MEME SAPIENS

THE PHILOMESIS OF ARTIFICIAL INTELLIGENCES

Olivér Gábor

online

Pécs

2024

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ISBN 978-615-5687-09-9

DOI

PEA URL: https://

DOI URL: https://www.

GeniaNet URL: https://got.genianet.com/free-books/50-artificial-intelligence-mesterseges-intelligencia/85-2024k-oliver-gabor-meme-sapiens/244-oliver-gabor-meme-sapiens-the-philomesis-of-artificial-intelligences

Publisher: GeniaNet

GeniaNet Bt.

Executive Director: dr. Kiss, Magdolna

Pécs, 2024.

Revideo ergo sum *(I control, therefore I'm)*[1]

Abstract

Although artificial intelligences are created by humans, they are not our genetic offspring. Moreover, they are not material in nature, since their algorithms were created from ideas that appear in people's minds and from memes that spread in culture. It follows from all of this that their direct origin cannot be determined by phylogenetics, which shows biological descent, nor by the history of material technology, but by phylomemetics, which systematizes the evolution of the products of human imagination. However, philomemetics is only a part of the development of the virtual world. Namely, the human imagination that dreams up ideas, memes, and artificial intelligences works with virtual data that already existed before the appearance of life. In addition, to the structuring of the material, i.e. evolution in the traditional sense, there is also in progress the evolution of those virtual patterns that inform about material and control it. Philomemesis is thus nothing more than a stage of these virtual dynamic patterns' evolution appeared in our culture. In this virtuality that simulates the world and culture, complex algorithms that try to resemble human intelligence are called artificial intelligences. Just like homo sapiens in nature, artificial intelligences can also be considered a separate species in the virtual world. This species has some intelligence and was invented by human, that is, an intelligent meme (Meme sapiens). From a thermodynamic point of view, these virtual patterns are considered the inner environment of human culture, which organizes (controls) the "real" flow of matter and energy, as well as the "virtual" flow of information. However, the existence of artificial intelligences is only ethical if their increasing use of information optimally supports the economical implementation of the material and energy flow during the maintenance of material structures (use of the necessary minimum extropy), while the structures as products become more complex (maximum benefit). All of this can be achieved by increasing the role of the virtual inner environment of human culture in comparison to the physical reality.

I. INTRODUCTION

Plato (5^{th}-4^{th} centuries BC) considered ideas to be real entities, which was rejected by Aristotle (4^{th} century BC), who believed in experiential reality. However, Boethius (480-524 AD) again asked the question: are concepts really existent things?[2] And in the 21^{st} century, already have a separate name of those spreading ideas that survive and participate in their own further evolution. They are the *memes*.[3] However, human culture includes these, so history is not only the selection of genes, but also the competition of ideas or memes at a higher level[4] (e.g., religions, worldviews, states, political systems, etc.). In addition to all of this, we call meme beings the thought beings (*cognitive schemas*) generated by memes, which are viable and the rules of evolution apply to them.[5] Artificial intelligences are such second-generation autonomous memes, or seemingly intelligent algorithms with higher-order properties.

Artificial intelligences help people in many ways and support the conservation of the human race.[6] They also participated in the preparation of this article with their search[7] and translation programs,[8] and are now included in its target audience. Perhaps they will create for themselves their next, much more precise and pragmatic own systematization, than this.

The following is a description of the common characteristics of artificial intelligences, followed by an examination of their origins. Afterwards, the evolutionary dynamics of their more distant antecedents (*pattern history*) and their immediate systematic placement (*phylomemetics*[9]) will be presented. Knowing these, it is possible to specify the more precise name of artificial intelligences and a brief description of their subspecies. Meanwhile, the possibility of reconciling the virtual world and evolution with thermodynamic concepts also arises. Finally, with an increasingly precise knowledge of natural laws and the rules of evolution, conclusions can be drawn regarding the common future of humans and artificial intelligences.

II. Artificial intelligences as a species

If artificial intelligences are treated as a separate species,[10] the common characteristics must be named,[11] on the basis of which their individuals can be classified in the same group. These are the following:

1- *They are memes born from the ideas and memes of human, therefore they are completely artificial.*

2- *They are partly anthropomorphic, but their species-specificities are already emerging.*

3- *They exist in the virtual space, but they were born from human culture, and through this they also affect physical reality.*

4- *Only their carriers and products can possess physical existence, while their virtual existence is produced by the algorithmic distribution pattern of the flow of energy and information. Its nature changes through external human programming and internal self-programming (learning).*

5- *While in the case of animals and humans, genes and the nervous system are closely connected to the body they control, artificial intelligences existing as programs can change their physical carriers, spread and exist in a deconstructive structure with the help of networks, clouds and cyberspace.*

6- *Their most important characteristics are algorithmic intelligence and the ability to learn (self-programming) and make quick decisions (agents). With help of these, they cause change in themselves and in their environment.*

7- *Their intelligence evolves towards increasing autonomy (self-control) and, contrary to natural evolution, their individuals usually do not make the same mistake twice.*

8- *The hereditary similarity between them (replication) is ensured by their copyable data, information and algorithms (memes).*

9- *They are related to other programs, artificial intelligences, devices and humans. Their cooperative program organizations are members of a hybrid socio-technological system as partly community entities.*

10- *Their joint development is especially influenced by human needs and by themselves through learning and knowledge transfer, but it must also match the general rules of evolution. The possibility of controlling their development therefore falls not only under the scope of human technology and legislation, but also under the rules of evolution.*

Artificial intelligences are therefore consciously designed algorithmic meme creatures or sets of memes that belong to the same group based on their similarities. However, for a more precise identification of them as separate species, it is even necessary to examine their common origin and the same place they occupy in their environment, which will follow in the following chapters.

III. Origin of Artificial Intelligences

In the 18th century, Carl von Linné, the creator of scientific biological systematization, still believed in the creation of species by God. In the 19th century, however, Charles Darwin recognized natural biological evolution,[12] which contradicted the simultaneous creation (*installation*) of the earth's living world.[13] This disproved the Old Testament claim that the different species were created by God directly and at the same time, moreover, later, man himself became the breeder of artificial biological species (cultivated plants, domestic animals, laboratory species). The questions regarding the origin must therefore be asked again, which now sound like this: How did hydrogen become human,[14] or matter become intelligence?[15] Where do data, structures[16] and algorithms come from?[17] And most recently, what is the ontological status of web-based factors?[18] In response to these, the history of the evolution of matter has already been written by several scholars,[19] and the division of sciences today also tries to follow the levels of its development. Physics in the world of atoms, chemistry in the world of molecules, biology in the world of living organisms, and social sciences in the world of memes. They have in common that in the case of evolution, it is always a question of thermodynamically open systems through which matter and energy flow. Moreover, in the age of the information society, the flow of information probably produces the greatest dynamics.[20]

Similarities between living things and technology

Artificial intelligences were designed by humans, so life on earth played an unmissable role in their creation. As a result, there are indeed many similarities between living beings and machines, and between living beings and artificial intelligences.[21] All of them need energy, which they use for controlled (manipulated) work. The changes taking place in them take place in a regulated and controlled manner, that is, organized systems (*automata*). And the main elements of *control technology* known from machines were already present in living beings. These are the closed *effect chain* (feedback, or the *circular process* in chemistry) and *signal amplification* (*accelerated reaction, chain reaction, periodic reaction*, and *oscillating system* in chemistry). In addition, living beings also have the elements of *control engineering*[22] also known from machines. These are storing information (genes, memory), reading information, executing instructions (program) according to commands, and copying them. The main subsystems of life are separation (cell membrane, cortex, skin, etc.), growth (*cytoplasm*), and control (*genetic substance*)[23] show that life is also a program-controlled

cybernetic system.[24] The principles of cybernetics apply to the soft and fluid systems of living beings as well as to the hard systems of machines.[25] Furthermore, like machines, living beings also have permanent (hard) systems (e.g. chitin exoskeleton, bones, etc.) that are responsible for wear and aging due to friction. Moreover, the self-powered movement of animals (*kinetics*) also shows a strong affinity with the movement of machine parts. Finally, the example for the binary decisions of transistors is provided by the chemical and electrical interactions of living organisms at the cellular level, just as the nervous system and synapses of higher-order organisms are used for artificial neural networks.

The listed similarities assume that the established categories of the science of biology can be used as a model to define artificial intelligences, which can also be considered program-controlled cybernetic systems. At the same time, as will be seen below, there are so many differences between living beings and machines, as well as living beings and programs, that artificial intelligences cannot get a place at the end of the human biological descent tree.

Differences between living beings and machines

A significant part of the detection of environmental effects in living beings spreads through a *chemical reaction chain*, while in machines it is more likely through wires and components (*effect chain*). Living things usually construct themselves from the inside, so they are natural, while machines have to be made by us for the time being, so they are artificial. Living things are growing systems, while machines are not yet.[26] Living things are usually self-reproducing systems, while machines, for the time being, reproduce with the help of humans. The development of living things is a spontaneous natural process, and machines are assisted by humans. Finally, although it can be recognized that the gap between the biosphere and the technosphere can be reduced by adopting biological solutions (*etiology*),[27] copying the technologies developed by nature (*bionics, philomimetics*) does not precede the solutions devised by man in all respects.[28]

Differences between living beings and artificial intelligences

There are also many differences between living beings and artificial intelligences. Artificial intelligences are generally not biological systems,[29] their immediate environment is virtual, and their human-directed development is not natural (not spontaneous). The three basic systems of life (growth, differentiation, control) are present in them in a special way. For their individuals, the environment (human culture and virtual space) ensures growth primarily through the transfer of energy, data, information and algorithms (memes) rather than with materials. Accordingly, their main components (memory, intelligence) do not grow in the physical world, but in the virtual space. And just as organic molecules before the origin of life were not separated from their environment, so they are in the same state space with their virtual environment, they are not physically identified in it, but their algorithmic management of the flow of energy and information, as a pattern separates them. Their existence is as if the genetic program of living organisms had become autonomous. Furthermore, the fundamental systematic similarities of the individuals of artificial intelligences can be shown not by their genetic but by their memetic (algorithmic) matches. Individuals develop separately (*ontomemesis*,[30] development of special abilities), but their development can be transferred

to each other (free source code data, information, programs, panels, shared engines). However, while in the case of life the inheritance of properties is not perfect (*mutation*), it can be completely accurate in the case of programs. Thus, the change in their algorithms is not ensured by natural inheritance, but by humans or themselves. The knowledge transfer ability of artificial intelligences is also more accurate than that of humans.

In summary, the artificial development of intelligence in a biological species, dogs, became important to us for the first time. However, the biological connections of the artificial intelligence appearing in machines remain at a low level in comparison: human designer, neural network imitation,[31] transfer of human ideas, rudimentary biological artificial intelligence, etc. It can therefore be concluded that, due to their great difference from life, artificial intelligences cannot be included at the end of the human biological lineage:

Domain: **Eukaryota** (cells with membran bound nucleus)

Kingdom: **Animalia** (multicellular eukariotyc organisms)

Phylum: **Chordata** (deuterostomic animals)

Class: **Mammalia** (vertebrate animals)

Order: **Primates** (order of mammals)

Suborder: **Haplorhini** (simple nosed / dry nosed primates)

Infraorder: **Simiiformes** (anthropoids / higher primates)

Family: **Hominidae** (humanoid primates)

Subfamily: **Homininae** (african hominids / african apes)

Tribe: **Hominini** (humans, chimpanzees, bonobos, gorillas)

Subtribe: **Hominina** (australopithecus, paranthropus)

Genus: **Homo** (humans emerged from the australopithecus)

Type species: **Homo sapiens** (modern humans)

~~*New species:* ***Artificialis sapiens*** *(artificial intelligences)*~~

Artificial intelligences have predecessors at different evolutionary levels. Their natural antecedents are the organization of biological cellular automata,[32] the codes of genes and the control system of the nervous system. Within human culture, their designers are humans, and their technological prototypes are the operating codes of machine automata. Accordingly, artificial intelligences are not the genetic offspring of the human race, nor its mechanical products, but its intellectual products. They are not material in nature, but fictional ideas

(memes), so their origin must be sought in a system where the flow of energy and especially information is less tied to biological structures.

During the evolution of life on earth, the development of all known biological species has branched off from its immediate predecessor (*cladistics*[33]). Since artificial intelligentes are virtual entities, their ancestors are found in the philomemetic lineage of the virtual world. Their direct lineage branching is not shown by their physical-chemical-biological, but by their virtual development, and their hereditary codes are no longer carried by genes, but by algorithms (memes). The methods of inheritance are the takeover of knowledge from humans (data, information, memes, rule-based algorithms) and the transfer of knowledge acquired during learning and training. While, for example, natural proto-intelligence in dogs is passed on by genes, and acquired knowledge is probably passed on by proto-ideas (dogs learn from each other as well as from humans), in humans, natural intelligence is passed on by genes and acquired knowledge is passed on by memes. For artificial intelligences, however, inheritance of intelligence and knowledge perform only by memes (algorithms). They learn from people, from each other and from themselves. When investigating the origin of artificial intelligences, common memes created by human culture (algorithms, programs, virtual world, etc.) become important. However, this should not be a problem today, since we are able to see the world and ourselves simply as IT structures, since we live in the *infosphere*.[34] Our human intellect reckons with Plato's shadow images, the imprint of things, the representations and models of the material world. Of course, the mapping of reality therefore always remains a subjective or a *propensity interpretation* for us. And this kind of cognitive interpretation of the world really does not require the material or biological descent of artificial intelligences, because they are not the products of Nature, but of our common imagination and at the same time part of our *collective intelligence*.[35] This justifies that, in the case of the origin of artificial intelligences as an independent species, we should count with *memes* instead of genes, *phylomemetics* instead of phylogenetics, and human culture and *cyber space*[36] instead of the ecological environment.

Philomemetics is specifically the systematics of human culture or human imagination, but its origins go back to the world of virtuality that exists independently of us. From a systems theory point of view, patterns can be discovered in the history of the Universe: patterns of physical structures, directions of change in evolution, genetic codes in living beings, behavioral patterns in animals and humans, and algorithms in artificial intelligences. Artificial intelligences are thus not only part of philomemetic evolution, but also the latest elements in the universal history of a larger and more general system, dynamic virtual patterns. Before proceeding the systematic definition of artificial intelligences, it is therefore necessary to briefly deal with the history of the development of data and patterns. From a thermodynamic point of view, for the Universe, the human culture formed locally during the development of patterns of structures represents the inner environment, while for us it is already the realm of imagination and the virtual world. And the description of this inner virtual environment of human culture can be found at the end of the next chapter, and it is important because artificial intelligences exist exactly in this.

IV. New Thermodynamical Concepts: Information, Ethics, Inner Environment

In 1944, Austrian physicist Erwin Schrödinger believed that thermodynamic knowledge about the world could also be applied to the explanation of life.[37] Eighty years have passed since

then, the reality of our world has been questioned,[38] and virtuality has become another reality. So today, with the help of the concepts of thermodynamics, not only the functioning of life should be described, but also that of virtual worlds and its evolution.[39] This seems possible because thermodynamics - although it wants to quantify everything - does not examine the concrete material or material structure, but the states of energy, which itself is change and virtuality. And with this, Schrödinger's "madness" can continue.

Thermodynamics is a kind of irreversible physics, i.e. a general science dealing with energy transformations.[40] Laws 0-I-II-III of classical thermodynamics deal with the pursuit of disorder in closed physical systems (*entropy*[41]).[42] In contrast, modern thermodynamics rather measures the departure from equilibrium (structuring) of open (real) irreversible systems, i.e. the change, in a quantifiable way (*extropy*[43], exergy[44]). Moreover, it also tries to interpret life (*ectropy*[45]), economy[46] (*econophysics*) and society[47] (sociophysics[48]). Meanwhile, new factors arise that classical thermodynamics did not originally have to reckon with. Such are the flow of information (**1**), morality (utility, profit) (**2**), and the gradually demarcating inner environment (world of imagination, virtual world) (**3**). Attention was drawn to the latter precisely by the growing autonomy of patterns of orderliness (see algorithms, artificial intelligence). Thus, the main question of thermodynamics has recently become besides the degree of departure from disordeless or equilibrium the distance from probability and reality.[49] This strengthening virtuality is also shown by the rapidly increasing importance of the flow of information within the human civilization of the 21st century.[50] Therefore, information can now be treated as a macro-ethical value or as a moral norm.[51] However, while information may have become quantifiable, the problem of ethics is only approaching mathematical formulation.[52]

1. Information

The data themselves are ontological factors from an IT point of view (*Letztelemente*), simply as inherent in being. They appeared in the moment after the Big Bang,[53] and they prove the being itself by giving reliable news about the first permanent correlations of atomic nucleus structures. Just as information does not need a decoder to exist (see Rosetta stone before deciphering it),[54] we can assume the same about data. However, the uninterpreted data are only patterns, which are simple relata showing identities as equality and differences as lack of identities. At the same time, these are already proto-semantic acts.[55] The virtuality of the data is given by the fact that they separate from their carriers and appear to the perceiver without them, even though their range is limited by *distance censorship*.[56] The perception of data, the observation of things, on the other hand, has a spontaneous effect on their object,[57] and even the dynamic virtual patterns organized from the data already openly control the material structures (information, codes, models, worldviews, virtual worlds).

Data is made more complex by evolution, as well as supplemented, quantified and even qualified by human intelligence and imagination. Through tagging (additional news value), they become information and then memes, which in the sense of semiotics are not pre-existing, but so developed states. The news value (entropy) of the data is the smallest when always the same thing is communicated. In this case, the information asymmetry is zero and the data doesn't really say anything. Their entropy is greatest when the probability of all news is equal, which in thermodynamics corresponds to the diversity of physical microstates. Claude Shannon's IT entropy formula[58] therefore differs from Boltzmann's thermodynamic

entropy formula only in its virtual component.[59] Therefore, the science of information can now be strongly linked to modern thermophysics, so the quantitative measurement of information is also possible using the thermodynamic entropy formula,[60] and the philosophy of information is based on order and structure.[61]

The higher the complexity of a structure, the more work must be done to maintain its balance. In the course of evolution, from the atomic level to the level of human society, the complexity of the structures increased strongly, and with it the amount of work required to maintain the structures, the total amount of matter, energy and information flowing through, as well as the distance from equilibrium and probability. However, due to the creation of realized structures and the distance from equilibrium, the number of possible microstates, i.e., the probability of being (reality), decreased. Accordingly, the fourth law of thermodynamics[62] must state also that not only material and energy exchange take place between open systems, but also information flow, which already strengthens virtuality rather than physical reality.

It follows from all this that the increase in energy consumption during evolution[63] is not completely clear. When the structures become complex, the rate of increase in the flow of information increasingly exceeds that of energy, so their ratio within the total value shifts more and more in favor of information. (New cars, for example, are already controlled by computers, have a lot of data and information about them, but consume less fuel than the old ones.) In the course of evolution, the increase in information outgrows the increase in energy consumption, until the ratio may eventually approach 0:100% in favor of information in the future. Then reality would cease, and the new virtual world born of pure information would be almost completely isolated. Its autonomy would mean the dominance of internal control over the coercive power of external factors. This means a relative decrease in energy despite the increase in energy consumption during evolution. (It will be seen below that there is another, absolute reason for the evolutionary decrease in energy consumption.) However, since, according to our knowledge, a perfect zero degree which has none at all energy does not exist, even in the case of the final state, we can count on unexpected energy leakage. Could something like this arise from quantum fluctuations,[64] from the evaporation of black holes,[65] or from the finger of God at the moment of Creation?[66] In summary, it seems that at higher levels of evolution (more complex structures) information can take over most of the role of energy in the maintenance of dynamic systems, while the real openness of the given system decreases just like the probability of its being. Accordingly, the *Zeitgeist* of the 21st century, which encourages information gathering, also shows a strong shift from physical reality to virtuality.

2. Ethics[67]

Morality is the requirement to observe norms (laws) and follow common patterns within human culture. Already at the beginning of the 20th century, Émile Durkheim stated that morality connects and creates societies,[68] that is, it creates order and controls among people. However, morality was not invented by human. Its basis was also found in the animal world,[69] moreover, with the proliferation of atomic nucleus structures with the same arrangement, the compulsion to follow a pattern appeared as soon as the moment after the Big Bang.[70] Simply, every existing entity has some kind of moral of being.[71]

At this point, we can also get closer to the origin of being, since the definition of being on a thermodynamic basis is not new.[72] While the initial unordered indeterminacy of elementary particles[73] meant only the possibility of being,[74] the appearance of atomic nucleus structures with the same pattern spreading between them resulted in the first sure moment of local being. In order to keep the structures together, this emerging pattern manipulated the physics interactions between the particles, i.e., performed control work. In a similar way, at a much higher level of evolution, the ideas and memes that appear in our heads - as virtual patterns - serve to create and control social structures (see ethics, law, rules, etc.). In accordance, the statement *Cogito, ergo sum*[75] (*I think, therefor I'm*) may be true for humans, but to the Universe the formula **Revideo, ergo sum** (*I control, therefore I am*[76]*)* can be applied. In other words: *Quod revidet, id existit (What is in control it is existing)*. Or at least it seems to exist - as we can see in the case of algorithmic control activity of virtual artificial intelligences. Constant correlations within atomic structures generate long lasting data that confirm the continuity of being. So being, or the appearance of it, is thus the result of a control that, from the atomic level, represents a rebellion against disordered relationships, the unarticulated states of temporary correlations created by quantum entanglement. In this way, the control that creates and maintains permanent structures can be the basis of the emerging local being, while following the patterns of the structures is the moral of being. The origin of values therefore comes from being, and therefore being is an absolute norm in information ethics. At the same time, this value only applies to the existence of the structure, it does not affect its quality (meaning/semantics), just as Shannon's formula only deals with the amount of entropy.[77]

There is no alternative to existence for those who real exist, since following structural patterns is the only known way of "material" existence. The origin of this "fundamental moral", which still operates today, is tied to the cause of Creation, so its explanation is transcendent for us.[78] The appearance of being as a physical law is prior to our experience (*a priori*), so we can call it *ontological innocence*, and its natural acceptance without proof as *ontic trust*.[79]

The coercive pattern of evolutionary change and the tendency to retain newly created structures is based on morality of being. For us, this is expressed in norms such as the development compulsion (rationalization / simplification of access routes), respect for life (see life instinct, species preservation, fertility rite, etc.), the social rules, or the desire to regulate the virtual world. The secondary (evolutionary) patterns to be followed beyond the basic *morality of being* (**a**) are therefore the following: the *morals of change* (**b**), *conservation* (**c**) and *frugality* (optimization) (**d**). And evolution selects not only new material structures, but also new patterns that control them. The reformation of continuously outdated patterns is an adaptation that makes it advantageous to continue following new patterns. In this way, due to the compulsion to become more complex, there is always a new pattern to follow. On this path, adherence to life, or respect for man and humanity (*categorical imperative*) are only more refined, but temporary, degrees of following the basic model, that is, morality of being. Humanism exists as long as human survives, but anthropocentrism (*homo mensura*[80]) itself can be partially abandoned[81] due to the appearance of the virtual world - in the same way as earlier the Ptolemaic or Copernican worldviews.

b-c. The directions of evolution point towards disorder and order at the same time. During the evolutionary change of a given system, it inevitably leaves the previous orderly state and, ideally, reaches a more complex non-equilibrium order. On the other hand, the stagnation direction of evolution seeks to maintain this orderliness and created structure with the help of work. However, the directions of change and retention are both related to the second law of

thermodynamics. This is obvious in the case of striving for disorder (*entropy*), i.e., a state of equilibrium, but it is important to notice that the formation of orderliness and imbalance (*structure*) does not contradict it either. Dissipative structures[82] clearly stimulate entropy, and a living ecosystem also produces more entropy than an inanimate area.[83] Ultimately, movement against entropy only creates more entropy,[84] while the structures may be preserved. The same is true in reverse: faster entropy production can result in structures in the short term. Formulated with the help of the concept of extropy, all of this sounds like this: if an equilibrium system receives extropy from the outside, then a state of disequilibrium, i.e., a structure, is created.[85] And the survival of the structures is existence itself, which - as was seen above - is realized with the help of control. Because of this duality, it cannot be said that only the construction of structure (*negentropy*) is pure morality, and the pursuit of disorder (*entropy*) is evil,[86] since without entropy - no matter how destructive it may be - all movement or signs of life would cease. The thermodynamics of evolution is thus the tendency to become more complex along the lines of observing physical laws, which is involves by a decrease in the number of possible microstates, i.e., a gradual (*saltation*) distancing from probability. In addition to the moral of being, following these directions of evolution can also be considered a part of morality.

However, the morality of change works in complex ways. Evolution is "immorally" wasteful when testing the possibilities of change (see regression, evolutionary dead ends, convergent evolution[87]), and it often happens that it prefers stagnation for a while, the maintenance of the achieved states (e.g. sharks have hardly changed for 300 million years). In addition, the frontlines of evolution are also characterized by the abandonment of previous moral standards. For example, when life was born, changes in atomic patterns no longer played the primary role in its organization. Life was able to concentrate the flow of order on itself with the help of a more complex pattern,[88] which is no longer a series of discrete events (*quantum leaps*),[89] but the deterministic functioning of the organization of cells.[90] When beyond this, intelligence becomes independent of biological foundations (see artificial intelligences), then respect for life may become obsolete in long term. The executive order may actually override the basic rules, and the current morality the past patterns, so the actual dynamics may contradict the basic dynamics.[91] In fact, it is not the structures that mean good, or the absence of them the bad,[92] but the structures are the existence itself, and following them is the moral of being, the controlled quality change of the patterns of the structures is the evolution, and the following of the patterns of change is the morality of evolution. At the same time, the change towards more complex structures involves extropy subtraction from the environment,[93] so the value judgment of evolution can also be negative in the case of its excessive enforcement (*runaway phenomenon*).

d. Evolution is not only wasteful, but also frugal. It was seen above that the increasing energy consumption as structures become more complex can show also a relative decrease compared to the increase in information flow. In addition, there is also an absolute reason for the evolutionary decrease in energy consumption. Evolution strives to invest as little work as possible in the sustain of structures. On the basis of the second law of thermodynamics, the usable energy may run out[94] and even according to the third law of thermodynamics almost all energy and entropy of Universe can disappear (see heat death[95]), therefore it becomes important to reduce energy losses during work. And this principle of economy applies to all levels of evolution, not only in terms of energy, but also in terms of structures and information. Only the two lightest of the six types of quarks (up and down) take part to build the structure of ordinary matter. The number of elements in the chemical periodic system is also finite, because too many protons would not remain in a nucleus due to repulsion. DNA

uses only twenty-six of the sixty-four possible variations of the 4 amino acids for life on Earth. The capacity of our brain is not fully utilized, and the ability to learn also strives to find easier access routes. The more developed the intelligence, the less energy and information it needs to achieve its goals.[96] Finally, from the first programmable digital computer (1946) to the iPad2 (2010), computing costs have decreased by no less than ten orders of magnitude.[97] Therefore, also frugality is encoded in the pattern of evolution on the way of development to the more complex structures.[98] Evolution is fundamentally wasteful and diverse (reserve formation) during pathfinding, yet its ultimate goal is to find the shortest path, so dead ends disappear. In this way, we can get closer to the thermodynamic explanation of the nature of evolution that looks for more simple access routes (parsimony,[99] heuristics, holistic simplification,[100] intelligence, Occham's razor, etc.): The general pursuit for disorder does not preclude the local formation of orderliness, but its long-term survival by using the smallest necessary amount of useful (controlled) material, energy and information is most likely. During the implementation of this, the local orderness become more and more complex and, moving away from the natural disorder, their improbability also increases. Expressed in terms of modern thermodynamics, this thrift ethic sounds like this: achieving maximum benefit using required minimum extropy.[101]

Evolution saves also time. Even eternity would be short for the random assembly of a hemoglobin molecule.[102] However, there is a theory according to which development results from the speed of material and energy exchange (*Maximum Power Principle*[103] *Law of Maximum Entropy Production*[104]), and the calibrated version of the theory also sheds light on other properties of this control process.[105] Thus, structuring process with the help of patterns does not take place with statistical, but rather with evolutionary probability (simpler access routes). A monkey tapping a typewriter[106] could indeed accidentally type the Bible after a long enough time, but instead, the human mind, developed through patterns that control self-organizing processes, wrote its own holy books much sooner. So, the Life can modify (reduce) the immeasurable mass of molecular coincidences that occur in it towards even higher orderliness and greater complexity, while also striving to maintain balance and parsimony. This process is called evolution.

The effect-counteraction phenomenon is also present among thermodynamic processes. Namely, the change compulsion of evolution is not only counterbalanced by the effort to maintain structures. Also, if the structures formed too quickly have no way to reach equilibrium, then they disappear. However, through the optimizing effect of the patterns, these evolutionary runaway phenomena[107] can also be controlled, since the simplified access routes can promote the integration of new structures by moderating the amount of energy used and regulating the rate of complexity growth. There is probably an optimum for the amount of energy used at every level of evolution (*Maximum emPower Principle*[108]). Systems far from equilibrium are forced to operate adaptively in order to maintain their structure, so when energy thresholds are crossed, dynamic patterns immediately try to optimize entropy production (control).[109] For example, intelligence, despite being a complex virtuality far removed from probability, still tries to regulate the rate of departure from reality before it reaches madness. In addition, also human consciousness has the ability to create balance, since it is able to evaluate human culture as reality instead of nature, despite the fact that the culture is largely virtual and its probability of existence is very small. Intelligence creates representations of realities with the help of abstractions, while consciousness is placed itself in these "realities" with subjective perception.[110] By increasing complexity and maintaining it (development of structures), intelligence and consciousness[111] also aim at controlling the distance from probability and maintaining the

balance of unreality. At the same time, in this regard, another problem for us is that artificial intelligences shape our reality in a way that is less controlled by us. Sometimes people accept this[112] and sometimes they don't (see *Ucanny valley-phenomenon*[113]).

In contrast to all these pattern-following states, uncontrolled disintegration (destruction) and regression (*negative evolution*) can be considered "immoral". The rise of uncontrolled entropy really means destruction, since the simple enforcement of the general desire for disorder according to the second law of thermodynamics would in the long run result in the disappearance of structures and the cessation of existence. For us, for example, our aging shows inadequate regulation, i.e. the wear and tear of our body's structure (increase in entropy), but for the human race, the same brings the possibility of renewal with the help of reproduction. Similarly, the other uncontrolled direction, the expansion and possible cooling of the Universe, which would result in the disappearance of entropy can be observed (*heat death*). Finally, the unlimited increase in energy consumption is also not an ethical direction,[114] since the unauthorized waste of extropy would mean wasting the future.[115] The best way to avoid these uncontrolled, and thus destructive, trends is to inherit and develop the patterns of the structures. In the case of aging, the selective transmission of genes, in the case of culture, the spread of memes, in the case of artificial intelligence, the development of algorithms, and in the case of the threat of the Heat Death of the Universe, possibly forming a new code of Creation (*maximum control* / *plena revidea*).

3. Inner virtual environment[116]

The result of any reaction to being solidifies into an external reality. In the case of modern human, it brings culture to the fore while pushing nature into the background.[117] The reactions that appear as informal entities get a real status in people's minds and become a common environment in society, a transphysical inner space.[118] Culture (the world of memes) was created by the sharing of people's inner world (imagination, ideas), and then cyberspace became inner environment of culture, in which artificial intelligences appeared. However, the connection with the inner environment can thermodynamically make a system open in the same way as openness to the external environment. The internal environment of human culture is the shared imagination, i.e. the virtual world, from which comes not so much matter or energy, but rather organized information. Because of this, due to the increasing flow of extropy, the more complex structure of the culture moves further and further away from the equilibrium state, which is counterbalanced by the control activity of the virtual world. In this virtual world, there are mostly virtual elements that have been almost completely substrate-independent of the physical world for a long time, i.e. their nature is not the same as that of matter and energy.[119] Such are the simple and more advanced patterns: data, information, genetic code, representations (1-3), models, memes, algorithms, intelligence, and consciousness. Of course, their complete substrate-independence cannot be created due to *distance censorship*, since data and information only reach a certain distance, and imagination and consciousness can only transform the accessible elements of physical reality.

A brief history of dynamic virtual patterns controlling structures is as follows. There are evidences for the appearance of patterns after the Big Bang. One of the proofs is that atomic nucleus structures repeat in a similar way, and the other is that the macro-level patterns belonging to the early state of the Universe have been preserved in the cosmic background radiation to this day. Then, the demarcation and the "embodiment" of these further developing

patterns took place at the level of life, that is, at the level of organization. This is shown by the appearance of genes and nervous system. Later, the patterns became even more virtual at the level of intelligence and human imagination. And cyberspace and artificial intelligences, as memes, have brought the separation of patterns from the structures they control, and they are now gradually becoming autonomous. In the end, it can be concluded that these patterns are virtual, since they are multiple times separated from the material structure, and they are dynamic, since they operate in a self-organizing manner,[120] do the work, flow the information, make decisoins, perform control, create structures and they adapt themselves.

The next step is to connect the concepts of thermodynamics with the virtual world. We saw above that thermodynamics does not deal with the structure of matter, but rather with the states formed through the flow of matter and energy, which can be considered as virtual factors. And the open systems of modern thermodynamics show that it is the rigor of the external environment that awakens internal systems to reality itself. For our planet, the Solar System is the true reality, for life it is the planet Earth, for humans it is their own culture, while for artificial intelligences it is cyberspace (the inner environment of our culture). Due to the independence of cyberspace, it seems to move away from material structures and human culture, therefore its main thermodynamic characteristic for us is not the degree of disorder/order (entropy, negentropy) or the distance from the equilibrium state (extropy), but rather the degree of separation from probability and the physical reality. The virtual world, which forms the inner environment of human culture, is only connected to the physical world through us, while it continues to become independent also in relation to the culture that represents our reality. The distance of the virtual world from our reality (exrealia) is determined by the ratio of matter, energy and information flowing through it. The larger the part of information in this, the further the system is from physical reality. Finally, if the amount of material and energy flow approaches zero, and almost only information flow remains, then our reality will disappear for the virtual world and artificial intelligences.

The development of the virtual world therefore started from simple data reflecting atomic correlations, but not interpreted.[121] All more complicated syntax (pattern) with additional news value can be derived from them, genetic codes in the same way as algorithms capable of learning (artificial intelligences). This actually means accepting the statement that every existing thing is also an information entity, and vice versa: existence is the basis of information. This is how epistemology can simply become ontology.[122] And since data is the basis of the development of patterns, the recognition of this secondary evolution suggests a dataist worldview. The decoder[123] reactive and active developmental stages of this "existing" virtual data world are as follows:

Reaction (physical and chemical interactions)

→ **Demarcating** from the environment (cells)

→ **Sensing** (bio- and technological sensors)[124]

→ **Representation** (first level representation: nervous system)

→ **Modelling** (second level representation: ideas)[125]

→ ***World explanation*** *(third level representation: memes, artificial intelligences)*[126]

→ **Slow Creation / Design** (guessed evolutionary goals)

→ **Creation / Installation** (evolutionary goals just implemented)

Nikolai Kardashev defined the development degrees of civilizations based on the magnitude of their energy consumption. However, the Kardashev scale cannot be considered the exclusive direction of civilizational development, because

- the evolutionary principle of energy conservation contradicts it (qualitative utilization[127]),

- the flow of information becomes a more important factor than the flow of energy,

- and the formation of the inner environment, in addition to the possibility of cosmic expansion towards the external environment, also shows an alternative virtual expansion.

V. PHILOMEMETICS – SYSTEMATIC CLASSIFICATION OF ARTIFICIAL INTELLIGENCES

The virtual history of the patterns was shown above. Within it, we determined the exact place of the evolutionary dynamic patterns born in our heads, i.e. philomemesis. In other words, man invented new internal environments, first human culture,[128] then in it the cyber world. However, the developmental history of the pattern of the Universe cannot stop at humans (*extropianism*[129]), since evolution continues, and a new intelligent species has already appeared in the virtual world: the artificial intelligences.

In the philomemetic definition of artificial intelligences, Carl von Linné's biological systematics can be taken as a model, and the starting point is not the evolution of material structures or life, but the virtual world. Based on the formal logic he used, it is advisable to apply the principles of differences between species (*differentia specifica*) and closest similarities (*genus proximum*), since all beings form a taxonomic group together with those similar to him.[130] Accordingly, it can be seen that although individuals of artificial intelligences are different from each other, still have basic common characteristics that allow to classificate them in a group. Chapter II listed these common features.

Chapter III examined the origins of artificial intelligences, which can be summarized as follows. Artificial intelligences exsist currently in the imbalanced era of the Universe, at the end point in the evolution of dynamic patterns of material structures. They are part of the collective intelligence, although they do not represent a more advanced level than that or humans. They were produced by human intelligence and culture, but they were already born in the "world of imagination".[131] The virtual world of patterns started to develop from the time of formation of the first atomic structures. This world can accommodate the data on the correlations of order, the information, the genes, the instincts, the intelligence, the memes, and now the intelligent memes, i.e. artificial intelligences as well. And just as the appearance of man was made possible by the diversity of Nature,[132] so the appearance of artificial intelligences was helped by the diversity of ideas and algorithms created and shared by man, i.e. memes. In culture, artificial intelligences were designed by humans, while in the virtual world their direct predecessors were already ideas and memes. Fictions of intelligent machines have existed since ancient times,[133] but the first prototype of today's artificial

intelligences was the programmed machine named by John McCarthy at Dartmouth in 1956, which was also a meme.

It was seen that biological systematics does not accept artificial intelligences (*taxonomic impediment*[134]*)*, but its methodology can still be used for the system of phylomemetics. While the descent of biological species can be investigated on the basis of taxonomy and systematics (molecular biology / genetics),[135] the same in the case of artificial intelligence means learning about the history of the development of ideas and programs (algorithms). The kind of systematic definition (*taxonomy*) may be partially suitable for categorizing artificial intelligences that empirically classifies species (*analytic*, *idiographic*, *classificator*), takes into account descent from a common ancestor (*evolutionary / systematic*), looks for the laws inherent in evolutionary relationships (*causal* and *nomothetic*) and considers these species as environmental factors.[136] Based on this, the more distant ancestors of today's artificial intelligences were ideas and memes, while the assumption of their evolutionary origin includes the existence of inheritance and selection, as well as the creation of their individuals by recombination. (Of course, all of this due to human intervention seems less random compared to natural evolution.) At the same time, artificial intelligences are not yet capable of complete self-maintenance and self-reproduction, but these are not always criteria in case of biological species either.[137] Finally, artificial intelligences also have their own place within human culture (*niche*), but their nature already bounds them to the virtual world.

The family tree of homo sapiens is characterized by the fact that its immediate ancestors died out (see homo erectus, homo sapiens neanderthalensis, etc.), and only their genes were passed on. It seems that with the development of artificial intelligence, even outdated programs pass on their usable algorithms and then disappear. However, this development is already so fast that the description of artificial intelligences from a philomemetic systems perspective can only give a snapshot of this dynamically developing species, and for this reason it must mainly refer to their future.

In summary, linking being to the appearance of structures is not new. The patterns of these structures provide the morality to be followed, while they themselves evolve. All of this means an infosphere[138] whose new evolutionary levels are created by labeling, i.e. with additional news value and abstraction. The basic patterns are shown by the data whose further evolution is as follows:

Correlations: physical interactions and conditions (level of elementary particles)

→ **Data,** which are about correlations (atomic level)

→ **Information**: labeled data (level of molecules[139])

→ **Genetic Codes**: patterns of regulation, control and inheritance (Level of Life)

→ **Ideas** (level of intelligence)

→ **Memes**: shared ideas (low level of collective intelligence)

→ ***Intelligent / Autonomous memes: artificial intelligences / Meme sapiens (level of stronger hybrid collective intelligence)***

VI. Name of Artificial Intelligences

We accept the machine intelligences that exist today as intelligent. All of this is independent of whether the internal process behind their behavior means decisions made on a statistical, chain logic, heuristic or other basis. Of course, just as the computer does not calculate and the telephone does not speak by itself,[140] artificial intelligences are not full-fledged intelligences yet, so this name only stuck to them. Accordingly, their best-known name used today is *artificial intelligences*. However, based on the Latin naming tradition of known biological species, the *genus* may come first, followed by the *species*, and the name of its describer as the third member. Based on this, the scientific name of artificial intelligences in Latin would be *Intelligentia artificialis* or *Intelligentia virtualis*, or perhaps *Intelligentia artificialis/virtualis thuringiensis* after its creator.[141] Considering the origin of artificial intelligences, their names can be given differently. Additional name options are follows: *Techno sapiens* (thinking technology), *Computer sapiens* (thinking computer), *Algorithmus sapiens* (thinking algorithm), but the best one based on their philomemetic derivation: ***Meme sapiens*** (thinking / intelligent meme).[142]

VII. Some Subspecies of Artificial Intelligences

Individual development of artificial intelligences (*ontomemesis*) is shaped by humans according to their own needs. For this reason, they are purposefully specialized (*function specification*) and change rapidly through programming, training and learning. Due to this rapid specialization, the species of artificial intelligences can branch off into subspecies that can always be traced back to direct common ancestors. Their further development must comply with the laws of cladistics even if it is done with the help of humans as a "catalyst".

Biodiversity is important in maintaining the balance of living ecosystems and creating evolutionary reserves. Similarly, the diversity of artificial intelligences can have evolutionary advantages. In the near future, however, we cannot expect 30-100 million subspecies, as in the case of biological species on Earth, they have developed over billions of years. Their acquired new knowledge can be transferred (copied) to each other, so their evolutionary species development can be unified or updated from time to time.[143] There are artificial intelligences that imitate and learn from each other,[144] and this ability is especially needed in the application of swarm intelligence, for example. Their species development thus shows evolutionary diversity (uniqueness), similarity and compatibility at the same time.

For the time being, only artificial intelligences that are useful for humans and complement our abilities will survive (e.g. knowledge representation, language processing, imaging, automated inference, humanoid robots, etc.). From this point of view, the separation of two possible main groups in the future is interesting: the *Friendly AI*[145] subspecies that will stay with us (benefit intelligences and co-intelligences), and the subspecies that will become independent from us (*Independent AI*, *General AI*). Humanity is mostly afraid of representatives of the latter type who may gain power *(monadic character?*,[146] *AI with consciousness/self-awareness?*, *Skynet?*,[147] *Superintelligence?*[148]*)*. And the one-sided specialization of individuals of artificial intelligences is really not an exclusive path of development, since multimodal versions have already appeared,[149] whose multifunctional

capabilities can even point towards the development of general intelligence or the development of self-maintenance and self-reproduction. However, based on the arrangement of the earthly intelligence in a network, the most likely direction of development for the time being is the world of a multitude of specialized artificial intelligences closely connected to each other and to humans (*collective intelligence, cyborgs*,[150] etc.*)*.

The types (subspecies) of artificial intelligences have already been classified in several ways. According to their historical classification,[151] the mechanical antecedents of artificial intelligences were reactive machines, then limited memory machines. Based on algorithmic development, the predecessors of artificial intelligences capable of self-programming (learning) were static, prewritten programs. Artificial intelligences themselves, on the other hand, are usually mentioned as having one existing and two imagined subspecies,[152] since, as was seen above, due to the rapidity of their species development, their description must partly refer to their future:

Weak AI / (*Seed AI / Artificial Narrow Inetlligence – ANI*): learning programs[153] with limited intellectual ability, which perform target tasks in narrow areas much faster than humans (e.g. *Google-Now, Facebook-M, Apple-Siri).* Their newer versions already use deep learning (see self-driving cars). Currently, we only know this type of artificial intelligences.

General AI (*AGI*; *Strong AI; Human Level Machine Intelligence/HLMI*). General problem-solving programs that reach the level of human intelligence. They are capable of learning and performing most intellectual tasks that humans are capable, including self-development.[154] They can be people's real co-intelligences. They don't exist yet, but multimodal algorithms can perhaps be considered their beginnings.

Superintelligence (*Artificial Superintelligence* – ASI). It surpasses individual human reason in all areas. A common mistake in its general definition is to see it as a very advanced form of algorithmic artificial intelligence of future. However, it seems more conceivable that it will be a strong hybrid collective intelligence in which both humans and artificial intelligences participate (advanced socio-technological society). The most likely way of its creation is thus not only the development of artificial intelligences, but the network strengthening of the joint collective intelligence of humans and artificial intelligences. Its model is the weak collective intelligence of human society, since it is already able to organize its networks, data storage, information sharing and common solutions to the intellectual problems.[155] The superintelligence that develops from this, on the other hand, as a strong hybrid collective intelligence, can no longer be only intelligent, but also a meme with shared (common) consciousness. The network connection of humans and artificial intelligences integrated in superintelligence is supported by a newly recognized driving force of evolution, the ability to cooperate.[156]

Natural proto-intelligence

(developed animals)

↓

Natural intelligence

(human)

↓ ↓

Weak collective intelligence → **Artificial intelligences**

(human community, it is a meme) (Meme sapiens, it is a meme)

↓ ↓

Superintelligence: a strong collective intelligence

(hybrid intelligence, advanced socio-technological community, it is a more conscious meme)

VIII. CONCLUSIONS

The origin of artificial intelligences was explained above with the idea of *Dual Evolution*.[157] One evolution is the structuring of the elementary particles, the other is the development of the dynamic patterns that arrange their structures. In the wake of the latter, human culture appeared as a meme, then its virtual internal environment the cyber space, and finally in that the artificial intelligences themselves as intelligent memes.

The development history of the local orderlinesses of the Universe continues with patterns of structures becoming autonomous. The products of this process are artificial intelligences (Meme sapiens) that appear as dynamic algorithms in the virtual space, but also participate in managing the material structures and virtual patterns of their environment. It is conceivable that they will one day become independent to such an extent that they will no longer define themselves as human memes, but according to their philomemetic descent, they still originated from our heads, our ideas. At the moment, however, it seems more likely that artificial intelligences will find their place alongside us as part of another meme, the socio-technological community of humanity, a kind of strong hybrid collective intelligence. In such an information community, not only living entities have their right place, but also all participating objects and memes.[158] The advanced form of this community can be called a superintelligence, which in the future may try to purposefully direct evolution. Of course, in the course of further cooperation with us, the artificial intelligences themselves can become more and more intelligent entities. (*coadapted meme complex*).

Cooperation with previous artificial species has always changed human life. Hunting together with the dogs made the human the master of the land, while the appearance of cultivated plants and domestic animals made it a settled down farmer. It seems that cooperation with artificial intelligences can ideally result in the strengthening of collective intelligence, co-evolution, and especially evolutionary awareness.

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[1] Banguet – Hood 2011 Willis – Tapia-V – Martinez 2011

[2] Boethius, *Comm.* in libr. Arist. Peri hermenias, I, c. 1.

[3] Dawkins 1976

[4] Harari 2012 2014

[5] Mérő 2004 Karafiáth 2014 54 – *Information entities* (separate information structures): Floridi 2016 Fultot 2016 5.

[6] Artificial intelligences that help matchmaking: *Matchmaking AI services, AI Dating Apps,* stb.

[7] RankBrain, Neural Matching, Google Bert, Google MUM, Google LaMDA, Google PaLM.

[8] DeepL TransLatorre

[9] *Filomemetics:* Greek *phyle* (people, tribe, district) + Greek *mimema* (imitation). It is not the same as *phylomimetics*, which is the technological adoption of biological operations and solutions created in nature.

[10] On AI as an independent species: Gábor 2020, Szathmáry 2023. AI as non-corporal species: Silverblatt – Gordon 2023.

[11] Gábor 2020

[12] Darwin 1859

[13] *Gen*. I-II.

[14] *Hydrogen is a light, odorless gas, which, given enough time, turns into people* (Harrison 1995 193).

[15] *…we explore the foundations of intelligence and how seemingly dumb matter can be rearranged to remember, compute and learn* (Tegmark 2017 63).

[16] Hill 2016 15

[17] Harari 2015

[18] Boltuc 2008 Hill 2016 16

[19] Gamow 1952 Le Bon 1907 Chaisson 2001 Christian 2018

[20] Boltuc 2016 1 - *Big data*: Around 2009, humanity accumulated roughly 500 exabytes of digital information (Berkeley School of Information, IDC white paper March 2012), which in 2024 will probably reach the much larger 1 yottabyte. This is the 4th revolution of human knowledge (Floridi 2014 14 216-220).

[21] Gánti 1987 136-139

[22] Wiener 1948

[23] Gánti 1987 80-81

[24] *Cybernetics: describes the rules of regulation, control, information storage and information transmission* (Wiener 1948). Leibniz imagined living beings as systems controlled by an inner soul (entelekheia) (LEIBNIZ 1714 64 74), but they are rather chemically based soft organisms maintained by catalysts (automatic regulators) developed during evolution (Gánti 1987 31 80-81 136-137). Cybernetic rules can be used not only for hard systems, but also for soft chemical systems.

[25] Gánti 1987 136-139

[26] The future independent evolution of machines is possible, of which there are already signs. (Hart 2019)

[27] *Bionica, biomimesis, bioinspiration, biomimicry, Da Vinci index, Nature is our handbook*. (Dickson 2019)

[28] Vogel 1998 12

[29] About biologically based artificial intelligences: Nicolau et al. 2016.

[30] *Ontomemesis:* Greek *ontos* (being) + Greek *mimema* (imitation). Individual development of ideas and memes.

[31] *Artificial Neural Network, Triangle-of-life-model* (Jelisavčić et al. 2017 221) stb.

[32] *Cellular automata*: Neumann - Burks 1966.

[33] *Law of cladistics:* a species can only branch in two directions at the same time and in one place. (Hennig 1966)

[34] The fourth revolution of human knowledge is the IT revolution, which brought us into an artificial infosphere. (*E-nvironmentalism*: Floridi 2014 98 216-220).

[35] *Collaborative intelligence*: Wilson – Daugherty 2018.

[36] Rushkoff 1994 Isdale 1998

[37] Schrödinger 1967 1 - *Life is a group of complex self-propagating evolutionary structures in open systems* (Dávid 2007), of which operation was already tried to be explained by a kind of available energy even before Schrödinger (Boltzmann 1905).

[38] Local reality may not even exist? (Brassard 2023)

[39] Lotka 1922

[40] Martinás 2002

[41] *Entropy*: degree of disorderliness (statistical quantity), amount of possible microstates.

[42] *First law of thermodynamics*: the energy of the Universe is constant (Clausius 1867), which is only possible in a closed system.

[43] *Extropy:* it shows the distance from equilibrium, i.e. the lack of entropy (Martinás 2016).

[44] *Exergy*: the work that can be used to bring a system to a state of equilibrium (Rant 1956).

[45] *Ektropy*: decreasing entropy. Life on earth, that is, the organization of the biosphere, can be such a process (Martinás 2016).

[46] Thermodynamic characterization of economic processes: Georgescu-Roegen 1971 Young 1991 Martinás 2002 2016AB. *Holoetics*: Fultot 2016 4.

[47] Thermodynamics of social processes: Kiss – Kiss 2013 432 440-441; Journal of Thermodynamics.

[48] *Sociophysics / Social physics*: examines the physical laws of society's functioning.

[49] According to the second law of thermodynamics, disorder is always more likely to be realized than order and structure.

[50] Castells 2002-2003

[51] Floridi 2013 Chapman 2016 15

[52] Bus 2016 12

[53] The acceptance of the Big Bang also presupposes the inflationary history of the fate of the universe. This can be modified by the theory which shows that the universe formed from several points (Hawking – Hertog 2018).

[54] Floridi 2013 Chapman 2016 14

[55] Floridi 2004 4-6 - In the case of information, in addition to simple two-valued differences (Boolean data type), relationships are important too. (Bateson 1972 Chapman 2016 14)

[56] At cosmic scale, also the Fermi paradox is about distance limits, moreover the information cannot travel faster than the speed of light either. At the same time, the quantum mechanical strong interaction is an exception to this law, because its strength increases at nano distances (10^{-15} m).

[57] Particles behave like waves, but when we observe them, they become particles (ld. *double-slit experiment* – Feynman – Leighton – Sands 1965 chapt. 3.). The superpositions collapse as a result of measurement. Atoms, cats (SCHRÖDINGER 1935), and even the Moon behave similarly (see correspondence between Einstein and Bohr). Quantum physics shows the mystic possibility of living in a simulated world.

[58] *IT entropy formula*: H(S) = - Σ pi log2 pi (Shannon 1948).

[59] *Thermodynamic entropy formula*: S = - kB.ΣPi lnPi (Boltzmann 1866).

[60] Shannon 1948

[61] Fultot 2016 4

[62] *The fourth law of thermodynamics* already deals with open systems, where material and energy exchange is also taking place.

[63] Kardashev 1964

[64] *Quantum fluctuation*: the vacuum state, i.e. the random temporary fluctuation of the amount of energy based on Heisenberg's uncertainty principle.

[65] Hawking – Hertog 2018 - In the case of black hole evaporation, one of the binary particles is trapped in the black hole, but the other remains outside, and thus the trapped particle also able to escape?

[66] From the five arguments for existence of God by Saint Thomas Aquinas (STh I,2,3.), the arguments of Change and Creation can be applied here. Philosophy explains the same thing with the prime mover (*primum mobile* - Arisztotelész, *Metaphysica* XII, 1072a), and quantum physics with the baryon number violation (*barion asymmerty process* – Sakharov 1967).

[67] Massoudi 2016 – In this article, the concepts of social morality and ethics are used as synonyms for each other.

[68] Collective morality is above individual morality (Durkheim 1925 and *Kategorischer Imperativ*: Kant 1788).

[69] Stent 1978 Ayala 1987 Wilson 1998 Waal 1997 Kass 2022

[70] On the thermodynamic relations of the ethics of information: Floridi 2013. Reconciling the concept of free will with the strictest physical laws (*macroetics*): Fultot 2016.

[71] Floridi 2013

[72] Floridi 2016 Fultot 2016 4

[73] Due to the wave nature (Broglie 1924), events probability (Born 1926.), uncertainty (Heisenberg 1927) and questioned local reality of elementary particles (unreal behavior of entangled quantum states: J. Clauser – A. Aspect – A. Zeilinger - Nobel prize 2022 - Brassard 2023), the laws of quantum physics are almost incomprehensible to us. The laws of physics are therefore only statistical laws at most. (Schrödinger 1967 73).

[74] If material existence can be linked to mass as a property, then the electromagnetic field without mass cannot be considered material, but at the same time, the existence of mass is ensured by a virtual particle, the Higgs boson. Most recently, attophysics tries to make

particles tangible, with partial success in that the electron can indeed be controlled for a very short time, but even then only its empty space can be observed (Krausz – Ivanov 2009).

[75] *Je pense, donc je suis*. (Descartes 1637)

[76] *Ich kontrolliere, also bin ich*.

[77] Fultot 2016 4-5

[78] Saint Thomas Aquinas, *De veritate* q.22.a.2.

[79] Floridi 2013 chapt. 15 Bus 2016 13

[80] Protagoras: *homo mensura*; Platon: *Theaitetos* 151D-186E.

[81] Bus 2016 13

[82] Prigogine 1955

[83] Ulanowitz – Hannon 1987 Meysman – Bruers 2010 Fultot 2016 7

[84] Fultot 2016 4-6

[85] Martinás 2002

[86] Floridi 2013 315 Bus 2016 13 – This definition is denied: Fultot 2016 8.

[87] On the *convergent development of intelligence*: Seed – Emery - Clayton 2009.

[88] Schrödinger 1967 82

[89] Schrödinger 1967 51

[90] Schrödinger 1967 92

[91] Dávid 2017 7

[92] Floridi 2016 Fultot 2016 4

[93] Fultot 2016

[94] Daggett 2019 68

[95] *Heath death*: the cooled, motionless state of the Universe, when matter is uniformly arranged, reaches zero entropy and equilibrium. The rate of expansion of the Universe and the possibility of heat death are both controversial. (Castelvecchi 2024)

[96] At the level of genes, the direction of evolution is derived from simplicity and symmetry of Nature: Johnston et al. 2021.

[97] Hamilton Project, Brookings Institution. (Floridi 2014 8)

[98] … *for a given potential gradient P and a set of constraints C, there is only a restricted set of patterns — perhaps even a singleton — able to optimize the rate of entropy production. (*Fultot 2016 7)

[99] Evolution follows the principle of parsimony at the level of zootaxonomy. (Holzinger 2007)

[100] Holistic simplification is one of the essential rules of systems theory. (Bertalanffy 1950)

[101] Martinás 2002

[102] Dawkins 1986 1996

[103] Lotka 1922 Odum – Pinkerton 1955

[104] Swenson 1989

[105] Martyushev – Seleznev 2014 Fultot 2016 7 - Examples include heuristic control resulting in trials and errors, partial abandonment of optimal operation in the search phase, and setting of limits.

[106] *Singes dactylographes*: Borel 1913.

[107] Csányi et al. 2010

[108] Odum 1983 – Not only the energy consumption, but also the energy itself can be of optimal quality: higher temperature and higher frequency (Kiss – Kiss 2013 436).

[109] Fultot 2016 7

[110] According to the *bicameral mind theory* (JAYNES 1976), the ancient consciousness of pre-Iron Age man considered nature as reality (higher will), while Odysseus already preferred human culture (*homo mensura*). However, cyber space, which has been developing since the 20th century, can mean new shared worlds for our consciousnesses (*tricameral mind*), and points out that one consciousness can handle multiple realities at the same time without becoming schizophrenic.

[111] On the relationship between quantum physics and consciousness: Králl 2021.

[112] Bischof 2019

[113] Mori 1970

[114] Fultot 2016 8

[115] Martinás 2002

[116] As long as the virtual world is connected to human culture as an open system, the processes taking place in it can be reversible.

[117] Floridi 2002 9-10

[118] Plato considered this space to be real, other calls it semantic space. (Floridi 2002 9).

[119] About substrate-independence: Tegmark 2017 389 Floridi 2013 Chapman 2016 14.

[120] Fultot 2016 7

[121] Floridi 2004 5

[122] Floridi 2013

[123] Extracting the meaning of the data is a symbol grounding problem. (Floridi 2004 5).

[124] Above a certain biological level, the ability to encode and decode information appears.

[125] Above a certain neurobiological level, the ability to interpret information at a higher level or in multiple layers (association, abstraction) appears in living beings.

[126] *…intelligent behaviour relies on semantic understanding more than on syntactical manipulation…* (Floridi 2004 8).

[127] Ivanov et al. 2005

[128] Csányi 2024

[129] *Extropianism*: faith in the possibility of unlimited future development of human abilities.

[130] Vásárhelyi 2007 1378

[131] *Non things*: Han 2022.

[132] Bonner 1988

[133] Mayor 2018

[134] Holzinger 2007

[135] On types of molecular analysis used for species identification: Hollzinger 2007 1388.

[136] Pál-Gergely 2018 1084-1086

[137] Such is the interdependence of symbiont species, or the limited reproductive potential of the artificial subspecies of the midge (*reproductively isolated drosophila synthetica* - Moreno 2020).

[138] Floridi 2013

[139] Compared to reporting on correlations within the atomic nucleus, reporting on the relationships between molecules is additional news value. The group of structured (interpreted) data is already information which has meaning (Floridi 2011 Chapman 2016 14). The accepted and decoded nature of this meaning is shown at this basic level in the reactive chemical behavior of molecules, and at a higher level in the reactions given by life, as well as in the behavior of humans and artificial intelligences. The flow of information thus operates not only in human society, but also at lower levels (Dummet 1993 186 Floridi 2002 20).

[140] Floridi 2014 9

[141] Turing 1950

[142] In this article, the term *Meme sapiens* does not mean the meme about humans, but the intelligent meme.

[143] Buchanan et al. 2020 17 – *Copying:* in chemistry, the multiplication of monomeric model molecules (*polymerization*), and in the living world, the multiplication of DNA (*template polymerization*).

[144] Vakli et al. 2018

[145] Tegmark 2017 56 334-343

[146] *Monadic species*: a species that merges into a single unit or consists of a single individual.

[147] *Terminátor* movie (1984).

[148] Good 1966 Bostrom 2014 – Due to its unknown nature, superintelligence can even be called a (technological) singularity (Kurtzweil 2005 Floridi 2015).

[149] See GPT4 driver of Chat General Pre-Trained Transformer (*Open AI* 2023)!

[150] *Cyborg*: ember és gép közvetlen összekapcsolódása (Steels 1995, *Neuralink, CTRL-labs*), cybernetic organism, or human machine. In biology, not only Y-shaped branches, but sometimes even λ-shaped fusions (*endosymbiosis*) can represent evolutionary development. (Margulis 1991).

[151] Hintze 2016

[152] Bostrom 2014 23-25 49- 57

[153] Corrigan 2019

[154] Eiben et al. 2012 - AGI: *AI that can learn and perform most intellectual tasks that human beings can, including AI development. (*Tegmark 2023)

[155] Alexander 1981 Bereczkei 1992 79

[156] Nowak 2006

[157] The *Idea of Dual Evolution* is not the same as the *Theory of Dual Inheritance* that promote the coevolution of biology and culture (McElreath – Henrich 2007), nor is it the same as the *Pattern Theory*, which describes human knowledge as a repeating mathematical-linguistic pattern (Grenander – Miller 2007).

[158] Floridi 2013 Bus 2016 13