invent just a model for such a process which allows to understand that the “new” is based just on the former given and was created without the need of an external influence.

Evolutionary processes are usually illustrated as follow up of the occurrence of entities in the time scale, in the classical understanding just for living beings.

But the evolution of humans deals with additional aspects too – obviously with new types of information

A complex understanding of the “only one evolutionary process” deals with the cosmic evolution etc. up to the autopoiesis of live too.

You can say: Evolution from  
“Big Bang to the Big Mac”

Such aspects are integrated into the “Extended View” on a hypothetic-deductive follow up of the attributed autopoietic processes – on four levels of abstractions.

The General Extended View offers the sketch of a draft of a blueprint of the evolutionary process from very early beginning up to now. It integrates not only the energetically aspects. It uses the potential of the precursors to deal

with information to create emergent offers, too: They are used for new types of consents and increasing efficiency and other wins for them. We can illustrate this process with two focus: One is the “traditional one” with the focus on the autopoietic occurrence of entities. I can show this just as a slide but have to skip further explanation.

## GENERAL EXTENDED VIEW

### **focus: energetic aspects autopoiesis of entities**

A draft of a sketch of a blue print

a „free invention of the human mind“

– consistent with the health related empirical facts

More relevant for your topic is the other illustration: The illustration of the evolution of information, information carriers and the storage of information (carriers).

We start again with the from the evolutionary point of view oldest observable entity which is at the same time the potential information and carrier of his information: The photon or “quanta”.

The actual endpoint of information transfer is the world wide web. It is an artificial machine, but: The WWW is based on “quanta”, too:

focus: information related aspects

creation of carrier and storage of information Evolution is a knowledge gaining process Nobel Laureat Konrad Lorenz

### **From Photon to the World Wide Web**

We need some classic aspects in memory:

It is remarkable that the descendants of quanta are not observable with our sense organ up to the level of atoms. Observable is only the so called “light matter”. “Light matter” covers just 4% of total energy of the universe – a fundamental restriction of “our world”.

And each further step of evolution is linked with a further restriction of the proportion of the energy of new level on the total existing energy: So you can neglect the proportion of the energy of persons in relation to the total energy just of the earth but in relation to the total biomass too.

But not negligible are the evolutionary consequences on the increasing complexity, variability etc. of information, information carriers and the storage of information which are constitutive for the evolutionary steps – not only e.g. for the humans, but for the future of our world too.

This stimulates to think over who can communicate with whom. And are their fundamental differences to expect between the types of “languages” – and therefore between the types of storages for information (carriers): There are fundamental steps within the evolutionary process: According to the deductions within the Extended view such a step is not only linked with the autopoiesis of life from inanimate precursors: This step is based on the creation of gens and proteins.

But all fundamental information systems which are the prerequisites for the physical and chemical properties of living entities remain fully in order. They are necessary for the characterization of any living being, but not sufficient to explain life processes.

The next and fundamental break in symmetry in evolution is the change in the intentionality from physical/biological survival / persistence to the intention to be and to remain in a special relationship to physically existing entity (e.g. thanks love) or to an assumed abstract entity (e.g. god, nation, science..)

What is so fundamental?

You can see the process of evolution up to this point as follows: It is sufficient to attribute to the inanimates, chemical and physical entities the symbol - intention of noninterchangeability thanks observable characteristics (and for basic life to be able to extend the option on such increase): Therefore the actors observe the environment, „to see what any can see but to recognize an option for realization which was never recognized” before. This option will be realized and can be – if it is a persisting emergent win – starting point for an evolutionary progress. The starting point is therefore the observation of a real existing, the following step is the attempt to realize a new observable realization. If this is a win then the so extended evolutionary level can be the starting point for the next construction for an additional new type of realization.

With the discovery that the relationship to an object can be seen as an individual win cause the shift: Never the observable structure is the focus of intention but the immaterial and individual attribution of a relationship – a meaning (e.g. love). Further on the realization is used to express meaning: The shift from the focus on realized to constructed. “To attribute to a process the message of an individual relationship”. In the center is never the form and their construction – which is stored within the genome In the center are constructions and consents about them. e.

Therefore we should expect that the storage system for information (carriers) should be modified too: We propose to discuss that neuronal modules can be

understood as “the genom-equivalent system for psycho-socio-cultural” information. They are indispensable to handle symbols, complex behavior, language, music, scripture etc.

But all fundamentally older information systems which are the prerequisites for e.g. a person must remain fully in order: especially the principles of genomics and proteomic (and their evolutionary development like epigenetics), but the physical and chemical properties of living entities, too. They are necessary for the characterization of a person as a social being, but not sufficient to explain intellectual, emotional and cognitive processes.

This cause the next question: How can the communication take place, if the languages are more and more sophisticated and deal with in principle different meanings for identical phenomena ?

We have to expect that the information get more and more complex within the evolutionary process even within living entities and their (sub)systems: within a cell, between cells, tissues and organs and within the organism and between the (parts of the) brain. And these processes must be different from the information processes between the different evolved entities without and with brain and especially between them and human persons.

And between them we have to expect differences depending on the biological, psychosocial, cultural etc. characteristics.

The communication could run thanks “interfaces” between the different levels: If you assume that actors “speak” minimum two or three “languages” then they should be able to perceive information from an older level, communicate with others on the same level and give information to a higher level. Such assumptions are in good agreement to e.g. the data of Julietta Frey about neuron activities in mice.

Now we start with the General Extended View with focus on information  
Photons/quanta act as “if they would have the mass hny” they carry their information and are observable observers for other quanta as “if information would have a localization in an “Euclid-analog frame”

They cause the field of gravitation: Einstein calls it „ghost-field“ – not from energy or matter – just to guide the photons the way for the geodetic line – a field for information. Helpful only if you can read the signs!

Any mass, any atom is expressed on the level of physics as movement of quanta, but is observed by e.g. humans simplified as surface, form, structure.

I focus your interest on (inorganic and organic) catalysts:

A catalyst can be understood as carrier of the information for an option for

realization. His presence increase its probability. How this knows can stimulate other molecules to selected realizations. Using this then others act for the “helmsman” – a basic for life thanks higher level to deal with information. If the capacity to deal with information is restricted then we have to expect a situation in which the memory of the actors is never sufficient. They need a stabile storage for information /carriers. The Crystal is stabil and can be linked in consent with information: DNA.

The use of genomic and proteomic (e.g. enzyme for cAMP) remains identical to stimulate the autopoiesis of the information carrier for identical structures in single cellular (e.g. amoeba) temporary multicellular up to humans.

Systems of hormones and complexity of genomic and proteomic interactions were differentiated within the evolutionary of structures as basis e.g. for taxia and phobia

Neurons allowed to organize information for more and more complex realizations for biological survival and persistence functions to realize e.g. thanks linkage between the grid for movement and the grid for information

The FUNDAMENTAL BREAK OF SYMMETRY.

New focus on to be accepted and to accept subjective relationships – the former focus (physical and biological persistence) as prerequisite.

From focus on uniqueness and noninterchangeability thanks observable energetical/material realized options to individuality and personality thanks information related constructions with meaning and values, which can not be observed but concluded from behavior, wordings etc.

Arguments to postulate an „genom- analogue“ system to store and recall meaningful information

The genomic and proteomic (e.g. for cAMP) remains identical in single cellular (e.g. amoeba) temporary and permanent multicellular up to human persons. The attribution of meaning to matter /letters and „sounds“ /words depends on the place of birth, not on the genes and proteins:

They are necessary but not sufficient for the understanding of memory on words....

The Stone of Rosette demonstrates:

The brain – with its modules and nets - enables us to conclude and to reactivate forgotten meanings attributed to structure

A new type of information was created to communicate about subjectivity to physically existing and observable entities with a new type of movement: behavior.

With the discovery that the decision maker can not be observed – just his outside body – and this can lay, the option for the next level of relationship with a new type of terms, contents und values (information) were opened: To accept the existence of the unobservable cause, primarily of a goodness and an immortal soul.

Its oldest symbol: the bird of the soul, cave of Lascaux, Dorgone, 15.000 B.C  
Worldwide humans created within the cultural evolution more and more types of information, information carriers. Any term (symbol, law...) is a free invention of the human mind to deal more appropriate with our world and from another nature then that for what they are staying

I invite you to have a short view on the process of the storage of and dealing with information outside of the individual, e.g. on books, libraries and in the World Wide Web. Here we are using fundamental agreements – the agreements between quanta / photons. We use their predictable persistence of modifications and attribute to them information we can select. We use their abilities to move themselves very quick over long distances with the speed of the light, make artificial interfaces to transform the language of the quanta via “younger “ entities and their modifiability to produce effects which can be perceived by human sensory organs.

## CONCLUSIO

Let me conclude just some consequences

1. Information is a term covering qualitatively very different contents
2. “Information” is the result of a process thanks an evolution depending ability
3. „Information“ is an (unobservable) relationship between an existing actor and
  - a. an other existing actor on the basis of an attribution of information to an observed (existing) object (even between quanta, quarks ....),
  - b. an attribution about priorities to an object, (physics, chemistry, biochemistry, basic life)
  - c. an assumption about the hoped or assumed attribution of the observed object as subject to the „valuating actor“, (emotion)
  - d. an assumed about the relationship to an actor which is unobservable but assumed as existing (finality)
  - e. Effects within just theoretically assumed or to observations of “instruments” attributed interactions between existing entitites (e.g. natural sciences)
  - f. Effects within processes “outside of the really given world” but within the assumption of a predictability of reactions of others (virtuality)

4. The (evolutionary) level of the “observer” defines what kind of potential information can be observed, can “never “, is too young to catch the information, has a lower evolutionary level as that what is needed to deal with such an information etc.
5. Identical information carrier can have different meanings on different evolutionary levels.
6. We can use the predictable consequences of information on different evolutionary levels to create machines, including machines to deal with information, e.g. the telephone or the WWW.

Let me close my presentation with a joke!

Mr. Einstein! Would you be so kind and explain to me: Why I can speak by telephone in NY with my husband in Russia?

This is easy: Imagine a very big dog staying in Russia and in NY: If you tread on his leg in Moscow then he will woof in Ney York Many thanks!

I think I have cached it! But one more question:

How works wireless mobile phone?

This is the same – just without a dog.

Many thanks for your attention

## LITERATURE

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