http://www.moderntechno.de/index.php/meit/article/view/meit40-03-035
DOI: 10.30890/2567-5273.2025-40-03-035

UDC 130.1+316.4

INTELLECT, CONSCIOUSNESS AND UNIVERSE: WHAT CAME FIRST?

Andriy Simchuk
d.b.s., prof.
ORCID: 0000-0002-1762-144X
Vasyl Stefanyk Precarpathian National University,
Ivano-Frankivsk, Shevchenka, 57, 76018

Abstract. *Human intellect, controlled by genes, is aimed at solving the problem of their multiplication, while the mind, based on self-awareness, acts in favor of the individual. Then natural evolution concerns only intellect and does not affect the dynamics of mind, which can only develop as a result of individual efforts, and this is a problem for progress. Information links in social organisms (for example, in ants) lead to the emergence of supraorganismic intelligence, and technical progress has provided effective means of communication (the Internet, social networks). Will this not lead (if it has not already led) to a similar integration of intelligences with unpredictable consequences? At the same time, consciousness is fundamentally different and can be a consequence of an information process based on the mathematics of a complex hierarchical dissipative system. In this case, consciousness can be primary, and the universe is the result of a simulation for the purpose of self-knowledge.*

Key words: *selfish gene, intellect, mind, human evolution, social media, consciousness, simulation, universe*

Introduction.

It is obvious that human cognitive abilities contain two fundamentally different components: genetically determined intellect (as the ability to solve problems) and individual mind (as understanding) based on self-awareness. At first glance, it seems that there is no contradiction between them, and they work together, representing simply different levels of the same system. However, is this true? What is important here is that intellect is inherited in all living organisms, including humans, and the heritability of intellect increases with age [3].

According to the concept of the selfish gene [6], genes are not “interested” in the goals of the organism in which they are located. The organism is only a tool that they use to achieve their main goal — to pass on as many copies of themselves as possible to subsequent generations. Thus, intellect controlled by genes and mind based on self-awareness may have different goals, and this may lead to contradictory, divergent developmental trends, especially with the growing influence of social networks, which are able to unite individual intellects into new systems. Moreover, if genes are not the cause of the evolution of consciousness, which is individual and, in turn, is not

interested in the problems of its genes, then where does this consciousness come from? Different goals may indicate that genetically determined intelligence on the one hand and consciousness on the other hand may belong to completely different systems, since one and the same system cannot have opposite, incompatible goals. I would like to express some thoughts on this matter, understanding that they are somewhat speculative.

Genetically controlled intellect: possible consequences in the age of social media.

Intellect developed in the process of evolution from primitive organisms to humans exactly in order to more effectively solve the problems of gene multiplication. Consequently, intellect serves precisely this purpose and is realized in the phenomenon of the organism's behavior in the form of various repertoires developed in the process of long-term evolution. These repertoires are made up of standard developed and tested procedures. Thus, genes, with the help of various biochemical and neurophysiological mechanisms, “force” organisms to perform individual and joint actions aimed at gene spread. Hereditary variability in these mechanisms creates material for natural evolution. Sometimes this is considered the cause and evidence of the absence of free will [18]. However, the absence of free will also means the absence of mind. If a creature's behavior is determined by its set of genes and its environment, then there is simply no room for reasonable activity.

Indeed, the presence of a sufficiently strong influence of heredity on human intellect and behavior allows us to consider that in this case, too, genes have the ability to quite effectively use the same procedures developed in the process of evolution in “their own interests.” Although natural selection, responsible for the development of such adaptive mechanisms and connections, may weaken in humans due to advances in medicine, sexual selection is fully preserved and this probably allows genes to be successful in achieving their “goals,” including through human intellect [14].

Thus, human intellect is not subordinated by default to his personality, his Self. Genes are generally not “interested” in the prosperity of the organism itself. Genes “use” the organism as a mechanism that allows collecting energy from the environment

and investing it in the transfer of genes to the next generation, and each gene "wants" to do this more effectively than others. Therefore, genotypes are only temporary associations, and this transience is manifested in genetically determined aging, illness [5] and death (apoptosis, for instance), which are necessary to free up a niche for the next evolving generations. The phenomenon of effective population size shows that about 10% of specimens on average participate in reproduction [9], and the remaining individuals are actually sacrificed to the process of gene multiplication, senselessly dying from diseases, parasites, predators and natural death. It is clear that all of these are natural processes, and I am simply using anthropomorphisms, but the essence does not change. In this case, the "goals" of genes are directly aimed against organisms for which these things are evil. Natural death, contrary to popular belief, is not an attribute of life. This is evidenced by the fact that, on the one hand, there are special genetically determined mechanisms of death (apoptosis), and on the other hand, exceptions to this rule [17].

It may be a coincidence, but if we look at the characteristics attributed to Satan, they surprisingly correspond to the trends that genes bring to their carrier. The Bible characterizes Satan as: sending diseases (Job 2:7), bringing death into the world (Book of Wisdom II. 24), wicked and deceitful (Matt. 13:19, John 8:44), tempting (Matt. 4:3) and the prince of this world (John 12:31). All these characteristics in relation to humans and even other organisms have genetic determinants. I have already written above about diseases, old age and death, we can also talk about the genetics of lies, unethical behavior [12] and promiscuity [10], it is difficult to argue about the power of genes over almost all aspects of biological life [6], including human behavior, as well as other species [3]. So, genes really do rule this world. All this is beneficial to the genes and that is why it was developed in the process of evolution, but all this is not beneficial to the individual, since in the end it always leads to bad consequences. Thus, the "enemy of man" may not be some mythological creature, but our own genes, or rather their property to strive for preferential multiplication in subsequent generations.

Mind presupposes understanding of the interrelations of objects and phenomena, the consequences of certain actions of an individual as a whole, abd the basis of reason

(as understanding) is self-awareness. Therefore, the organism is a value for the mind, and in this, reason and intellect do not coincide, but rather have opposites. In this sense, there are contradictions and conflict between reason and the selfish gene. Sometimes the concept of the selfish gene is criticized for justifying human selfishness [13], however, I think it does not justify it so much as it explains it. A weak mind is not able to resist genes that have honed their influence on an individual for hundreds of millions of years. Genes can try to use the ability of the Self to think for their own purposes - for example, by setting goals and developing procedures for crimes, wars of conquest, seizure of power, etc. This means that since the goals of genes (intellect) and mind do not coincide, the direction, purpose and result of the activity of mind must be included in its definition. In any case, modern ideas about the pinnacles of mind development, such as the Dyson Sphere, seem absurd. I'm absolutely certain that no civilization will ever do this. Because a Dyson Sphere is the ultimate dream of a population, not a civilization. It's exactly what ants would do if someone gave them the right technology. But of course, I don't put it all on genes and intellect - it's like a a lighthouse that brings the Light to illuminate the path from the first organisms to the beginnings of reason, but unfortunately, no further.

Thus, here we can conclude that only intellect is capable of evolving as a result of natural selection, but the mind itself (due to this selection) cannot evolve. Indeed, the mind can act contrary to genes, and then such individuals will fall out of natural evolution. And the individual nature of the mind says that only individual efforts are capable of developing it (As they say: The Kingdom of Heaven suffers violence (Matt. 11:12)). Again, an analogy: the mind can really provide technologies for controlling genes, and therefore remove diseases, old age and natural death from the lives of reasonable people, and without any mysticism. However, for some reason it is believed that the evolution of the mind continues, although empirical data does not confirm this [16]. Really, the existing society does not create conditions for the mass evolution of mind. They are not among the goals of the market system, are not included in the programs of political parties or other public organizations. This problem is not considered systematically at all because humans are considered rational a priori, and

this may not be entirely true - the results of human average activity seem questionable from the point of view of their rationality. In any case, this is a serious problem.

In addition, there are still some pessimistic considerations regarding intellect. Recent experiments have shown that in social organisms, individual intellects can combine into a supra-organismic intellectual structure that is much superior to them [8]. The fact that this was recorded in ants suggests that it was a spontaneous process that did not require self-awareness, but was based only on the informational connections that united individuals. Humans also belong to creatures with social connections, which initially developed for successful hunting, protection from predators and other tribes, etc. Therefore, a similar effect can also take place in human populations.

Game strategies that manifest themselves in the genetically determined behavior of many biological organisms have long been used in economics and politics [2], [4], [3]. However, recently there have been major changes in communications. The powerful development of social networks is radically changing the political landscape, which has been formed for centuries and was based on the elites of societies. For a long time, most people were not interested in politics, and it was difficult and very expensive to attract them to it. Now this can be easily done using social networks. Considering that the mind, as I have already noted above, is not able to develop spontaneously, without the activity of the individual, the behavior of many is under greater influence of genetic factors, and social networks can contribute to a situation where we should expect the integration of their individual intellects into supra-individual structures that can exceed individual abilities. A sort of upgrade of the collective unconscious. This is a case where selfish genes can «use» technological advances created by the mind for their own purposes. Maybe everyone is now afraid of the wrong kind of intellect, which is what should really be feared? Artificial intellect does not have its own goals, but integrated human meta-intellect does have its own goals. One way or another, these will be the goals of selfish genes, and we are unlikely to like the methods of achieving them.

Can genes control such meta-intellect of human societies as effectively as they do

on an individual level, or on a group level, as it happens in social animals, and how can this be expressed? Obviously, the conditions and environment in this case are very different from what it encountered during millions of years of evolution, but perhaps the trends developing now in world politics are a consequence of the growing "power" of this collective unconscious, integrated due to the Internet and, most importantly, social networks. The growth of right-wing radical sentiments with a pronounced dominance of alpha leaders even in Europe [1] on the one hand and very similar features and patterns (use of social networks for agitation and propaganda, preference for subordinate loyalty over competence, populism, etc.) of recent elections in countries as different as Ukraine [7] and the United States [20] on the other hand, may indicate certain strategies that were played out as a result of clashes and cooperations of interests, in which genetic behavioral determinants could also participate, since they are, in principle, characteristic of people. I do not doubt the legitimacy and democracy of the elections, but the problems can go beyond specific manifestations and have much more serious consequences and pose problems for the development of reason and the progress of civilization. In any case, as expected, humanity apparently did not show up for the Final Battle of good and evil or even took the wrong side for the most part, if we look at the already more than 11-year war in Ukraine, where the division of strategic directions of development is especially evident, and the punishment of Evil is not considered at all as an option for ending the war. I wonder if the second half of this myth will come true?

Consciousness and universe: what came first?

What consciousness is and where it comes from is still not clearly defined and understood. The only thing that can be said for sure about it is that it really exists, because it definitely exists in people, and even in animals. If consciousness exists, then everything that exists or appears in consciousness also exists, because it is precisely this filling that makes it up. For example, you can imagine a disk (an infinite number of points, bounded by a circle). You can, for example, draw it with a pencil on paper, or with a mouse on a computer screen, so that it is easier to imagine, but in reality it is neither on paper nor on the screen, but it exists only in light. It exists in consciousness,

but cannot exist in the physical material world, due to the fact that it has no dimensions, because the points from which it consists do not have dimensions. Therefore, it is structureless inside, that is, it is impossible to distinguish any of its internal regions or points from each other. It is impossible to find the center, because no matter which point you take - between it and the center there will always be an infinite number of points, and the probability of immediately finding the central point from their infinity is zero. It is also impossible to find its edge. In other words, there is no information inside the disk, so the middle itself does not exist. That is, the disk as an object carries only 1 bit of information - either it is there or it is not there.

Another thing is if you take the formula of a disk and a certain set of numbers that would mean the coordinates of the centers and radii. Then a system of disks appears in consciousness that have certain distances between the centers, can overlap to varying degrees, and so on, that is, correlate with each other in a certain way. Again, you can carefully draw them on a piece of paper or on the screen of a gadget, but still they can only exist in consciousness. If you also set a formula by which the coordinates of the centers and the sizes of the radii are calculated according to a certain law, then taking into account the time for calculation, a system of disks should appear in consciousness that develops over time - a kind of universe. And this is not a loud name, because the elementary particles that make up our universe are no different from the same disks - they are structureless inside. This means that they cannot exist physically as the same disks, but they can exist in consciousness. From our experience, only that which carries information exists, because otherwise there is nothing to speak of at all. Information is a qualitative variable and therefore the universe, as a consequence, is a quantum system.

If elementary particles do not have an internal structure, then they cannot have dimensions and shapes, that is, they cannot be physical, independent of consciousness. Conversely, in order for them to exist physically, they must have structures inside, and those in turn must also have structures, and so on to infinity, and this is impossible, if only because at each level there would have to be a mass defect, which in sum would also become infinitely large. So the physical existence of elementary particles is not

possible. Thus, the physical universe cannot exist as such at all. Is there then at least something objective, independent of consciousness? Probably, the only objective reality independent of the subject is only mathematics. It is unchanging and absolute, and we do not develop it, but only discover it. However, mathematics in consciousness can become a system of objects that interact with each other and are real for consciousness itself.

By the way, this easily explains the well-known observer effect. It was usually believed that consciousness only reflects the surrounding world, but the observer effect nevertheless indicates that in reality only this reflection exists for the subject. The observer is definitely a conscious subject. Where does consciousness come from? Some time ago, people did not know anything about elementary particles, but they still existed then, because the world has not changed since people discovered the existence of these particles. And the brain structures themselves consist of the same elementary particles that should already exist in some consciousness.

Here it would be worth turning to chaos, because a chaotic complex dissipative system is a processor that creates and processes information. In addition, the idea that the brain processes information precisely thanks to chaotic structures such as those that make up the midbrain also appeared in the 80s of the last century [15]. Of course, there is also mathematics that describes a complex chaotic dissipative system, and it is this mathematics that could be the reason for the emergence of consciousness. That is, mathematics generates an information process, and that in turn can become conscious in the sense that it is aware of itself as something self-existent.

Somewhere (sometime) in eternity, such an event would definitely have to happen. Such an information system would have no environment, because everything that could have connections with it would have become part of it, and what would not have would not exist for it. Therefore, the consciousness that would appear in such a case would be isolated. Surely many people in childhood asked questions like: "who am I?", "why am I me, and not someone else?", but such a primary consciousness that arose from chaos could seek the same or similar answers only within itself, and probably the best way to do this is to model a consciousness that could study the system

from the inside. To do this, it is necessary to create conditions for the evolution of structures capable of using the primary consciousness to a certain extent in their own interests. By studying themselves, they would also study it.

So our universe may be just such a simulation, designed for the evolution of consciousness and reason, as a tool for exploring itself. It may be a mathematical-informational model created in the primordial consciousness. Now, within the framework of the simulation hypothesis, it is fashionable to consider such modeling as a way for a more developed civilization to explore various aspects of its history or even have fun. But I believe that such attempts would be highly immoral and unworthy of reasonable beings, and could be justified only in the case of a consciousness that does not understand what it is and what it does [19]. This is exactly what the primordial consciousness could be, which has just emerged, has already realized itself as a subject, but has not yet become fully reasonable.

What we know about our universe allows us to assume that the model is probabilistic, that is, it consists of all possible trajectories of dynamics that are in superposition. But the collapse of this superposition is sometimes attributed to consciousness [22]. If indeed dissipative chaos is the basis of primary consciousness, then individual consciousness probably first appears together with chaotic structures in the brain of animals. Perhaps this is due to the "chaotic" black substance (substantia nigra) in the midbrain, which first appeared in vertebrates. Quantum processes in the microtubules of these structures can be means of information communication with primary consciousness due to such a phenomenon as quantum entanglement. Of course, this can only be a guess, but a certain correspondence between the structures of the universe and the brain still exists [21] and this may not be a coincidence.

In another way: Human consciousness imagines the universe and can imagine anything, for example, disks, as in the example above, or dreams, which are sometimes no less real for this consciousness than the universe, but at the same time have permissive physical properties. Because of this, each of us can even ask himself whether he is a person who sees in a dream that he is a butterfly, or that he is a butterfly who sees in a dream that he is a person. That is, consciousness is certainly broader than

the universe, but everyone can have their own dreams, and the universe is a common representation for everyone. This is exactly what unites everyone into a single system. From this we can also conclude that there is some kind of integral consciousness that imagines the universe, that is, models it, using certain mathematics for this.

Mathematics itself is ideal and general, but the information process is specific. It creates specific relationships, because information is impossible without "source-receiver" relationships. That is, the same mathematics can describe completely different information systems: for example, this can be attributed to such different processes as population dynamics and economic dynamics, where the mathematicians are very similar. And in general, this is not uncommon. At the same time, many sections of mathematics have no relationship to our universe, but they do exist, and we can discover them in our consciousness. But can mathematics be the basis of consciousness, generate it?

If there is a mathematics of dissipative chaos - and it does exist - then there is also its consequence - the information process. If such an information system is hierarchical and sufficiently complex, then it can become the basis for consciousness, its emergence and evolution. At a certain stage of the process, consciousness becomes aware of itself, and then tries to find out what it is. Of course, it is not human consciousness, because it did not arise in the conditions of the Earth. Therefore, in order to understand itself, it creates a simulation, models the universe, tuned to the evolution of structures capable at a certain stage of using the capabilities of primary consciousness for their own purposes.

Thus, for the world to exist, it is necessary and sufficient that there be a certain mathematics that describes the world and the consciousness in which this process takes place. The process, that is, time, is a consequence of dissipation. "Computer" time and time in the model itself are interconnected [11]. Therefore, it is this time that is the only real characteristic of the model, and its quite expected deceleration when simulating objects can easily explain not only the existence of gravity but also effects similar to dark energy and dark matter, if we consider a simulation expanding in 4-dimensional time, where its 3-dimensional outer boundary is equivalent to the "now" of our 3-

dimensional universe. Thus, mathematics is the basis of everything, information is its concrete implementation in the form of a system, and time, arising as a result of dissipation, or rather its slowing down, is the equivalent of energy.

I have already written before that no reasonable being would ever create a simulation out of ethical considerations [19], because then they would take on the burden of all the troubles and horrors of this simulated universe. Of course, out of compassion, and not out of fear of some mythical sins that do not exist, like the rest of the afterlife. A person simply makes a choice and acts, and the consequences of actions can be either positive or negative for him. As I wrote above, genes encourage us mainly to actions with negative consequences for us as individuals. In contrast, reason is the source of ethics and morality. So the primary consciousness, which we use to the extent of our heredity and acquired traits and knowledge, is the reason for our existence - existence beyond our desire. And perhaps this is what the primary consciousness was trying to apologize for. But one can accept a one-time martyr's extract on the cross out of solidarity and guilt, one can advise to give up desires in order to reduce the amount of suffering, but nothing can be fixed - one cannot painlessly return the universe, carelessly and irresponsibly, but, unfortunately, inevitably, called to life, back to non-existence. However, it is in our power to forgive and understand this young helplessness of the reason for our existence and try to help reduce its terrible consequences. At least, to engage in the development of our own mind.

Summary and conclusions.

Human intellect, controlled by genes, is aimed at solving the problem of their multiplication, while the mind, based on self-awareness, acts in favor of the individual. Thus natural evolution concerns only intellect and does not affect the dynamics of mind, which can only develop as a result of individual efforts, and this is a problem for progress. Information links in social organisms (for example, ants) lead to the emergence of supra organismic intellect, superior to individual one and capable of solving more complex problems [8]. At the same time, technical progress has provided effective means of communication (Internet, social networks). Will this not lead (if it has not already led) to a similar integration of intellects in the human community with

unpredictable consequences? At the same time, consciousness is fundamentally different and can be a consequence of an information process based on the mathematics of a complex hierarchical dissipative system. In this case, consciousness can be primary and much wider than our universe, and the universe is the result of a simulation for the purpose of self-knowledge. Thus, in a person, two different, in many ways opposite worlds probably meet, and this is not an allegory or mysticism.

References.

1. Aktas M. (2024). The rise of populist radical right parties in Europe. International Sociology, vol. 39(6), pp. 591-605 https://doi.org/10.1177/02685809241297547

2. Axelrod R. (1984). The Evolution of Cooperation. New York: Basic Books. https://websites.umich.edu/~axe/Axelrod_Evol_of_Coop_excerpts.pdf

3. Bouchard Jr. T.J. (2013). The Wilson Effect: The Increase in Heritability of IQ With Age. Twin Research and Human Genetics, vol. 16, pp. 923-930 DOI:10.1017/thg.2013.54

4. Brüne M, Juckel G, Enzi B (2013) 'An Eye for an Eye'? Neural Correlates of Retribution and Forgiveness. PLoS ONE, vol. 8, e73519. https://doi.org/10.1371/journal.pone.0073519

5. Casanova J-L., Abel L. (2013). The Genetic Theory of Infectious Diseases: A Brief History and Selected Illustrations. Annual Review of Genomics and Human Genetics, vol. 14, pp. 215 — 243 https://doi.org/10.1146/annurev-genom-091212-153448

6. Dawkins R. (1976). The Selfish Gene. Oxford University Press. https://books.google.com.ua/books?id=OirfBgAAQBAJ

7. Doroshenko L. (2022). Populists and Social Media Campaigning in Ukraine: The Election of Volodymyr Zelensky. In: Taras D, Davis R (eds) Electoral Campaigns, Media, and the New World of Digital Politics, pp. 221-243 https://www.jstor.org/stable/10.3998/mpub.12013603.14

8. Dreyer T., Haluts A., Korman A., Gov N., Fonio E., Feinerman O. (2025).

Comparing cooperative geometric puzzle solving in ants versus humans. Proceedings of the National Academy of Sciences — PNAS, vol. 122(1). Article e2414274121. https://doi.org/10.1073/pnas.2414274121

9. Frankham R. (1995). Effective population size/adult population size ratios in wildlife: a review. Genetical Research, vol. 66(2), pp. 95-107 DOI:10.1017/S0016672300034455

10. Garcia J.R., MacKillop J., Aller E.L., Merriwether A.M., Wilson D.S., Lum J.K. (2010). Associations between Dopamine D4 Receptor Gene Variation with Both Infidelity and Sexual Promiscuity. PLoS ONE, vol. 5(11), e14162. https://doi.org/10.1371/journal.pone.0014162

11. Kumar, R. (2021). Mathematical developments in the simulation hypothesis. Advances in Computers and Electronics, vol. *2*(1), pp, 8-9 https://doi.org/10.25082/ACE.2021.01.001

12. Loewen P.J., Dawes C.T., Mazar, N., Johannesson M., Koellinger P., Magnusson P.K. (2013). The heritability of moral standards for everyday dishonesty. Journal of Economic Behavior & Organization, vol. 93, pp. 363–366 https://doi.org/10.1016/j.jebo.2013.05.001

13. Midgley M. (2009). "Hobbes's Leviathan, Part 3: What is selfishness?: How Richard Dawkins went further than Hobbes and ended up ludicrously wrong". The Guardian. https://www.theguardian.com/commentisfree/belief/2009/apr/20/religion-philosophy-hobbes-dawkins-selfishness

14. Miller G. (2001). The Mating Mind: How Sexual Choice Shaped the Evolution of Human Nature . Anchor Books , N.Y. https://ontherapyaspse.wordpress.com/wp-content/uploads/2012/04/geoffrey-miller-the-mating-mind.pdf

15. Nicolis J. S. (1986). Dynamics of Hierarchical Systems: An Evolutionary Approach. Springer. DOI: 10.1007/978-3-642-69692-3

16. OECD. (2024). Do Adults Have the Skills They Need to Thrive in a Changing

World?: Survey of Adult Skills 2023, OECD Skills Studies, OECD Publishing, Paris https://doi.org/10.1787/b263dc5d-en

17. Piraino S., Boero F., Aeschbach B., Schmid V. (1996). Reversing the life cycle: medusae transforming into polyps and cell transdifferentiation in Turritopsis nutricula (Cnidaria, Hydrozoa). The Biological Bulletin, vol. 190 (3), pp. 302–312 https://doi.org/10.2307/1543022

18. Sapolsky R.M. (2023). Determined: A Science of Life Without Free Will, Penguin Press. https://ndpr.nd.edu/reviews/determined-a-science-of-life-without-free-will/

19. Simchuk A. (2024). Simulation hypothesis: who launched the universe? European Science, vol. 5(sge32-05), pp. 80–92. https://doi.org/10.30890/2709-2313.2024-32-00-037

20. Sithole N. (2025). “What Do the US Election Results Tell Us about the Global Trajectory of Populism?” European Center for Populism Studies (ECPS). January 8, 2025. https://doi.org/10.55271/rp0093

21. Vazza F., Feletti A. (2020). The Quantitative Comparison Between the Neuronal Network and the Cosmic Web. Frontiers in Physics, vol. 8, 525731 https://doi.org/10.3389/fphy.2020.525731

22. Wigner E.P. (1995). Remarks on the Mind-Body Question. In: Mehra, J. (eds) Philosophical Reflections and Syntheses. The Collected Works of Eugene Paul Wigner, vol B / 6. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-78374-6_20

Article sent: 13.08.2025