Introduction

Recently, the simulation hypothesis has attracted increasing attention and interest, although its origins can be traced back to Plato's famous ideas about shadows on cave walls. In the middle of the last century, Polish science fiction writer and philosopher Stanislaw Lem described the idea of simulation in his story about the crazy Professor Corcoran. At the same time, serious physicist John Archibald Wheeler wrote a book "It from bits", in which he substantiates the thesis that the physical world is based on bits of information (Wheeler, 1989). Now the main idea in the simulation hypothesis is the assumption that in the process of technological progress, developed civilizations are able to simulate universes due to the rapid development of computer technology. In such a situation, there is a very high probability that we are living in a computer simulation (Virk, 2019). The only question is: will advanced civilizations - if they exist - really want to create such simulations and are there, in principle, other candidates for this role? In this essay I would like to consider these questions in the most general terms. Much of this is of course speculation at this point, but these ideas can be developed and tested.

8.1. Information as the main player

Simulation is an information process, and information is one of three types of system-forming relations. The elements of a system interact with each other, and in the most general case, exchange only matter, energy, and information. The universe can be considered a system that includes the rest of the hierarchy of various systems that form all the diversity of our world. Thus, everything in the universe can be reduced to three fundamental categories - matter, energy, and information. There are many

[8]**Authors:** *Simchuk Andriy Pavlovich*

definitions for each of these categories, but since they are fundamental, the essence and function of each can only be understood in relation to the other two. Intuitively, matter can be defined as a carrier of energy and information, since both energy and information are immaterial and cannot exist without a carrier. Substance and field are usually defined as matter, but both also have energy and information, that is, they contain these categories in addition to the material basis. We know that energy and information can be taken from a material carrier and transferred to another. If we can remove some of them, then we must admit that we can remove everything. So what remains? - It is impossible to know, since there is no more accessible information.

That about which it is impossible to obtain any information does not exist in our world. But information and energy require a carrier. Therefore, this carrier - if it exists - is not in our world. An analogy arises when a virtual space filled with objects is realized on a computer. In this case, everything happens in the processor, where the information is processed in accordance with the programs. The processor itself is outside the world that it simulates, but at the same time serves as a carrier of energy and information for it. The nature of the processor does not matter, but for the simulation it appears to be simultaneously present nowhere and everywhere, since it processes all points of the simulation space and is therefore incognito present at each point as a necessary carrier. In this case, for the processor, all objects of the simulation are in the same place, and this can be confirmed by the existence of quantum entanglement.

Energy is the ability to do work or the quantitative characteristic of motion in a broad sense, and information is a certain order in which this motion occurs, it determines whether communication is possible or not. Only information from the three categories implies the presence of a source and a receiver of information. This means that the elements will interact only if there is a certain correspondence between them. In reality, we deal with energy and information in any interaction and know nothing about their carrier. Therefore, we call matter a complex of two immaterial categories, suspecting only that something is hidden behind them. In any case, the spin was recently separated from the particle in an experiment (Aharonov *et al*., 2023)

confirming that the particle is probably not a true material carrier.

Thus, we must accept the principle of correspondence, which allows participation. Any interaction is possible only if there are similar qualities that allow objects to exchange relevant information. You can shout something to the deaf and dumb as much as you like, but they will not hear anything, because they do not have the appropriate instruments for this. There is energy, but no information can pass through, and this prohibits interaction. If we imagine a world where individuals can communicate only through sound, and some of them are deaf-mute, then the deaf-mute individuals will be excluded from this world. Of course, one might think that they will be united by a common space...

It is natural for humans to imagine a three-dimensional space, and if the theory requires more dimensions, then, of course, they must be curved and closed. But, for example, an amoeba lives by taxis, namely gradients, when some variable (salt concentration, for example, or light intensity) increases in one direction from this amoeba and decreases in the opposite direction, and it reacts to this gradient by moving, that is, it lives in a one-dimensional space. This protozoa has no "concept" of three-dimensional space and does not "know" anything about its existence. Perhaps, like the amoeba, we cannot imagine that space can have more than three full dimensions.

In the case of a simulation, space is virtual and it is simpler and more logical to consider it a derivative of the interaction and not vice versa. Ideas about the secondary nature of space have already been expressed (Swingle, 2018). Interacting particles, exchanging information about their coordinates, form each other's "representation" of the corresponding space. Fundamental interactions are different from each other and therefore should create different spaces. The only quality we can attribute to space (understanding that it is virtual) is its dimensionality. Therefore, different interactions should apparently generate spaces of different dimensions. The strong interaction could be considered almost one-dimensional, since the gluon field is compressed into a tube connecting quarks or nucleons with each other. The electromagnetic wave is transverse in three-dimensional space, and perhaps this interaction creates a two-dimensional space, and the gravitational interaction can form a three-dimensional space.

If we imagine the birth of a four-dimensional space from a singularity and take this point as the origin, then the distance from the center can be considered the time that has passed since the Big Bang, where the future is outside in all directions. The three-dimensional universe should then expand with increasing time (distance from the origin). Perhaps in such a model, gravity can only be explained by the known fact of time dilation depending on mass (energy): the higher the mass (energy) density, the more time it takes for a processor to obtain the results of all possible calculations. As a consequence, masses should curve their trajectories in four-dimensional time towards each other. In such a model, empty spaces in the Universe should obviously expand faster than those with clumps of mass, and this could explain the problems with the Hubble constant (NASA Hubble Mission Team, 2019). And black holes are not tunnels to other universes, but wells into the past. In addition, the problem of the large size of ancient galaxies (Glazebrook *et al*., 2024) may be related to the fact that time is counted from the very beginning in a straight line, and the light from these galaxies comes to us in a spiral segment. The universe described here can be schematically represented as a tetragonal pyramid, where the square base with four corners symbolizes four-dimensional time, its volume represents three-dimensional gravity, flat faces represent two-dimensional electroweak force, and the edges look like one-dimensional strong force. The birth of such a world is directed from the base to the top, and evolution, conversely, from the top to the base. The "perception" of the amoeba slowly crawls along the edges of the pyramid, and human consciousness lives inside its volume.

The system described appears hierarchical. Usually, the hierarchy of space dimensionality is considered starting from 0 (a point). Spaces with higher dimensions are formed by a series of movements in perpendicular directions: the movement of a point forms a 1-dimensional line; its movement forms a 2-dimensional plane; the movement of a plane creates a 3-dimensional volume. However, the reverse sequence seems more natural, if only because in the hierarchy the transition to each higher level is accompanied by a reduction in the degrees of freedom (Nicolis, 1986, p. 1). This may also be indicated by the growth of energy/mass in the series from neutrinos through leptons to baryons. Three-dimensional interaction is folded into two-

dimensional, and then into one-dimensional, and each time this is associated with an increase in energy. In such a hierarchy, any events with leptons (2-dimensional level), for example, should be regularly accompanied by events on the 3-dimensional level (neutrinos), and events with baryons should generate consequences both on the 2-dimensional level (leptons) and on the 3-dimensional level (neutrinos). Of course, all this is just speculation but some ideas can be tested.

8.2. Mind and civilization

Those who talk about the simulation hypothesis often mean that our universe was created by some other advanced civilization (Virk, 2019). Perhaps so, but this does not solve the problem. Because this civilization can be simulated by other civilizations, but this cannot continue indefinitely. There must be a first civilization somewhere. So who simulated the universe? I do not think that a more advanced, namely reasonable, civilization could or even intended to do so. Why? The concept of civilization is very vague, and based on existing ideas, a population of ants can be considered a civilization: they build complex engineering structures, herd and protect aphids, grow mushrooms in special rooms, and even arrange battles (Weber, 1966). Yes, they are definitely not reasonable and their behavior is written in genes, but human behavior and intelligence (I use the term in the text as the ability to solve problems) are also largely determined by genes (Bouchard Jr., 2013).

The concept of reason is broader than intelligence, but its definition is also vague. Its mechanisms are not yet understood, but we can infer it from its results. I consider the mind as a means by which a person is aware of the consequences of his actions and on this basis chooses those that increase this ability or, at least, do not decrease it. Part of this definition can be attributed to free will. Freedom itself can be considered as the ability to act spontaneously. Will is always vectorized, and free will can be considered a conscious choice from existing possibilities. Mind differs from free will only in that the will can be directed at any result, even a negative one, such as murder, while

rational choice is always aimed at increasing rationality, namely, at continuing reason, improving the environment (knowledge, technology, efficiency, *etc.*). After all, understanding the consequences of its actions, the mind will not harm itself. There is no evil mind - this is an oxymoron. Only the will can be evil. Any action can be analyzed from the point of view of this criterion and thus choose the best of all possible actions. Reason seems to limit freedom. But this is only the first impression. Yes, indeed, of all the possible options, few are reasonable, and although most of them are unreasonable decisions – and this majority gives a feeling of freedom – but in the end they will lead to a dead end, from which there will be no acceptable way out at all. It is clear that rationality itself is relative, since it depends on the amount and correctness of accumulated knowledge. Therefore, without knowledge there can be neither free will (after all, even murder requires knowledge) nor reason. I think that civilization is a way of life for reasonable individuals.

All biology obeys, to put it simply, one single principle written in the genes: "You must reproduce better, faster and more than your neighbor." To reproduce more than your neighbor, you need to eat more other organisms than your neighbor, and to do this you need to kill more of them than your neighbor, and, if possible, remove the neighbor himself. Therefore, all biology is the continuous eating of one by another and continuous reproduction. Eating causes suffering, and reproduction requires death. Fear, torment and death permeate the biosphere. Why then, when you come, for example, to a clearing on the shore of a beautiful lake, do you warm yourself sweetly and relax peacefully? The animal nature whispers to you that there are no organisms around that are dangerous to you, they are present to others and constantly feed on them around you, they eat anything and everything that can be eaten. The entire surrounding space is filled with crying, suffering and torment that is silent to your ear. But here nothing threatens you, and your psyche, recorded in your biological part, helpfully gives you peace of mind, filling your blood with narcotic biochemistry. If not for this, your psyche would not have survived this vast ocean of fear and torment. Where else could hell be if not here? People do not notice this, because they evolved in this environment. This can only be understood by the mind.

I have already cited ant populations as an example of imitation of civilization, but this is a special case, although not in our favor. Any ecologist knows that each population completely fills its ecological niche. If the niche grows, then the number also increases, and vice versa. Ants, for example, by growing mushrooms, increase the capacity of their niche. That is, technology allows for the expansion of a niche's capacity. This is exactly what happened to humanity. However, can population growth in response to niche expansion be a conscious choice of sages? For what purpose? There is another aspect that should be taken into account. Available resources and energy entering an ecosystem are always limited, and the expansion of one niche is only possible at the expense of other niches, other organisms. This will certainly lead to a simplification of the ecosystem and a decrease in its sustainability. The purely biological reaction of humanity in response to the technological expansion of the niche, of course, led it to one of the dead ends where reasonable civilizations do not go.

Against this background, one can see how absurd the idea is that civilizations should leave gigantic, noticeable traces in the universe. How do you have to hate your own, albeit biological, home, your cradle, in order to destroy it all, and use all the material of the system in order to build, as some think, the pinnacle of the imagination of "civilization," the so-called Dyson Sphere? Is it worth destroying everyone around in order to maximize your niche and multiply uncontrollably? For what matter? I am absolutely sure that no civilization will ever do this. Because the Dyson Sphere is the ultimate dream of a population, not a civilization. This is exactly what ants would do if someone gives them the right technology.

Biological populations are always regulated by feedback, for example, predators, diseases, etc. Lemmings at the end of a breeding season become sterile due to stress and drown *en masse* in the ocean. I am afraid that similar feedback may again be a sharp contradiction between the level of our technology and the masses. Growing prosperity frees up time and facilitates the involvement of the masses in politics, and at the same time the spread of social networks allows any adventurers to influence the mass preferences and set dubious goals.

There are many different systems of government, however, creativity, and

therefore development, is possible only where there is freedom. Therefore, totalitarian societies, unlike democratic ones, do not evolve, but most often, on the contrary, degrade. Totalitarian societies are a return to the most conservative, essentially animal state, where alphas control everyone. However, the disadvantage of democracy is that the majority that elects is always incompetent. And elections usually resemble a game of roulette. That is why even democracy is impossible in a reasonable civilization. It cannot rely on the random choice of incompetent people simply because voting cannot find a rational solution to a problem. No one has ever chosen between the Theories of Ether and the Special Theory of Relativity by a majority vote. But any problem can be solved by the scientific method. Reason depends on accumulated knowledge. One person cannot know everything, but a rational person will help others to improve, expanding their overall competence. Rational individuals are able to independently assess their area of competence, make the right decision about participating or not participating in solving a problem, and therefore do not need control from others, including laws. This type of society can be called anarchy. You may think that anarchy can lead to chaos. This is true for pre-reasonable societies, but not for reasonable civilization.

Where are reasonable civilizations in the universe? Mind lies in the denial of the animal, reasonable people cannot normally relate to the biological way of life, knowing that this horror is constantly happening around. Therefore, reasonable civilizations, as soon as they get the opportunity to go into space, will never live on inhabited worlds! Inhabited, namely biological worlds, are universal bioreactors, where life must evolve to the doors of reason. And this is normal for biology. There is no other way to achieve reason except through suffering. But these worlds are not a place for reasonable people. If you have been high enough in the mountains or in high enough, cold latitudes, where there is a minimum of life, you will remember the feeling of inner purity that filled you. This is because there is less torment around. On uninhabited worlds, the pressure of torment is reduced to a minimum. Therefore, I am sure that this is where real reasonable civilizations live. The Kingdom of Reason is there, in space, where they live according to rationality, and therefore control their lives, their future and their

evolution, rationally changing their destinies and heredity in order to leave the biological food chains, get rid of diseases and suffering.

I am sure that reasonable civilizations are not represented by any of the giant galactic empires or federations that science fiction writers love to describe and traces of which our astronomers are looking for. Reasonable civilizations, I believe, are located in different places in space and are represented by a number of relatively small societies sufficient to maintain the level of civilizational development, and the connection between them allows them to develop as a common community. At the same time, they do not have special institutions of management, control and coercion. The development of technology shows a steady trend towards miniaturization of devices. For example, 3D printers allow for the production of a large number of different items in small quantities. The technology is approaching the ideal option for such civilizations. What's next?

Organic evolution is aimed at improving the qualities of the organism and its intelligence as a tool for achieving biological goals, not reason. Reason is a by-product of evolution. Its demands do not coincide with biological goals. Therefore, when reason arises, it does not develop further naturally. From the threshold of reason, evolution can only be artificial, conscious. The existing society does not create conditions for the mass evolution of reason. They are not among the goals of the market system, are not included in the programs of political parties or other public organizations. And reason can develop spontaneously only in the form of separate isolated cases, but this is not enough, since evolution of the mind can continue only through the development of appropriate technologies that can provide those needs, different from the usual ones. At the same time, the development of technologies while maintaining the status quo only deepens the contradiction between them and the mass people. How can the emergence of civilization occur? - For example, by creating bases on other uninhabited planets (if we still have time).

Thus, it is not the absence of civilizations in the universe that prevents the creation of a simulation. I am sure that they exist, and of course it is understandable why rational individuals would never conduct such experiments? Who would take upon themselves,

on their conscience, the entire volume of horror and torment that the simulation would bring to life? Or is there someone who considered the moral "costs" worth the goals set and launched the simulation? I think there is a candidate for such a role. This is dissipative chaos, which in complex systems becomes a processor that creates order itself and simultaneously processes information (Nicolis, 1986, pp. 2-3, 321-339). But why does the Processor need a simulation?

8.3. «God at the mirror»

If there is any chaotic complex dissipative process, then it will necessarily become a processor that creates order and processes information. If such a Processor is the author of our universe, then it is obvious that in the created world there can be nothing more complex than the Processor itself. If we already have self-consciousness, then we cannot deny it to the Processor itself. The fact that our world is characterized by conservation laws, for example, of energy, means that the Processor is an isolated system, when all connections and processes exist only inside. It is difficult to imagine how a completely isolated consciousness feels. When experiments on sensory deprivation were conducted, the subjects also experienced hallucinations (Grassian, 2023), but these people knew themselves before the experiment. What if consciousness needs to start from scratch? Such a closed consciousness, in order to know itself, must split within itself in order to reflect itself as in a mirror, but this mirror must be impartial. The only way to implement such a task would be to create a model in which individual structures evolve in such a way that at a certain stage of this evolution they are able to use the capabilities of the Processor for their own benefit. In this case, such structures will be able to study their universe, consciousness and mind, and therefore the Processor itself. To be impartial, such a model must be probabilistic.

If you play a computer game many times, the results will be different. But you can create a model of the game, where there will be all the options with different probabilities — this is the entire game from beginning to end in superposition. Such an

approach will allow you to get all possible results and maximum information.

Such a model of the universe, obviously, could solve the problems and give the Processor all the answers it needs. However, the question remains: why did it start the process of simulation in real time? After all, then the result of the simulation becomes unpredictable. I think because he was horrified by the result. This whole model turned out to be a monstrous "bag" of the suffering of death and the horror of biological evolution. Reproduction and devouring. The pre-rational state in evolution has become especially terrible, when they torture and kill not even to devour, but to achieve power or even just a sense of superiority or to satisfy complexes. And all this in many minor variations in superposition. I think the Processor launched the implementation in order to reduce everything to, albeit a terrible, one trajectory and thus reduce the amount of suffering to the possible minimum. Of course, the trajectory may not be optimal, but this already depends on us, since with the beginning of the implementation, free will appeared in the universe. Every day and every hour, making a choice of action, we choose one option from the possible ones and thus build a realized trajectory. Our choices also change the probabilities of future trajectories.

The implementation lies in the collapse of superpositions. Time arises where the present is a zone of superposition collapse that propagates at the speed of processing; the future is still in superposition, and the past is already collapsed into a single deterministic trajectory. Something similar about the spontaneous collapse of a superposition state has been recently described (Gaona-Reyes *et al,*. 2024). And since our consciousness lives in the present, we are dealing with quantum mechanics and classical determinism at the same time.

In the simulation, the brain itself cannot be a separate processor, a receptacle of the mind, simply because its structure is realized by the Processor, just like everything else in this world. Even if our universe was simulated by another, more advanced civilization, our mind in this case can still be realized in the processor and not somewhere else. The head of the NPC does not contain his intelligence — this is a property of the processor. The possible homology of the human brain and the structures of the surrounding world was suggested in the last century (Nicolis, 1986, pp. 358-

359), and recently a work was published on the similarity of the brain structure and the macrostructure of the Universe (Vazza & Feletti, 2020). And in the case of simulation, the scale does not matter, but the coincidence of the structures of the brain and the Universe is important. A possible mechanism of communication between the brain and the Processor could be the same microtubules that have demonstrated quantum effects in the brain and which are considered a possible source of consciousness (Adams & Petruccione, 2020). Quantum entanglement in this case could provide a connection between these different-scale structures, or perhaps it would be a consequence of this. In any case, such ideas could explain why microtubules in the brain are important for self-awareness and mind, and not the same structures in the liver, for example, or any other organ.

All this can be very convincing evidence that people have evolved to use the capabilities of the Universal Processor for their own purposes. And this could be tested by looking for individual correlations between different creative abilities and the coincidence of brain structures with the structure of the universe. In the simulation, our minds are more properties of the Processor and cannot help but leave their imprints in it. You can call them monads or souls, but brain death cannot be an argument, since both the brain and the mind are only digital constructs, "recorded" in the Processor. Here, the level of the mind, which determines its stability as a system, should be more important. Genes played their role in the evolution of the brain and this was reflected in the development of the mind, "recorded" in the Processor. This can create certain correspondences between these information structures, and then the individual evolution of the mind can be quite real. In addition, the Processor, as a mind, looks through the unique (due to genetic combinations) narrow human minds at the world it created and knows itself, but there is nothing mystical or otherworldly here.

Summary and conclusions.

In the simulation hypothesis, information interactions play the most important role and space is virtual and must be a function of these fundamental interactions, each of which must generate its own space with different dimensions. Mind can be identified by the ability to understand the consequences of actions and the choice of those that enhance this ability. The goals of mind and genes do not coincide, so the mind can evolve only through persistent artificial self-development. And for the same reason, reasonable civilizations do not live on planets with a biosphere. No reasonable civilization would dare to simulate our world, bringing to life the horror and suffering of biological evolution. Only a mind that is in a hopeless situation can decide to do this. Dissipative chaos in a complex hierarchical system, which processes information, can serve as a candidate for the role of the universe Processor. In conditions of complete isolation there is no alternative to simulating the evolutionary process, during which certain codes can evolve to a state when they can get the access to the Processor capabilities in their own interests, gaining self-awareness, free will and mind, participating in the process of self-identification of the system.