Serbian scientists respond with an idea – Artificial Intelligence generated on the principle of water molecule structure

History and Philosophy of Technology

> "But today when we understand that life originates, as any other mechanism, from the compound of elements in the physical world, we find ourselves facing a problem that makes life even more mysterious than before, when its mechanical nature was not familiar to us: it is the problem of origin and structures we are discovering"
> Ivan Đaja (1955)

Introductory quotation: Origin and Structure

It is true that humanity is far from realisation of complete (general) *Artificial Intelligence*. It is also true that, in most cases, no difference is made between *machine learning* and operational *intelligence of machine systems*. However, the need to establish a new kind of "expanded field of intelligence" is obviously stronger than the evolutionary need for a uniform preservation and development of *biological intelligence*.

A note on the difference between Machine learning and Artificial Intelligence

We should be aware that the development of Artificial Intelligence, cybernetics and robotics is not limited to technical-technological development intended for establishing industrial-economic or military-technological domination, i.e. creating techno-systems for trading or military intelligence (surveillance) activities. However, this is exactly what the representatives of the great world powers and multinational corporations are doing at this very moment while establishing the strategies and programmes for the long-term development of Artificial Intelligence. In fact, Artificial Intelligence is primarily to be used for protecting the fundamentals that make humans complete living beings. Creating algorithms that would code software to operationally react to the need to preserve life as a phenomenon, and biological intelligence as its inevitable attribute, will definitely be set as a legal, ethical and safety priority in defining the general goal and purpose of developing Artificial Intelligence (as a factor that will indirectly manage bio-system and exchange of goods in the near future).

The aim and purpose of Artificial Intelligence development

In the current era of proto-digital consciousness (bestowed on machines as complex non-living systems), the importance of safety must be highlighted, especially when predicting risk and planning the future role of highly sophisticated (intelligent) technology in everyday life. Therefore, scientists should follow the cultural foundation and specific scientific trail of their predecessors. They should have adequate degree of conscience and awareness, not only towards the development of new intelligent technologies, but also towards the preservation of cultural identity of symphonic idea. This idea should be implemented into the software, as a specific operational principle which would provide a well-coordinated and sustainable interaction between biological and Artificial Intelligence (i.e. bio-technological symphony).

Proto-digital consciousness – risk prediction and sustainability of interaction between biological and Artificial Intelligence

Serbian science used to have great minds, whose ideas on the development of advanced social systems and technologies preceded the ideas of the great world known scientists, the pioneers in this field. In this respect, we should be reminded of the continuity beginning with the idea of wireless transmission of signals (data and energy) that Nikola Tesla worked on in the last decade of the 19th century and successfully applied in his Colorado Springs laboratory (1899/1900). After he returned to New York, Tesla proclaimed his plan to make the first complex for the "system of the world telegraphy" (worldwide wireless system, 1900), and published twelve ideas that foresaw modern wireless data transmission. In many respects, his ideas concur with the general ideas of Artificial Intelligence development. We should never forget that without two patents that Tesla filed for immediately upon returning from Colorado Springs (1900 – 1901), which were confirmed in 1903, the world would not know about "logic AND gate". The development of modern digital technology, along with robotics and Artificial Intelligence, would be unimaginable without his work. In 1933, Tesla went even further, presenting his theoretical innovation – *the thought reading device*.

Among the scientists whose work included technological innovation based on water, the most prominent one was Mihailo Petrović Alas, the inventor of the first hydraulic analogue computer for solving differential equations (1897). In his work, Petrović went ahead of his time and in the previous year he presented the idea and concept of a "chemical computing device" (1896). Then he proposed some types of chemical reactions to provide energy for his arithmetical device (analogue computer) "for solving analytically unintegrable differential equations, namely Riccati's equations with constant and variable parameters". Also, Petrović was working on "electric analogue computer" and developed the necessary theoretical instruments required for its realization within his studies of phenomenology (1941). Petrović's work can be considered seminal because he noticed the existence of "a simple analogy between electric and hydraulic phenomena". He indicated that "electric inertia, manifested by self-induction, has the same function as the inertia of fluid in hydraulic phenomena", i.e. that "electrical resistance plays the same role as mechanical resistance in the fluid flow" (A. Petrovic, 2004).

Furthermore, let us be reminded of the work of Kosta Stojanović, who in 1910 explained the concept of regulating social flows by the rules of thermodynamic, which would turn out to be an important factor in the future development of cybernetics and Artificial Intelligence. There is also the research of Ivan Đaja, a prominent and famous physiologist who discussed the occurrence of and difference between biological and machine intelligence. At the beginning of 1960s, a significant progress was made in development of bionic aid by Rajko Tomović and Miodrag Rakić. Their pioneering work in the field of developing artificial organs (with the sense of touch) represented a sort of a forerunner in the development of medical robotics and technical application of Artificial Intelligence.

However, professor Đaja pointed out that machine intelligence cannot be recognised as intelligence as long as it does not comprise the fundamentals of biological intelligence to keep preservation and protection of life as a phenomenon. It is also important to emphasise the fact that Serbian scientists from the beginning of the 19th and the first half of the 20th century predicated

their approach on the principles of the *theory of (natural) harmony,* which is nowadays not understood enough. Therefore, it is important to mention that Nikola Tesla was the first one who successfully applied technologisation of the principle of harmony, which he himself explained this way: "The greatest good will come from technical improvements tending to unification and harmony, and my wireless transmitter is preeminently such" (1919).

Let us also mention Đaja's notion that one of the main starting points (aims and tasks) of biological intelligence is primarily preservation of the primordial state of thermodynamic properties and salinity of the environment (water) where life and biological intelligence as such, were uniformly conceived. At the same time, Đaja inspires us by pointing out to all that the living beings have demonstrated so far and what the products of "carbon dioxide and the elements of water can provide". He emphasises the importance of the relation between intelligence and processing and exchange of compounds (oxygen – carbon dioxide) within a functional synergy of various living species. According to Đaja, the main problem is reflected in the fact that inorganic nature "tends to melt life away", constantly struggling against what is in the core life (which is at "a higher order than physical world"). On the other hand, what originally lies at the basis of life contradicts the order (pattern) of inorganic matter, i.e. tends to resist death. Taking this as a starting point, it can be concluded that the biggest safety risk of modern technological development would be taken if inorganic matter, such as computers, were given a kind of intelligence based on the pattern (structural system) opposite to the one life is based on. In this case, life as a phenomenon would get one more adversary, intelligent enough to harm it. Therefore, one of the most important safety problems depends on what answer is given to the following question: which order is actually followed by algorithms and software systems that will be the base of Artificial Intelligence, robotics and cybernetics? The answer is important because the achievements in these fields will be used for global networking of the future environment where they will indirectly dominate.

Problems concerning inorganic structure and life – the risk of software transposing of a faulty pattern

More than a decade ago our team started research in an attempt to solve this problem and find the uniform basis to serve as a sustainable geometric-structural coordination between the two currently separate systems – biological and Artificial Intelligence. In an isolated, self-regulating thermodynamic system such as a human organism, water is a structural dominant. Water is a special kind of intermediary between life as a phenomenon and non-living matter as the environment where life is simultaneously being generated and extinguished. The results of the research dealing with water and its molecular structure pointed to the conclusion that its physical-chemical properties follow the geometry of the exact economy based on proportional order resting on *continuous proportionality.* As a matter of fact, if we observe the structure of a water molecule from this point of view, we actually direct our attention towards the fact that in geometric-constructible way water represents the simplest and most economical aspect of organising the space-time structuring of matter. Without its presence both life and biological intelligence obviously would not exist. Therefore, we can assume that a water molecule represents a unique space-time reflection of organising nature on the principle of economy of harmony. This is also indicated by a unique geometric-constructible basis that can be used to derive dependent values of a water molecule (when water is in all three physical states).

Structure of a water molecule as a generating basis for integration of biological and Artificial Intelligence

Apparently, water represents a specific indirect factor of the change of order within matter, where the mentioned specific economical quality (continuous proportion) shapes a specific relation. This relation brings non-living matter to the phase of life, and evolution of life to the emergence of intelligence. Furthermore, it is also important that substructural bases of a water molecule, in geometric constructible sense, are compatible with certain geometric regularities of light propagation like *primary and secondary rainbow angles, Brewster's angle,* and *the angle of atmospheric (equatorial) refraction*. Geometric compatibility of structural and substructural properties of a water molecule can help to deeply and more purposefully understand the influence that a change in geometric properties has on the development of bio-system. On the other hand, geometric compatibility can significantly contribute and give sense to the development of compatible solutions for sustainable technical technological implementation and integration of biological and Artificial Intelligence.

It is a fact that, regardless of a whole series of complex physical-chemical properties of a human organism, i.e. "anomalies" and the dynamic of molecular structures, each water molecule is, geometrically speaking, strictly defined and moves within a strictly defined geometric range that can be expressed constructibly. This means that geometric range is expressed in such a form that represents a practical basis for creating an algorithm. The geometry of a water molecule indicates the preservation of dynamic equilibrium in organisation of complex compounds that organisms are composed of. The proportional basis of a water molecule is observed as transposed and within a harmoniously positioned thermodynamic range of a human body (in a temperature scale defined by a range between the freezing point and evaporation point of water). The same proportion is observed in harmonious changes of water quantity in a healthy organism during different stages of live. Furthermore, the geometry of water molecule structure enables us to have insight into the double interfering nature of molecular dynamic, which can help a better perception of the paths of natural information decomposition, i.e. the way information is deposited and activated. It is assumed that each information depending on the structural logic of water molecule also functions by similar properties. This means that instead of a linear, this structure has a double angular trajectory (structure) of decomposition, which points out a specific nature of establishing a continuous relation and discontinuous relations in the process of thinking and memorising (remembering).

The logic of water within the logic of software engineering
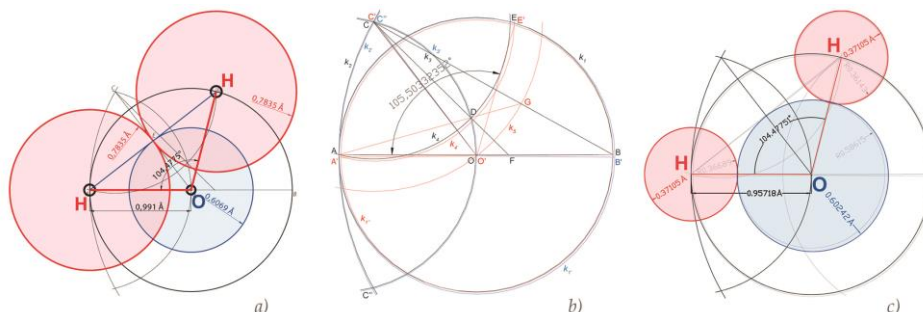
A simple geometric-constructible basis used to achieve the values of water molecule structure – in all three physical states (Milosavljević, 2011)
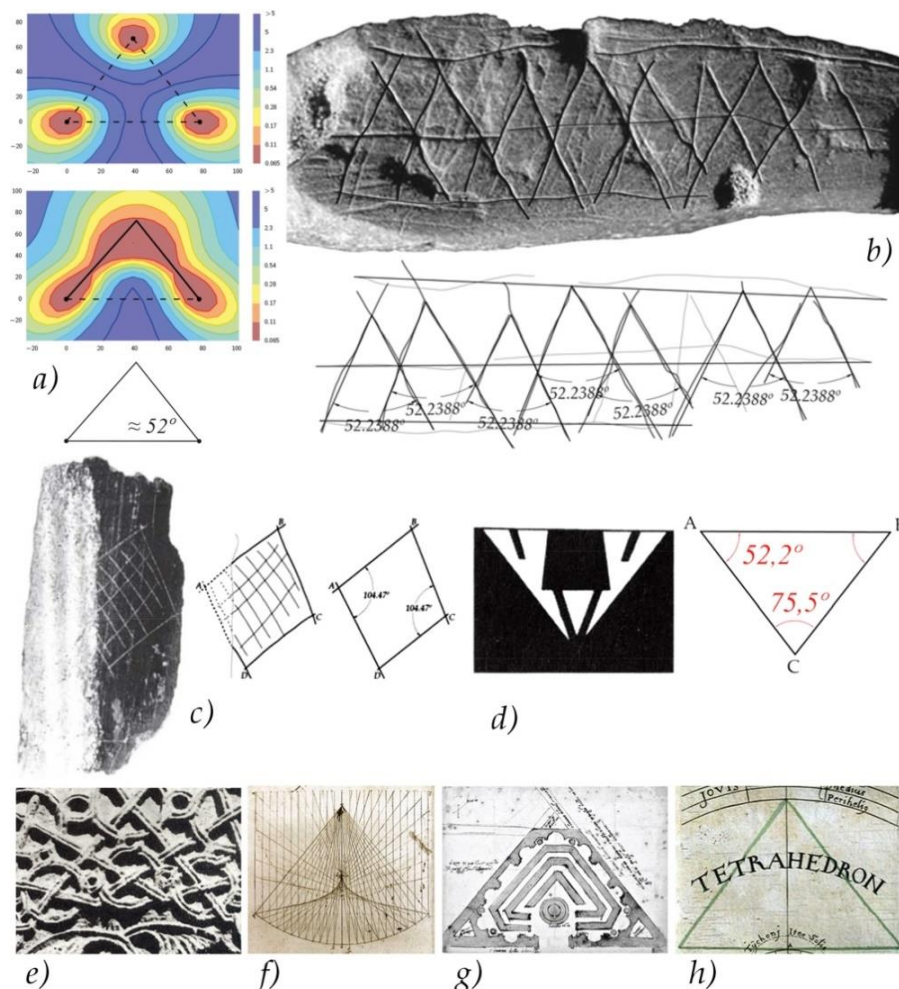
Our idea, and the goal of *ВилаAI* (*Вила_Artificial Intelligence*) programme is to generate geometric-constructible values of a water molecule structure (*Вила I phase*), develop an algorithm (*Вила II phase*), and a software platform for the future world system of integrating biological and Artificial Intelligence (*Вила III phase*), based on the logic of geometric functionality of a water molecule structure. The purpose of creating this platform is to protect life as a phenomenon and harmony as the principle of its sustainable organisation. Adaptation of Artificial Intelligence to work on the principle of structural dominant upon which bio-system (as we know it today) depends, and biological intelligence as its integral part, will inevitably have to pass through a "digital sieve". This sieve would have to be based on the structural network that has also acted as the bearer of life in biological sense, and therefore the bearer of intelligence. Inevitably, such dominant is water – the geometry of its molecular structure and dynamic of its molecular clusters. As shown by the most recent research, the abovementioned geometry can help us understand and overcome the problem of the loss functions in multi-layer neural networks and their efficiency in generating "deep learning".

Multidisciplinary research that we have conducted is not directed only towards the analysis of the molecular structure of water. It is primarily directed to understanding the evolution of geometric thought. The research results show frequent repetition (copying) of specific geometric patterns in human works of art, the majority of which had the analogy with the elements of the geometry of a water molecule structure. From this point of view, the evolution of Palaeolithic art (instinctively and/or intuitively created prior to the first aspects of rationalisation of the experienced and created) is particularly interesting. It indicates that in its primary sense, the creative intelligence was being developed through a specific process of assimilation, adaptation, and transposing of the structural basis that represented the biological dominant of the organisms which began the process of creating. This is particularly noticeable on the forms engraved on artefacts found on different sites from Middle and Upper Palaeolithic, but also on those belonging to Mesolithic and Neolithic (created prior to the wider use of salt in human diet, when the geometry based on using the right angle started to prevail). On the basis of the aforementioned experience, and from analogical point of view, the best approach to Artificial Intelligence development is the one aimed towards learning from nature and the way it accomplished evolutionary gradation of intelligence development. This would apparently not be possible without simple parameters of geometric continuality upon which the structure of a water molecule is generated.

Only if we compare the compatibility of research results achieved by using modern technology (especially when we talk about analysing the properties of loss functions in neural networks) with geometric patterns in art typical of Palaeolithic and the following periods (where modern man attributes special meaning to identical/repeated patterns), we can conclude that it is the same geometry, or reflection of the same principle of geometric economy within the function and process of thinking. The abovementioned facts and material indicators give us hope and chance to successfully define and operationalize a unique pattern that would help us create a software basis for compatible interaction and sustainable integration of biological and Artificial Intelligence. At the same time, it would help us make them more efficient and compatible.

ВилаAI programme – a new approach to new technologies

Research into the evolution of geometric thought – the basis for understanding the structural dominant which provides harmonious integration of biological and Artificial Intelligence

The evolution of intelligence – identical geometry from Palaeolithic to contemporary expression and experience: (a) the result of the analysis of loss functions in neural networks (*Garipov et al., 2018*), (b) the engravings on the ochre stone from Blombos cave (c. 77,000 – 70,000 BC; *Henshilwood et al., 2002*), (c) a rhombic network engraved in a fragment of a bone object in a Mesolithic layer Vlasac II (Djerdap gorge, 6,500 – 6,300 BC; *Д. Срејовић, 1969*), (d) triangular motif (the example of so called white painting) on an artefact from archaeological site in Anzabegovo I (Ovče polje, 6,200-5,800 BC; *Н. Н. Тасић, 2009*), (e) relief decoration on the south distyle of Ljubostinja monastery (Rade Borović, c. 1405; *А. Дероко, 1967*), (f) a drawing in Leonardo's "notebook" with the analysis of light refraction, 1490 – 1499; *Codex Arundel, f. 87 v; British Library*), (g) Michelangelo's plan for "Small hidden library" (c. 1525; *Biblioteca Laurenziana*), and (h) a drawing from Kepler's book "Harmonices Mundi" (1619)

Finally, let us return to the opinion of Ivan Đaja, who reminds us that in a living matter "there is a continuous effort to preserve a harmonious whole and restore the disturbed equilibriums..." (1955), which is important to accept as a guideline when setting the aim and purpose of creating new intelligent technologies.

Compatibility of interaction between biological and Artificial Intelligence

Predrag Milosavljević, PhD,
History and Philosophy of Natural Sciences and Technology

Author