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Big Mismatch between the New Technology and the Old Mechanistic Viewpoint

By Kayoko AWAYA

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I. Introduction

Today we are definitely facing various global crises such as global warming, climate crisis, global environment problems, (accidental) nuclear war, and so on. We also know that almost all of these are human origin, and many research teams and organizations have raised these issues and the countermeasures. However the reality seems to be not getting better, rather getting worse. Why doesn't it work?

In fact, I warned that people's mechanistic way of thinking was accelerating these global crises on the book The Catastrophe (Awaya, 2007). But the mechanistic way of thinking (mechanism) is what has supported modern science and technology, and has gradually guaranteed success under the competition for the global supremacy. Therefore we can't let go of the idea (mechanism) easily, even though we know it is wrong depending on the case. To make matters worse, we couldn't find alternative way of thinking, though quantum mechanics— which should be the base of natural science in the micro world and also the new technology—clearly breaks the mechanism. Then leaders had no choice but to cling to past glories—in fact, K. Schwab confesses on The Fourth Industrial Revolution that he feels the lack of leadership and understanding for the change in each field (Schwab, 2016). And worst of all, the new technology which main part is controlled by the laws of quantum mechanics, is beginning to have global impact. Now technology itself could lead to the end of humanity. I wonder if the world bubble of intellect will burst someday.

Now, I want to point out clearly the mismatch between the new technology and the old way of thinking (mechanism). Here are a brief historical explanation of the mechanism, tragic cases caused by the mismatch and some suggestions to a new worldview. Of course, the mismatch is not the only cause of the global crises, but it is key point for us to know this mismatch so that we can explore new ways of thinking and living.

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II. Current Technology Caught in the Trap of Mechanism

Scientific revolution" was named by the 20th century historian H. Butterfield, who highly praised the activities of natural philosophers in Europe, especially in the 17th century. He called it a period that renewed the picture of the physical universe and the structure of human life itself. Thus this revolution was the true birth of the modern world and the modern spirit (Butterfield, 1957). This trend continued steadily and spread around the world until the 19th century.

The discovery of the laws governing all physical phenomena in the macro world, starting with Newtonian mechanics in the 17th century and ending with the completion of electromagnetism in the 19th century, has led to the unshakable palace of physics (classical physics). The underlying philosophy that supported it was the mechanistic view of nature since Descartes. The physical reality (particles, waves, fields, etc.) that appear in this view is independent of measurement and moves according to deterministic equations—Newton's equations of motion, Maxwell's equations of electromagnetic fields, etc. Therefore under certain conditions, their behaviors are predictable, i.e., they are controllable and usable entities in the real world. In this way, science and technology became inseparable and, especially with the Industrial Revolutions, one of the main driving forces of the world, under the powerful demands of the market and the military.

Here let's think about the term "mechanism" which is the keyword through this paper. Although it was a powerful ideology in giving birth to and advancing modern science, what is indicated by it is not always clear. So, I will list three characteristics of what I regard as mechanistic thinking (mechanism) which had contributed to the promotion of modern science up to the 19th century;

a) Objective Reality

The dualism of matter and mind (mind-body dualism) advocated by Descartes and Newton made it

possible to establish the idea of nature as an object of science (natural science) which is considered objective reality independent of our observations.

b) Causality

The behaviors of natural objects obey the laws of causality, each has a unique time evolution described by, e.g., Newton's equation of motion, Schroedinger equation, etc. In a sense, you can say that the main purpose of science is to find such laws.

c) 1+1=2 rule (The whole is the sum of the parts)

Descartes' Introduction to Methods in 1637, which had a great influence on the foundation of modern scientific methodology, lists four rules for the correct use of reason. Namely, the rule of clearness, the rule of analysis (division into elements), the rule of synthesis, and the rule of enumeration (complete enumeration and review of the whole). This methodology is sometimes called "factor reductionism" This is used not only in research, but also in a wide range of situations, such as the organization of processes in industrial settings. In fact, this is so familiar that we use it even unconsciously in our daily thinking. I'd like to express this as "1+1=2 rule", for the sake of simplicity and the image of arithmetic embodying typically this methodology. Of course, this effectiveness is guaranteed insofar as the whole is the sum of its parts.

All of the above ① to ③ have been exactly established in classical physics, and have strongly supported the development of modern science and technology.

However, in the 20th century, technological progress has enabled science to study the micro world of molecules, atoms, electrons, etc., which are the building blocks of macro matter. The results obtained in these experiments revealed a series of phenomena that could not be understood by classical physics. Therein has laid a serious philosophical problem that was not easy to solve. But the physicists managed to build a theory, quantum mechanics which is a physics about the micro world, around a quarter of the century. In the famous book THE PHILOSOPHY OF QUANTUM MECHANICS—The Interpretations of Quantum Mechanics in Historical Perspective—, M. Jammer said on the first page that Quantum mechanics went through a process of development almost the only one in the history of physics, namely, the form itself is prior to the interpretation (Jammer, 1974). Even now our interpretation is far from a complete one.

You can understand the difficulty of interpretation by checking that quantum mechanics doesn't obey the mechanism mentioned above, as follows:

1) In the micro world, the idea of objective reality, which is used in the sense that it does not depend on measurement, is not valid as it is. Because a micro object is so small that we can't measure it without disturbance in principle. While a macro object can be measured technically without disturbance, so we can regard it as an objective reality.
2) Of course, the Schroedinger equation obeys causality. But the Born probability rule, the other fundamental law of quantum mechanics, does not obey causality. In general, it can predict only the probability of obtaining same measurement value, not the value itself.
3) Quantum entanglement is a typical phenomenon which gives an example of $1+1\neq2$ rule. It occurs when a group of particles are generated, interact, or share spatial proximity in a way such that the quantum state of each particle of the group cannot be described independently of the state of the others, including when the particles are separated by a large distance.

Thus you can easily imagine how the foundations of physics were shaken from the ground up at early 20th century. In fact, A. Einstein believed in classical objective reality and continued to insist on the incompleteness of quantum mechanics. The fierce debate with N. Bohr who asserted the transformation of natural philosophy under the concept of complementarity (Bohr, 1949) led many scientists and philosophers to struggling to overcome this situation. This was truly challenge to the mechanistic view point of nature, which was the foundation of classical physics. Quantum mechanics should have originally taken on the task of (epistemologically) unifying the macro and micro worlds.

However, the current of the times has not allowed these issues to be fostered in earnest and the discussion of these issues has been confined to a single specialized field "the measurement problem of quantum mechanics". Although there have been some important developments in this field since then, they have not been strong enough to change the viewpoint of nature. Instead, it seems that the old mechanism has been rather reinforced under the pragmatic and positivist tendency.

For example, R. Feynman frankly said (1965);

> When it comes to quantum mechanics, no one really understands it. I think it is safe to say so. ...Please don't think such as 'How does it work that way?' You would get bogged down. It is a blind passage."

Thus, many physicists do not believe that unsolved problems lie at the foundation of quantum mechanics. And even though they are not bothered by such problems, there are mathematical prescriptions for individual problems which can be computed so that applications to individual technologies are also possible. Then we can't escape from the trap of mechanism!

Now we are facing a world of barbarism by the terrible mismatch that we pragmatically develop new technology which is obtained in the micro world, under the old mechanistic way of thinking which is obtained in the macro world. The first typical example is the nuclear development.

Let's see this below.

III. First Stop of Thinking—Nuclear Development

Why did they so easily move on to the technological development under the old idea without searching for a new view of nature? One thing we can say for sure is that World War II from 1939 to 1945—the most destructive conflict in human history—had a major impact. In particular, the Manhattan Project in the United States, the United Kingdom, and Canada, mobilized all their scientists and engineers to develop and build the atomic bombs.

The plan was successful, and the atomic bombs were manufactured and dropped on Hiroshima and Nagasaki on August in 1945. The bombs killed hundreds of thousands of people in total, and triggered the Cold War structure of postwar such as nuclear weapons development, nuclear testing competition and so on.

But the most important factor to our considerations here is that these bombs are completely different from conventional ones. Atomic nucleus is super micro object obeying quantum mechanical laws. But the atomic bomb (i.e., nuclear bomb) was made without knowing how to interpret the newborn quantum mechanics and therefore to interact with the micro world as a whole. They got the latest scientific knowledge that nuclear reactions were accompanied by huge releases of energy. More strictly speaking, an atomic fission releases enormous energy (E) by the mass defect(M) and the Einstein's formula ($E = MC^2$), where M = mass defect of the fission, C = light velocity. Because of the greatness of the value C^2, it brought about a huge success for the Allied Forces to take advantage of this fact for making atomic bombs. This is a typical mechanistic way of thinking. If the story ends here, there is nothing left to discuss for the present. However after WWII, we gradually have begun to notice that we have opened the door to an unbelievable world of radioactivity.

To see this, first of all, look at the pictures Figure 1. and 2. (NHK, 2006).

Figure 1: Right Hand of H. Ouchi on the 8th day After the Exposure (NHK, 2006)

Figure 2: The Same Hand on the 26th day After the Exposure (Ibid)

These are photographs of the right hand of Hisashi Ouchi (35 years old at the time), one of the three workers exposed to radiation in the criticality accident. It occurred at JCO's Tokai Works, a nuclear fuel fabrication facility in Tokai-mura, Ibaraki Prefecture on September 30, 1999 —located approximately 130 km north-northeast of Tokyo on the Pacific Ocean. Figure 1 shows his right hand on the 8th day after the exposure, which is just a little red and swollen. While Figure 2 on the 26th day shows loss of epidermis and reddish-black discoloration.

When I looked at them at first time they caught my heart, and they have never left me since then. If you feel nothing strange, you must lose your sense alive in a daily life. Because these pictures make an impression as if time was reversed. What we usually see is that, e.g., in the case of a normal burn, even though the skin get blistered, the basal cells of the epidermis divide to produce new cells, which gradually move to the surface and eventually replace the old ones resulting in the recovery of the skin. Why aren't these photographs put in the opposite position?

Figure 3 illustrates this phenomenon, which is a micrograph of chromosomes of the marrow cells in his iliac bone. It was taken on the 4th day after the exposure and the chromosomes have been broken into pieces and cannot be identified. This fact means that no new cells will be produced in the future. At the moment he was exposed to radiation, he lost the blueprint of his life. He died on the 83rd day—another victim died on the 211th day after the accident. Dr. Maekawa who treated them, said that the horror of radiation was beyond human comprehension and human life was truly fragile in front of such a devastating effect.

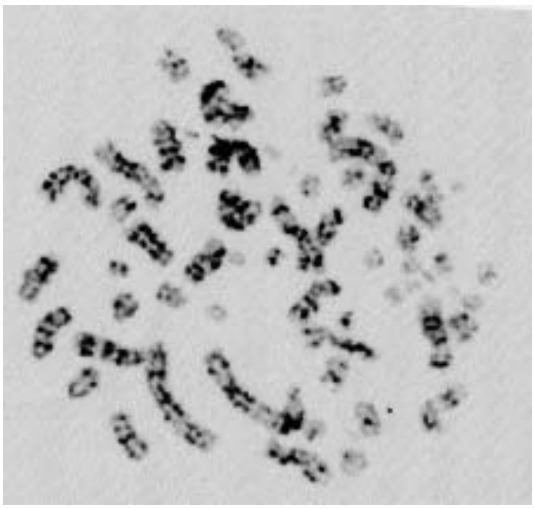

Figure 3: Micrograph of Chromosomes of H. Ouchi on the 4th day after the Exposure (Ibid)

In this accident, a fission chain reaction suddenly occurred during the processing of uranium fuel, reaching "criticality" and releasing a large amount of neutron radiation. The sodium (Na) in the body exposed to this radiation was converted into a radioactive substance called sodium-24. Ouchi said that he heard a sound like "pashi" and saw a blue light—the "Cherenkov light" that is emitted when a criticality is reached. His exposure dose was around 20 sieverts—though the amount of uranium that underwent nuclear fission in this accident was only 0.001g (for more details, see NHK, 2006).

What I want to address here is not the issue of inadequate safety measures by the company, etc.—although, of course, that is another issue which have to be taken up to a large extent. What I want to emphasize here is that nuclear development is a completely different "technology" in the history of mankind. I wonder if we can say it a kind of technology in the first place.

This is indicated by the physical characteristics of nuclear reactions themselves;

1) The world of life is run by chemical reactions among atoms and molecules, which basically leave nuclei unchanged. Therefore bringing about nuclear reactions into this world leads to a fundamental destruction of life.
2) This is evident from the fact too that the energy generated by nuclear reaction is hundreds of millions of times larger (per elemental reaction) than the one by chemical reactions. The main place of nuclear reactions is outer space (nuclear fusions in stellar interiors). On the surface of the earth, there are only a few radioactive isotopes such as natural uranium. The world average annual exposure of one person is 2.4 millisieverts. Life on the earth has originated by energetic chemical reactions under such a nuclear stability.
3) Another evidence comes from that nuclear reactions are basically accompanied by the generations of radioactive materials, whose radiations (α-, β-, γ-,

neutron-rays, etc.) easily penetrate into the cells of living organisms and destroy their DNA, because of their large energy. And the decays of these radioactive materials are completely governed by the probability law of quantum mechanics, and then it is impossible in principle for humans to control the decay itself. This is the source of the unsolvable conundrums that haunt nuclear power plants around the world such as the ever-increasing disposal of spent fuel and radioactive waste, the unpredictable terrorism and accidents, radioactive contamination and so on.

4) Radiation has neither color nor smell, and unless we use Geiger counters or other sophisticated instruments, we cannot make independent judgments about exposure to radiation and are left unprotected. In the case of the JCO accident, Ouchi and his colleagues left the area only after when the siren of the monitor alerted them about the presence of radiation. In other words, during the nearly 4 billion years of evolution of life on the earth, the sensory organs that perceive radiation were ultimately deemed unnecessary.
5) Radiation exposure destroys the human body from the inside. The principle is the same even in the case of low dose of radiation. In this sense, nuclear weapons and nuclear power are the same. That is, bringing nuclear development into the 4-billion-year-old world of life is in itself a completely unscientific act and an enormous reckless gamble—the exception is radiotherapy which is only a passive utilization. I hope you can feel this absurdity directly by the above Figures.

Thus, we can see that the characteristics of nuclear reactions can be summed up in two points: enormous energy and the generation of radioactivity. These are, with few exceptions, quantitatively and qualitatively incompatible with the living world here on the earth, where we live.

Without looking at this whole image—without a biological view point and without a perspective on how to understand and control the radiation that quantum mechanics governs—the atomic bomb was created simply because of the enormous amount of energy it could generate. Why? It is said that it was because of the emergency situation of war and the fear of being overtaken by the enemy, and because they wanted to end the war as soon as possible. However, after the war, was any effort made to clarify the whole image?

Looking at the nuclear proliferation and the nuclear development race that has continued from the postwar period to the present, and the development of nuclear power plant under the policy of "peaceful use of nuclear power" it seems clear that the perspective of the whole has been increasingly neglected, and we are moving forward with a narrow-minded mechanistic theory which is extremely dangerous for humanity as a whole.

"CRAZY APE" warned by A. Szent-Gyoegyi seems to be more relevant now (A. Szent-Gyoegyi, 1970). The atomic bomb was the first stop of thinking by the human.

IV. Accelerating Biotechnology Under Mechanistic Viewpoint

The discovery of DNA by J. D. Watson and F. Crick in 1953 was undoubtedly a powerful material stepping stone for the postwar biotechnology, especially the mechanistic viewpoint to life. DNA stands for Deoxyribo Nucleic Acid and is composed of a sequence of four types of bases represented by A (adenine), T (thymine), G (guanine), and C (cytosine) with a long double-helical string structure formed by complementary bonds A-T and G-C. DNA uses this sequence of bases to synthesize proteins, which are the building blocks of living organisms, and to transmit and express genetic information. It is amazingly simple that the structure and function of a living organism can be determined entirely (genetically) by the sequence of only four types of bases. Life became just a matter of chemistry, as J. D. Watson said (J. D. Watson et.al, 2003).

The next major step came in 1973 with the successful genetic modification (GM) experiments of H. Boyer and S. Cohen. At the same time, there raised voices of concern about biohazard. The National Academy of Sciences formed a committee to investigate this problem, and a year later, it compiled its findings in a letter to Science, later called "Moratorium Letter" which was signed by both Boyer and Cohen. It urged scientists around the world to voluntarily suspend all research on GM technology until the potential dangers of recombinant genes could be determined, or until appropriate measures could be found to prevent their spread. Then in 1975, 140 molecular biologists from around the world gathered in Asilomar, California, to discuss the dangers of GM experimentation for the first time (Asilomar Conference). One reporter named it as "Pandora's Box Conference" suggesting that perhaps molecular biologists were standing on the same cliff edge where atomic physicists stood on just before they created the atomic bomb. But this voluntary break did not last five years (Ibid.). W. Isaacson, who later wrote The Code Breaker, evaluated the Asilomar meeting as having led to the subsequent breakthrough in genetic engineering, but said that "Asilomar" came to be noted for what scientists did not discuss there. That is "the question of how far to go in designing and editing genes if the methods are found to be safe" (W. Isaacson, 2021).

Eventually, despite pros and cons, GM crops and foods gradually appeared on the world market.

However, these products—including hepatitis B vaccine etc.—are introduced into human bodies and do not directly manipulate DNA themselves in the human body's own cells. The first thing which came to my mind was a kind of fear about the collapse of the ecological order on the earth. Meanwhile, the international project by National Human Genome Research Institute and others had made progress in deciphering human genome—comprising about 3 billion pairs of base sequences—and declared done on

Science in 2003. Today, genetic information (DNA base sequences) can be automatically decoded by computer. Under the strong linkage of industry, military, and academia, biotechnology would be further accelerating.

The basis for the next major breakthrough in thinking came from the hypothesis of F. Crick et al. that RNA (Ribo Nucleic Acid) could self-replicate in the early history of life on the earth. J. Doudna and her colleagues focused on the study of RNA structure and function, when almost all other biochemists were preoccupied with DNA sequencing for the Human Genome Project. The Crisper Cass 9 that Doudna eventually arrived at with E. Charpentier is, simply put, the Cass 9 enzyme, which acts as a scissors, merging with a piece of RNA that leads to a targeted sequence of target DNA, breaks the double strand of DNA at the targeted location. We can even introduce a new favorable gene into the section from where the gene was cut. In fact, this is the strategy used by bacteria against virus (bacteriophage) in the oldest ongoing battle on the earth. After a new virus striked, the surviving bacteria take in part of that virus's DNA so that their descendants can be immune to it.

After winning the 2012 Nobel Prize, as the race to establish a crisper patent and genome-editing company was heating up, Doudna had a nightmare. It was Hitler with the face of a pig saying "I would love to know the uses and significance of this interesting technology you have developed". The aftermath of this horrible dream haunted her forever and soon convinced her that she should have held a conference similar to the Asilomar conference in 1975 (W. Isaacson, 2021). Then, in January 2015, the ethical issues were discussed in Napa, and in December, the first International Summit on Human Genome Editing was held in Washington. The conclusion was that some strict conditions should be met for genome editing of germ line, but the words such as "moratorium" or "ban" were not used. Most bioethicists were discouraged, while those involved in medical research saw it as a yellow light allowing "prudent progress" (Ibid). Three years later, however, in 2018, a designer baby—a fertilized egg in vitro using a technique of Crisper Cas9—was soon born in China, shocking the scientific community. Now, there is no brake anywhere, isn't it?

Thus, the molecular tools centered on Crisper Cas9, quickly became the leading genome editing technology studied and used around the world, because of their wide range of applications, efficiency, simplicity, and low cost. Already, genome editings of vegetables, live stocks, or fishes are advancing many times faster than before. GM and genome editing are both technologies based on mechanistic manipulation, literally "cutting and pasting genes as desired".

Why is this a problem? In fact, the order of life on the earth has been built historically on the dynamical stability of DNA brought from the ecological balance including mutations, horizontal gene transfers, species extinction, etc. I wonder if human artificial interventions such as careless genome editing would destroy the balance in the future. No one can deny this, because no one knows what will be the result of our disorderly artificial interventions into genes themselves. Considering the mechanistic manner of handling genome—at least without quantum mechanical considerations—I even more believe so.

Recently we were swallowed by the big wave of vaccination against the COVID-19 pandemic. I was very astonished by the global inoculation. Because the main vaccines are composed of the artificial mRNA or DNA genes corresponding to the spike protein of the COVID-19 virus, which are injected into human bodies. Some people don't call this vaccine but here I dare to call them artificial gene vaccine (AG vaccine). The main problem which I want to bring up here is not the too short development period (no clinical trial) nor the problem about its effect to prevent the infection.

The main issue here is that this AG vaccine is a completely different product from the conventional one. The genes (AG vaccines) injected into human's muscles, enter the bloodstreams and are sent to various cells. Then they diligently make spike proteins in the cells—so that these spikes act as antigens and induce immunity if it goes according to the script. Following the traditional method, you would be injected with spikes themselves as antigens. While in this case (AG vaccine), you are injected with genes—besides they are made artificially—which make spike in the various cells. Here, I'm not sure if these genes (AG vaccines) can be controlled mechanistically to the various responses in the various cellular environments. Furthermore the information is little known in the world, though this is clearly a "human experimentation" aganst the entire human race. Today at least, various symptoms after AG vaccinations are being reported all over the world, such as side effects including deaths, breakthrough infections, increase of excess death rate, etc.

In addition, at least we can say that in the case of DNA-type vaccines, they are incorporated into the human genome to make spikes, and these incorporated parts remain in the genome semi-permanently. While

mRNA-type can be also incorporated into the genome (by the reverse transcriptase) in some cases. If they are delivered to the germ cells, they will naturally affect the next generation. Moreover, since these effects do not necessarily appear as immediate side effects, it is difficult to identify. Then at the time the fatal defect will be discovered, it might be too late. Where does the easiness come from, that conducts such potentially dangerous human experimentation on the global scale? Another implication of this human experimentation—the results of which may be verified many years later—is that the overwhelming majority of the human population is willing to submit themselves, without question, to such artificial gene vaccinations. It can be seen as an experiment to show how far the collapse of human intellect has progressed, can't it?

V. Limitation of Mechanism in the 21st Century

In the 20th century, we are confronting a world where mechanism, the base of classical physics, dose not work as it is. The situation becomes a kind of chaotic one as we have already seen. The accelerating progress of computers and their support of AI (artificial intelligence) and biotechnologies are currently in the spotlight. The problem here is not about individual spectacular achievements of technologies, such as Crisper-cas9, genetic AI, etc., but rather the reality that these technologies are basically developed in an unregulated manner under the mechanistic viewpoint.

After Sapiens, well known as a million seller, Y. N. Harari wrote its sequel HOMO DEUS, where he predicted that in the 21st century humanity would acquire God-like powers of creation and destruction, upgrading Homo sapiens to Homo deus. He also attempts to show that scientific research and technological developments would be advancing much faster than most people understand. For example, those of us who willingly entrust our judgments to the convenience of AI, which analyzes the big data that is constantly being accumulated, are already being absorbed by the "data supremacy" and are in the process of annihilating ourselves (Harari, 2015).

However, I am skeptical about the future of technology and human envisioned by Harari. By his idea, we could manipulate our organs, emotions and intelligence in countless ways.

The paths that could be taken in upgrading man to godhood include bioengineering, cyborg engineering and engineering to create a "non-organic creature", which is a "living thing" whose neural network is replaced by intelligent software that is free from the constraints of organic chemistry. They move around in both the virtual and real worlds, and escape into the inorganic realm of outer space. What is happening to the human mind. Harari says that a new kind of intelligence without consciousness is now being developed and the unconscious algorithms will soon outperform human consciousness in pattern recognition—at least for the military and corporations, intelligence is essential, but consciousness and subjective experience are not.

He continues that once biologists conclude that living things are algorithms, they would tear down the wall between living and nonliving things. Namely, they would transform the computer revolution from a purely mechanical one into a biological upheaval, the reality is a mesh of biochemical algorism and electronic algorithms with no clear boundaries or individual centers. He says that the most interesting new religion is "data supremacy" which worships neither God nor man, but data, and everything in the universe is made up of streams of data. Data supremacy thus breaks down the barriers separating animals and machines—like Descartes' idea!—pointing out that exact the same mathematical laws apply to biochemical and electronic algorithms. Eventually, the electronics algorithm will decipher and surpass the biochemical one.

I've come this far and I've come to believe that Harari's vision is a continuation of Descartes' mechanism that led to the modern era. We can see that the underlying mechanism of Harari's "data-supremacy" is a development form of Descartes' one. Both see animal and human body as no different from machines and do not recognize the uniqueness of life. Descartes' mind-body dualism corresponds to the split between consciousness and intelligence in Harari's vision. The difference is that in the mind-body dualism, the value of mind is higher than the body, while in Harari's future, consciousness seems to be erased. If the mind-body dualism was originally intended to make natural science (body) independent of religion (spirit), the elimination of the spirit (consciousness) is common and rather thorough. Harari says that this development have progressed along with the development of computers, eventually all material events would be controlled by highly intelligent algorithms without consciousness.

Now are we already being absorbed by what Harari calls data-supremacy, or in the process of annihilating ourselves? He asked "Can someone please step on the brakes?" and also answered "we cannot step on the brake, because no one knows where the brake is in the first place". But don't be deceived. He is only a kind of epitome of mechanist in the 21st century. The new version is dressed in "algorithm", "data-supremacy", etc. Regardless of algorithm or big data, these alone don't make any sense and there must be needed at least two persons—two consciousness of sender and receiver. Furthermore we already know at least one brake. That is to establish just the new worldview solving the problem which underlies quantum

mechanics and epistemologically unifying the macro and micro worlds. Because the current new technologies are considerably based on the micro world (e.g., semiconductor), while the perspective treating them is still mechanism—with new dresses. This mismatch is exactly the historical barbarity against humanity.

VI. Some Comments for Getting new Worldview

a) The Meaning of Ψ

The essence of quantum mechanics is sometimes symbolically shown by Ψ—strictly speaking, state Ψ in the Hilbert space—which is commonly used as describing the state of an object. Ψ is defined as probabilistically indicating the propensity of getting a measuring value when we want to measure some physical quantity and set the appropriate instrument on the measuring stage. Namely Ψ is not defined as describing the object alone, but also the outer world participatio—i.e., the observer, the instrument or the environment— is presupposed from the beginning, even though we neglect them in our minds like in the classical (macro) case. Then the paradox of "particle or wave" is naturally eliminated in the simple question of which you want to measure about "particle nature or wave nature". I would say that this is just a viewpoint revolution in a literal sense. That is, at least for a micro object—strictly speaking, a quantum object—we treat it essentially accompanied by the surroundings by using Ψ. According to T. Takabayashi (as I discuss later), the probabilistic character of Ψ comes from our limitation in principle to ne control the outer world—this controllability is just the condition for the modern science experiment (the objective reality). You can easily see this uncontrollability by looking at that you never know just the time when a radioisotope will decay and attack your gene.

b) Viewpoint Revolution

Turning to the environmental issues, we have gradually noticed about it especially after WWⅡ, but we have not basically changed the way of thinking, although the global environment is heading into a dangerous situation. Why can't we change our idea. One of the reasons is that we are flavored with mechanism having high affinity with individualism, which thinks the society as only the sum of many individuals and tends to consider the environment issue as extra things not inevitable one. If we realize the viewpoint guided by quantum mechanics, the most universal theory for nature, at least you would overcome mechanism. We have to rethink about science and technology from a total perspective including human lives. Only by doing so, the Science Revolution would be completed (Awaya, 2019-2021).

In any case, we are just on the way to establishing the new worldview, the idea of "the epistemological complementarity between the macro and micro worlds" introduced before is also one of the attempts (Awaya, 2005, 2023).

c) Physical Theory of Measurement

Quantum mechanics is the theory for not only the micro world, but also including the relation between macro and micro worlds through the measuring process. The study of measuring process (the measurement problem of quantum mechanics) led a "physical theory of measurement" by T. Takabayashi which is the most reasonable so far (Takabayashi, 2001). I introduced it briefly in the previous paper (Awaya, 2023).

The essence is as follows:

When we measure an object with state vector Ψ, the appropriate macro detector is essential. Detector is a system which causes a micro-macro transition by a huge number N of freedom in the quantum mechanical description. About the interaction between the detector and the object by quantum mechanics (Schroedinger time development), he considers the detector as a set of small detectors—he names them "cell"s—and writes a "non-neutral (exited) state" of n-th cell as Φ_n which is one of the states with many degenerate quantum numbers corresponding to n-th subspace (secter). Of course the detector must correspond to the spectral decomposition of the state vector $\Psi=\Sigma c_n\Psi_n$. Then the interaction between the object and the detector with the neutral state Φ_0 is $\Psi(t_1)X\Phi_0(t_1) = \Sigma c_n\Psi_n(t_1)X\Phi_0(t_1) \rightarrow$ [Schroedinger time development]

$$\rightarrow \Sigma c\ \Psi(t_2)X\Phi(t_2),$$

Where Σ is regarded as the direct sum, and the interference term disappears for $N\rightarrow\infty$ at t_2. If we use the density matrix W of the total system at t_2,

$$W=\Sigma\Sigma c_n c^*_m \mid \Psi_n><\Psi_m \mid X \mid \Phi_n><\Phi_m \mid$$
$$\sim \Sigma|c_n|^2 \mid \Psi_n><\Psi_n \mid X \mid \Phi_n><\Phi_n \mid \quad \text{for } N\rightarrow\infty$$

where X is direct product, t_1 (t_2) is the first (last) time of the measurement and $\{\Phi_n\}$ is a set of the distinguished macro states because of the function as a detector.

Thus we got physically the final state (the reduction of the state) by the Schoroedinger time development. Then, e.g., DNA is constantly being measured by the surrounding intracellular environment so that maintains 3D structure with mutations.

d) Quantm Biology by J.Al-Khalili and J.McFadden

J. Al-Khalili and J. Mc Fadden were deeply impressed by the book WHAT IS LIFE? written by E. Schroedinger (Schroedinger, 1944) and have developed quantum biology. They remember the situation of

molecular biology, that had rapidly developed after the discovery of DNA, and almost all scientists did not rely on quantum phenomena and forgot the Schroedinger's bold claim, some even showing open hostility to the idea that quantum mechanics was needed to explain life (Al-Khalili & McFadden, 2014).

They are trying to explain many important unsolved biological phenomena by quantum mechanics, especially unfamiliar quantum behaviors such as discrete energy levels, wave-particle duality, quantum coherence, quantum tunnel effect, quantum entanglement, quantum superposition, etc. Some of their basic ideas seem as follows: Living things are sailing the edge between the quantum and classical worlds and take root in the bedrock of the quantum world. Cell is ship with enough elongated keel to pierce up to the quantum world. Death may be to lose the power opposing thermodynamical random force (see for more detail, Ibid).

e) AI is just a Machine

Here I think, it is very important to notice that machines are not living things and cannot be transformed into living things in the future. You can understand this just by thinking of that the currently living organisms are all the result of 40billion years of the earth's ecosystem history, and also that no living organisms have appeared since the period of the first life birth on the earth. Furthermore, no matter how many improvements are made, AI never be able to have consciousness. Because the consciousness itself also emerges under the same historical root. If you can't understand this, you would say easily, e.g., "battle with computer" etc., such as the movie "The Matrix". The problem lies in humans who tend to feel machines as living things just like you feel ghosts are scary, even though you know that ghosts don't exist.

To clarify this too, I would like to strongly recommend quantum mechanical research of human brain.

VII. Conclusion

There are so many things for us to sustainably live in the 21st century. Considering the mismatch, we can organize the problem and the task as follows.

1. We should notice the mismatch between the new technology and the old mechanistic viewpoint.
2. Every nuclear development must be prohibited except for radiotherapy.
3. Biotechnology have to be worked with awareness of the limitation of the mechanistic way of thinking.
4. We must build an international registration system to which any developers and companies register new genome editing organisms including GM products before being put on the market.
5. We must conduct an international search about the side effects after AG vaccinations of COVID-19 for decades to come—it will become very valuable data for future biotechnology unless there are any fabrications or concealments.
6. It is eagerly desired to develop quantum biology so that we can obtain a rich picture of the quantum world.
7. It is very exciting to research brain with quantum theory, especially to compare with the neural network and to explore the emergence of consciousness.
8. ponj
9. We have to establish a new worldview which is an (epistemological) unification of the macro and micro worlds, and is the minimum one that whole human race can scientifically share.

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