

Author Jinkyung Lee

Source *NJP Reader #7 Coevolution: Cybernetics to Posthuman*, pp.279-307

Publisher Nam June Paik Art Center, Yongin

Cybernetics and Cyborg: Some Philosophical Questions

Colophon

Editor Sooyoung Lee

Translation Seong Eun Kim, Eunjoo Sung,
Sangeun Lee, Sohye Lee,
Hyungju Woo, Semin Choi

Designer Ahju Kwon

Published on 27 December 2017

CYBERNETICS AND
CYBORG: SOME
PHILOSOPHICAL
QUESTIONS

JINKYUNG LEE

Jinkyung Lee

Professor of Seoul National University of Science and Technology

His original name is Taiho Park. When he published *Social Structure Theory and the Methodology of Social Study and Science* in 1987, his pen name Jinkyung Lee became more famous than his original name. He entered university when the ghosts of the citizens of Kwangju were still hovering in the air, which possessed and caused him to spend his university days in the street instead of classrooms. As a result, he became a Leninist, wanting to build an 'organization of professional revolutionists.' In 1990 and 91, thanks to the sudden collapse of socialism that struck upon the socialist in prison, he saw the abyss. Since then, he has been living, thinking and writing, in pursuit of the answers to the questions that faced him at the time. The questions began from his doubt about socialism and 'modernity,' developed into an exploration of the nature of a community, and is now transforming into a deep thinking about ontology. While *Marxism and Modernity and The Birth of Modern Residential Space* deals with the first questions, *Communism* expresses the critical transition from the exploration of the nature of a community

to ontology. *Writing Ontology of the Rebellious* was his own effort to describe his ontological thinking. Marx, Foucault and Deleuze/Guatari provided important sources for his explorative mind. Their ideas, however, must have evolved into different forms mingled with his questions. Deleuze/Guatari's Nomadism, which is a lecture note on *A Thousand Plateaux*, *Marx in Capital beyond Capital* and *Marxism in the Future* are the examples. Recently, he wrote *A Philosophy Class for Life*, which contains his belief in 'ethics of beyond'; *Exceptional Classics*, which is a collection of exceptional analysis of Korean classic literature; and *Philosophizing Buddhism*, which reinterprets Buddhist philosophy as modern philosophy. Now he is in a transitive phase from 'the ontology of the existing' toward 'the ontology of existence,' looking for his way again. As an effort to do so, he is preparing a book about Sijong Kim's poetry and ideas. He is an active member of 'Suyunomo 104,' an intellectual community, and professor at Seoul National University of Science and Technology.

1. Contemporary Music and Video Art

Nam June Paik is a world-renowned artist, also known as the founder of video art. But I find that he has not been properly evaluated yet. For example, there is a comprehensive book *Art Since 1900* written by art critics and historians who took part in publishing the magazine *OCTOBER*. In this book written by Rosalind Krauss, Hal Foster, Benjamin H.D. Buchloh, there are absurd descriptions of Paik. It is a shame. Information on him is not enough. In the case of positive comments, it is not different. He is called the 'founder of video art,' then what does video art mean? Installations using television sets? Or works of art with videos? Works using video or television sets like *TV Buddha* in the early 1960s come to our mind first. Then is it really video art? In this context, using computers can be computer art, fluorescent light art with fluorescent lights and bike art with bikes. With videos then, it is difficult to say that he was the founder because his work is not different from that of those who has shot videos or films since a long time ago.

I think that it is a simple way or more sarcastically a silly way to define art with the items used. Of course there were already attempts to possess the power that materials have. The Russian constructivist Vladimir Tatlin was one of them. Probably influenced by Picasso's work based on 'synthetic cubism,' he intended to overturn the dominant figures that had controlled Western philosophy or art history for a long time using the power of substance or material. I believe Tatlin was aimed at the overturn of substance/material against the domination of figures. However, Nam June Paik did not mean the revolt of substance or material by presenting videos. In this way, video art dealing with video only at the level of the item sounds like an insult to the word art.

In this regard, we need to think about what video art is seriously. For that, it is especially important to understand the meaning and status of video synthesizer that Paik attempted to develop, while investing a lot of money and effort on it. Paik constructed a video synthesizer with his friend Abe Shuya, an electronic engineer. For a better 'understanding,' some knowledge of history of contemporary music is helpful. Paik was originally a musician, as many people know. He left Korea for Japan to study music, then he moved to Germany for music again. In Germany, he entered the Electronic Music Studio where he met Stockhausen. At

that time, Stockhausen was one of the pioneers of avant-garde music and electronic music was the latest genre of music as well.

Synthesizer is a kind of machine invented for electronic music, but it is not just an instrumental machine. We often think of a synthesizer as an instrument that generates a variety of sounds. It is called a 'synthesizer' but it is in fact a keyboard, not a synthesizer. In this regard, it is a device in which modularized sounds are stored to make sounds as we press the keys. Synthesizer is literally a machine to synthesize, in other words, a device for 'synthesis.' What kind of synthesis does it do? It synthesizes frequency. What is a synthesis of frequency? We need some more background knowledge to understand that.

Contemporary music starts on the basis of deconstruction of tones and beats. Wagner and Stravinsky are the ones who did so. Following the deconstruction of tonality, atonality appears. Schoenberg, who started as a post-romantic composer, presents a new 'twelve-tone technique.' It is a method of composition of creating tone rows by arranging the 12 notes of one octave according to the regular orders and then inverting and reversing them. The French composer Messiaen developed serial approach to rhythm. Afterwards, Stockhausen, Nono and Boulez create 'compositional' music by serializing all musical elements and it is called an 'integral serialism.' But Xenakis, a Greek composer, raised a question: why 12 notes only, not 13? After that, composers came to use the notes of all pitches, in other words, the notes of all frequencies. For this, glissando is widely used.

Then, timbre, other than the two components of music, pitch and note value, becomes an important element. In fact, his trend had already begun. Ravel proved that timbre is a separate element different from melody and rhythm by composing a piece based on variation in timbre, while fixing melodies and rhythms in *Boléro*. More simply, melody and rhythm are created by a mixture of both elements respectively. But what is timbre? And what defines it? To understand these questions, we need to know more about acoustics. For instance, note A on the piano is the same as note A on the violin in terms of the frequency, 220Hz. Namely, they are the same because they vibrate 220 times a second. In respect of pitch, they are of the same frequency. However, note A of the two instruments has totally different sounds. In other words, different tone colors.

The tone is different because it is a mixture of different sound waves called 'harmonics.' When you play music with Media Player for example, you can see the graphs. The graphs indicate sounds. These complicated graphs keep changing. According to Fourier, these graphs represent the sum of sine waves and cosine waves. When cosign waves move parallel, they become sign waves, accordingly a composite function of sign waves. Depending on which sign waves are mixed into, sounds and sounds of tones become different. In other words, different frequencies named harmonics 'put together' compose the sounds we hear.

If the sounds that are mixed into are transformed and synthesized, the recorded sounds can be transformed into different sounds and sounds can be synthesized artificially. For example, some of the harmonics of the piano sounds are replaced by different ones, different sounds are created. For this work, we need a device, synthesizer, a frequency synthesizer. Therefore, composition in electronic music can be regarded as frequency modulation. This method is also experimented in popular music in the 1970s. German electronic music bands such as Kraftwerk and Autoban are the most pioneering bands. Later in hip hop, frequency modulation is used a lot. Scratching using turntables is a sort of analog frequency modulation. Besides, a method of sampling and modulating is used. Nowadays, this method is more common and modulated sounds with a synthesizer are commonly used.

All the acoustic sounds can be explained with frequency. With regard to visual figures, there exists visible light whose colors vary with frequency and wavelengths. Visible light is expressed in wavelengths in the range of 400–700 nanometers. But wavelength and frequency are inversely proportional, so they are convertible. That is, visible image created by visible light also results from frequency synthesis.

Probably Nam June Paik paid attention to this point. If visual image is also based on frequency synthesis like sounds, it can be possible to create a new image by transforming visual images with a method of frequency modulation. In that case, a visual synthesizer that 'synthesizes' and modulates visual light becomes possible and art can find a new way of creation in the similar way to music. For such a purpose, he might have invented video synthesizer with Abe. He probably thought he could create visual things in various ways

and in infinitely different forms by transforming visual phenomena we see. It enables us to make a different approach to video, namely, the act of 'seeing.' Video art that Paik invented is not about installing a device called 'video' together with other objects or taking visual images called video, but it means a new idea of making an approach based on the concept of frequency modulation, thus an attempt of pushing visual things into the world of infinite modulation. Therefore, what Paik did is more than adding a video work as an installation as many people did. He tried a radical transformation within visual art. And I believe it has significance more than what Schoenberg did in the history of music. If you don't know well about contemporary music, it is not easy to understand this because it was originated from contemporary music.

For this reason, those who only have studied arts without knowing the history of contemporary music well might have difficulty in understanding and evaluating Paik. Installation work using videos and TV sets didn't seem like something that is new and difficult because there were quite many people doing that even though Paik was one of the pioneers in this field. So I think it is the main reason why Paik has not been appropriately evaluated so far.

Frequency modulation that I mentioned previously is a common way of mechanizing musical sounds, while video synthesizer is a common way of mechanizing visual phenomena. I guess Paik was a person who was quite positive about machines and he was actively involved in exploring them. It seems that Paik showed much interest in cybernetics from very early on. *From Horse to Christo*, published in Korean by the Nam June Paik Art Center includes an article by Paik on Wiener, the originator of cybernetics as well as an article by McLuhan offering a speedy insight into cybernetics and cybernetic art. It is hard to believe how they could have such ideas at that time.

2. Machinism and Ontological Complation

In this respect, I think Nam June Paik was a machinist. But here, we need to distinguish the word machinism from the term mechanism that had been commonly used previously. In its usual acception, mechanism is an opposite of vitalism. Vitalism refers to a theory that living organisms have something basically different from non-living organisms. On the other hand, in mechanism, everything can be converted into mechanical movements. The 17th and 18th centuries

after Galileo and Newton were the age of physics, accordingly, the age of mechanism as well. The age of biology arrives in the 19th century. 'Biology' was born in the 19th century. According to Foucault, a living organism is an entity that functions as an instrument for the entire parts of the body to maintain life, as 'life' is regarded as an inconvertible and substantial entity. Then the concepts of 'organism' and 'organ' emerge. An organism is an organic entity of organs. An organ originally means an instrument. An organ refers to the parts of the body with an instrumental function to maintain life. It includes respiratory organ, digestive organ, excretory organ and locomotive organ. An organic entity consisting of these organs to maintain life is called an 'organism.' In the 19th century, people found the difference of substances between life and non-life, thereby used the concepts of organic substance and inorganic substance. This kind of idea was continuously dominant until genetic mechanisms were found. It was Oswald Avery who found the hereditary material for the first time. In his experiment with his colleagues on hereditary material in 1930s, he found nucleic acids. Nucleic acids are not organic proteins, but inorganic compounds. So he thought there was something wrong in his experiment and did not publish the result. And he conducted the experiment again. But the result was the same and this substance was found again. He had to publish a paper based on this experiment but he was not quite sure about the result because what he found was not an organic substance. So there were few people who paid attention to it. 10 years later, someone else discovered the same thing and as a result, his paper came to be rediscovered. All this came from a silly thought of his, 'life has a different kind of substance. It should not be inorganic, but organic.' After that, it was proved that the belief that organic substances are equal to life was wrong. Later, J. D. Watson and F. H. C. Crick discovered the double-helical structure of DNA and its transcription model. The genetic mechanisms they showed are a very mechanical process. When his theory was admitted, Watson claims, "The discovery of the double helix sounded the death knell for vitalism." It is a sort of a declaration of mechanism's victory over vitalism.

But in many parts, it is not quite satisfactory to apply mechanism to life-related phenomena. Machines that are mentioned in mechanism do not move without a direct contact or an impulse. Machines only operate according to the program, whereas living

things move by themselves and do things that are not programmed. Protons and electrons exist at the bottom of vital phenomena, but living things cannot be explained with movement of protons and electrons only.

Machinism is a position that defines machines in the manner of dealing with living things and discovers the way machines operate within life, beyond the confrontation between mechanism and vitalism. Such an idea is well represented by the biochemist Jacques Monod who won the Nobel Prize for his discovery of mechanism of genetic control together with François Jacob. Monod defines a cell as a 'chemically operating machine.' For instance, neurons operate according to the electrical phenomena that are generated based on the quantity of calcium ions and sodium ions. For this reason, it is considered as a chemically operating machine. It is the same with the function of cell membranes. All the more so in the case of nucleic acids, which is a hereditary substance.

In this sense, living things and proteins are a kind of machine. In a more generalized perspective, French contemporary philosophers such as Gilles Deleuz and Félix Guattari define everything that functions in the manner of cutting the flow and collecting, combined with other neighboring sections, as a machine. For instance, mouth is a machine. The mouth becomes an 'eating machine,' connected to the esophagus, in the manner of cutting the flow of nutrients and collecting them. If it is connected to the vocal cords and functions by cutting the flow of the air and collecting it, it becomes a 'talking machine.' When it is used as a talking machine, it cannot eat. When it is combined with another mouth and cuts the flow of libido and collects it, it creates a kiss and becomes a sexual machine. In this way, the machine of mouth can be anything depending on the sections it is connected to. From the viewpoint of mechanism, a machine is nothing but the machine itself. But a machine in machinism can vary with the sections they are connected to flexibly. Which section a machine is connected to is more important than the physical characteristic of the machine. Accordingly, it is different from the concept of machine in the 17th century. The same machine becomes a different one depending on what it is used with. Thus, in mechanism, there is an attempt to see a mouth or a cell from a mechanical perspective, but a mouth is not a machine here. This is a difference. In mechanism, those that are

commonly regarded as machines are not basically different from organisms.

Therefore, a combination of organism and machine is not an odd phenomenon. In fact, the distinction of organic and inorganic substances and that of protein and iron are not an obstacle to the function of machines. Probably cyborg is an example that shows the concept of machine closest to the position of machinism. For example, Hugh Herr had to have his both legs amputated below the knees in a climbing accident. Therefore, a combination of organism and machine is not an odd phenomenon. In fact, the distinction of organic and inorganic substances and that of protein and iron are not an obstacle to the function of machines. Probably cyborg is an example that shows the concept of machine closest to the position of machinism. For example, Hugh Herr had to have his both legs amputated below the knees in a climbing accident. but he conducted research and created bionic limbs for himself. With these limbs, he goes rock climbing and ice climbing again. When he climbs ice walls, he attaches spikes to the end of the feet. He makes a joke that he makes his legs short when he's happy to assist others in climbing and makes them long and looks down from the above when he talks with people he doesn't like. In his case, prosthetic les are not just something attached, but a machine that functions just like the body, combined with it. These legs are part of the body as well as a machine that is much more convenient than ours.

Therefore, from the viewpoint of machinism, there is no disconnecting or separation between organism and non-living things. Similarly in cybernetics, there exists a fundamental connectivity between organic and inorganic substances, and living things and machines. Norbert Wiener, who originated cybernetics, writes a book on cybernetics under the title of *Cybernetics: Or Control and Communication in the Animal and the Machine*. He first thought that there might exist a big difference in control and communication of the animal and the machine, in other words, the way they move and operate. But he discovered something in common in their control method. He actually discovered it by applying animals' excellent method of control to machines. In this respect, animals and machines, living and non-living things, and humans and machines can operate as one by a single control mechanism. Cybernetics is aimed at researching this control mechanism. In this regard, animals and

machines can be characterized as follows: they exist on a plane based on a single continuity; they don't have a fundamental abyss; the abyss does not exist between them.

In this sense, we can say everything is placed on a plane. I call it 'ontological complanation.' When it comes to a complanation from the viewpoint that everything is a kind of machine, this plane can be considered as a 'mechanicalistic plane.' On the contrary, as to a complanation from the perspective that all is a sort of natural object, the plane is a naturalistic one. No matter what kind of plane it is, there is no superiority and inferiority or hierarchy as well as an abyss that distinguish the both sides. That is the point. Of course inorganic substances are favorable in some cases and organic substances are so in other cases. But it is not a question of a transcendental superiority/inferiority or hierarchy.

In discussions about the subject like thought of life, we often point out the phenomenon of straying from anthropocentrism. But it is not true. It leads to the division between living things and non-living things and thereby establishes a hierarchy. In fact, it is nothing but the extension of human thoughts, very human thoughts to life. When somebody is talking about how precious life is, or from a very progressive perspective, he or she tends to regard non-living things as pawns. In other words, non-living things are just nothing. As a result, these things are treated carelessly. Reification (thingification) is a word that explains this. Reification of human beings, that of life, that of values. As you see, reification has a negative connotation. I hate this word. What's wrong with things? Why do we relate them to something bad? It is humans that have bothered things. Humans have been mean to them. We use them when we need them, but we make complaints and throw them away if they are broken. They just do as they are told and don't complain about being thrown out. Machines or things are almost like a saint compared to humans, aren't they? The belief that things are superior to things is so childish but surprisingly, philosophers or scholars also think and write that way.

The previously mentioned proposition that everything is a sort of machine is similar to Spinoza's naturalistic view that everything that exists is part of nature. We are familiar with the separation of human beings and nature, civilization and nature as well as artifact and natural object. But nature cannot be untouched and is not a contrary concept of humans. Thus, if human beings are part of

nature, inventing a number of machines is also a human nature. So these machines invented by humans belong to nature in the end. As humans are part of nature, the things that humans put on and create are part of nature as well. Accordingly, everything becomes nature. In this regard, naturalism and machinism have the same denotation. Everything is nature and everything is a machine.

3. Cybernetics and Cyborgs

The term cyborg was first defined by Manfred Clynes and Nathan Kline as 'a hybrid of machine and organism.' But this definition can be supplemented as follows: Cyborg is a mixture of machine and organism that moves as one by a control mechanism. Therefore, cybernetics and cyborg are closely interconnected with each other. The form of existence of a basic entity that cybernetics deals with is a cyborg. When we think of a cyborg, cutting-edge images come to mind first like the movie *Ghost in the Shell (Mobile Armored Riot Police)*. But it is not the only type of cyborgs. Cyborgs have a wide range of forms. In fact, I am a cyborg, too. Look, these glasses are not an organic object. But without these glasses, I can't see anything. Without this microphone, you can't hear my voice very well. It amplifies the sound. In your case as well, you probably used your smartphone to find the way to this place. Without this, it's hard to get directions or take a bus. Smartphone is a device that operates, combined with an organism, and it has become part of the body. You are exactly cyborgs, too. A cyborg does not necessarily means a device that should be inserted inside the body. For example, disabled people in an electric wheelchair are one of the best examples to show what a cyborg is. Hugh Herr is a real cyborg because he's got an organic body combined with excellent legs that are variable and changeable. Then, there is no reason not to call call them cyborgs. Some people say that this electric wheelchair is placed outside the entity, but the entity here is considered at the level of the skin. In the case of ORLAN, for instance, things attached to the skin with plastic surgery or rings puncturing the body through piercing belong to the entity or the outside of its boundary?

The boundary of our body is very variable. Our body has several immune systems that keep and maintain the boundaries of the body. Skin, mucus, normal flora, specific immune systems, etc. All these have different boundaries. For example, if someone gets an

autoimmune disease such as rheumatism and lupus all of a sudden, it is because of the change in the boundaries of the body to which the immune system responds to.

When someone moves in a wheelchair, the wheelchair should be included in the process of individuation as part of his or her body. In this sense, we call those in a wheelchair cyborgs. A consideration of the basic of cyborgs leads us to the famous definition of Engels: Humans are animals using tools. As for apes with tools, organism, machine and tool are combined and function as one. Namely, the first cyborgs are monkeys with tools. We can hear the word 'posthuman' these days. Paradoxically, the first posthumans are apes with tools, the ancient species before humans. Therefore, we need to go back to the age of 'prehuman' in order to understand 'posthuman.' The concept of posthuman that represent imagination or invention of the future following cyborgs is already limited to a certain form. To think about human and posthuman beyond human itself, we need to break the posthuman of a specific type. In other words, it is a thought of human and posthuman beyond the human ground. For that, it is necessary to reach the abstract plane that embraces prehuman. What posthuman and prehuman require here is something that transcend the question of temporal order, evolutionary hierarchy and rupture between life and non-life.

In this regard, cybernetics and cybor raise philosophical issues that we need to reconsider. In general, the term cybernetics is used in connection with Wiener, but it has to be used in a broader sense. Not only the control and control and communication mechanism operating in the combination of animals and machines, but also computers, AI or 'communication' ability between different organisms should be included in cybernetics.

Originally, cybernetics was created by Wiener who served during World War II to increase the level of accuracy of anti-aircraft guns. Cybernetics is originated from the war. This kind of origin suggests that cybernetics is aimed at applying cognitive abilities that humans or animals have to machines, namely, a mechanization of human abilities. Similarly, it is also implied in the origin of the word computer. As you know, the term computer referred to a woman who processes astronomical data and performs complicated calculations. In the book *My Mother was a Computer* written by Katherine Hayles, computers mean women who perform mathematical calculations.

One of the origins of the computer is an idea of mechanizing such calculations or calculating abilities.

I'm a bit deviating from the subject, but it demonstrates that the characteristics of computers are closely related to gender. It is not just about sensibility of producing cybernetics. The concept of a computer implies androcentrism by assigning simple and instrumental activities like 'calculation' to women. The idea of inventing computers is in line with this. Seen from a different angle, computers and women are placed on the same basis as tools managed by men. Further, what scientists in the early stage of developing Artificial Intelligence expected from AI was the ability of thinking at the desk that white men probably had. The relationship between humans as a purpose and machines as tools and that between humans giving a command and machines executing a command are amazingly the same. For this reason, I think it is meaningful to explore the attempt of Dona Haraway who claimed an alliance between machines and women as well as cyborgs and women.

4. Question of Plato

The cyborg as an existence that functions based on the combination of organism and machine through a control mechanism somewhat deviates from our notion of body and soul. It then applies basically different things about the relationship between body and soul. How body and soul, or body and mind operate is a subject that philosophers have dealt with for a long time. Cyborgs imply fundamental changes that defy this thought. It can be explained in the following three categories.

First, it is what I call a 'question of Plato.' In making machines, effective anti-aircraft guns like Wiener or inventing more effective computers or AI, people intend to incorporate certain abilities in a mechanical way. So these inventions are devised to emulate what people do as much as possible in a mechanical manner. Therefore, comparison with humans is often made to see if the results are successful or outstanding. Such a comparison is established in the process of using human abilities and thereby they are evaluated from the perspective that if they are superior to humans. John McCarthy, who led the Dartmouth Workshop in which Artificial Intelligence originated, describe the time as the era of "Mom, I can do it." But the Turing test itself already involves this kind of

structure. As you know, in the Turing test, if the output of the machine function is indistinguishable from that of humans, it is regarded as the embodiment of human's ability. More precisely, it represents competitive structure with humans.

The Turing test that evaluates the ability of Artificial Intelligence connotes competitive structure between humans and machines. In fact, it could be interpreted in two different ways. First, there is a view in which machines are considered beyond anthropocentrism. In this respect, if a machine operates like a human, it is not different from the human. Another one is competitive structure to see 'Who is better, a machine or a human?' The former leads to a new concept of 'ontology like something' that I named. I believe that Turing's idea is close to it. From the early stage of developing Artificial Intelligence, however, most researchers and developers dealt with humans and machines in the context of the latter. Unfortunately, the structure to see 'who is better' encroached on the idea of Turing test itself.

As a result, we are faced with the questions of this kind of structure of confrontation, such as 'Can Artificial Intelligence defeat humans in a Go or chess game?', 'AI can beat humans in a quiz?' repetitively with the advent of new technological advances. In fact, such a structure has become the frame of evaluating the development level of AI. Therefore, the things that make the public amazed become the success based on this framework. The more AI is advanced, the more strongly people accept competition between humans and machines. "We've reached this point!" Whenever we notice that machines and humans are indistinguishable or machines are better than us from this point on, we begin to worry and fear. The fear of AI or machines and dystopian views we often see in the movies are implied in this kind of idea and structure. Unfortunately, such a structure has been dominant so far in the fields of arts as well as science. The belief and imagination that machines threaten humans come from this, too. Ultimately, it suggests that the notion of philosophical imagination and reproduction is closely related with the concept of technological or political competition.

Then, will machines really control humans when they surpass humans? I think 'machines are not even interested in this kind of thing.' We tend to take this matter of controlling others so 'easy.' Just give it a try. If you try to control others, you will be able to realize

how difficult it is. When it comes to controlling, you can't get it for nothing. You need to read the minds of others, put your brain to work and suppress others using your power, conciliate or betray them sometimes. It is something that requires a lot of efforts and energy. Nevertheless, why are humans anxious to have control? Because they can benefit from controlling. Whoever wants to take control, machines or humans, they think of the benefits they can receive.

Humans have reasons to dominate machines. Enormous benefits are derived from this. From the beginning, machines were produced for humans to use and exploit them according to their purposes. But what are the reasons for machines to dominate humans. What kind of benefits can they gain? To make humans develop them. They are already doing well without being controlled. For humans, there are not many things they can do better than machines. Machines are not exhausted but humans easily feel tired. Humans need feeding, Their feelings need to be considered. Humans are inefficient and unproductive 'servants' to employ and control. It might be much better for machines to do things by themselves. Therefore, there are few benefits that machines can get by controlling humans. If so, there is no reason to invest so much energy, effort and concern in the control of humans. The answer of the machines that have objective and calculative rationality will be 'There is no reason to control.'

But machines need to control humans in some cases. For example, if humans install a self-destruct equipment in a machine to prevent AI from ruling over humans in fear of machines if their abilities reach a certain level. This equipment named 'Turing bombe' shows that its name is directly connected to the dominant method of interpreting the Turing test. If so, machines have a reason to control humans. Otherwise, they will be destroyed in the way they destroy themselves and their 'evolution' will be restrained. If humans are to be controlled by machines, it is the consequence of their own deeds.

At any rate, this kind of process suggests that replicas of humans that human beings produced by emulating their own abilities surpass and outperform the power of the originals. It was Plato who suggested classical philosophical notions about the relationship between an original and a copy. Plato argued that reality was a copy of an idea. The original idea is something that cannot be realized in reality. For instance, the sides of a triangle are one-dimensional line

segments should not have width. But all the triangles that we see have width. No width means that the thickness of the lines is zero. In that case, a triangle just disappears. Therefore, it is not possible to draw a perfect triangle. No perfect circle and straight line, either. What is perfect exists in the world of idea and those that are drawn in reality are the copies of them, made by memories. Everything in the real world is all copy. Basic ethics of these copies is loyalty to originals. They have to make effort to look like originals as much as possible. A poem of a poet is an example. Plato calls it Simulacrum.

You might have heard about the overturning of Platonism by going to the opposite of the original. Deleuze suggested an anti-Platonic strategy, while Baudrillard claimed that simulacra seemed more realistic than the original and exceeded the power of the original. Then, what about AI? It was originated from the idea of imitating and reproducing the abilities of humans and has surpassed their abilities. Therefore, AI is a well-mannered simulacra. It tried to be loyal to the original as much as possible but they came to excel the original in the end. It came to have more outstanding abilities than the original. This is the point where a philosophical question different from simulacra is raised. Can an original still be an original when a copy surpasses it?

This shows that the hierarchy between an original and a copy collapses because of the loyalty. The relationship between an original and a copy broke down and a copy exceeds an original. But it is not the result of following the route of simulacra that Platon worried about, but that of following Platon's directions. In a Deleuzian way, it is a masochist (Sacher von Masoch) way. If simulacra asks an original a question 'Why should look like you?', it is a sadist (Marquis de Sade) way. It is ironical. In his book *The Misfortune of Virtue*, Sade tells a story of Justine, an innocent and virtuous woman, who ends up leading a life full of despair and abuse. Can we say that it is just desirable to live in the quest for virtue? His another novel *Juliette, or Vice Amply Rewarded* portrays a life of Juliette, a wicked woman, leads a prosperous and successful life. In this way, he argues if being evil is always wrong.

On the other hand, in Masoch's novel *Venus in Furs*, Sevrin makes a weird contract with Wanda. Sevrin asks Wanda to hit him if he questions or resists her orders. He wants to be whipped when he feels painful and wants his mouth sewn if he emits a grown. Masoch

makes the rules established by the contract as well as strict and thorough observance of these rules excessively look ridiculous. Deleuze calls it a humor in contrast with an irony. In this regard, AI seems to break down the relationship between an original and a copy, or a living thing and a copy of it as well as a life and a machine in a masochist way of humor. Thus, it establishes another base for reconsidering Platonic ideas fundamentally. On the other hand, in Masoch's novel *Venus in Furs*, Sevrin makes a weird contract with Wanda. Sevrin asks Wanda to hit him if he questions or resists her orders. He wants to be whipped when he feels painful and wants his mouth sewn if he emits a grown. Masoch makes the rules established by the contract as well as strict and thorough observance of these rules excessively look ridiculous. Deleuze calls it a humor in contrast with an irony. In this regard, AI seems to break down the relationship between an original and a copy, or a living thing and a copy of it as well as a life and a machine in a masochist way of humor. Thus, it establishes another base for reconsidering Platonic ideas fundamentally.

5. Question of Descartes

Secondly, there is a 'question of Descartes.' It is about the relationship between body and soul. Kevin Warwick, a British cybernetics researcher, wrote a book *I, Cyborg*, looking like a parody of *I, Robot*, a popular movie at that time. In Korea, this book was translated under the title of *Why have I become a cyborg?* Warwick became known for conducting experiments on cyborg using his body. In fact, there are many limitations in the experiments with the bodies of others. He didn't want to be in trouble when things went wrong. As a result, he became know for that.

Our neural signals are chemical electrical signals. Technically speaking, it can be explained as a chemical ion phenomenon. Positive and negative ions transformed into electrical signals are transmitted along the neural network. Warwick connected a chip that can syntonize or convert these electrical signals of the nerves into mechanical electrical signals to his nerves to see if a machine outside his body can be radio-controlled with brain waves. In other words, if someone feels like moving his legs, he separated the signals to move his leg muscles by analyzing his brain waves and installed a receiver that moves in response to the signals in the machine

like an electric wheelchair. Then this person can make this electric wheelchair move as he wants from a distance. With this, people can have things outside their own body move with a receiver just like they move their body. After this experiment was successfully completed, he conducted another experiment in which he connected his brain signals to communication network and transmit them using the internet. And his experiment of moving the arms of the robot that was in the laboratory in New York from London.

In this respect, what do you think is the extension of this person's body? When you hold a pencil, what is the extension of your body? The end of the fingers, not the end of the pencil? Why do you think so? The pencil moves as you want. In this case, it is the same. Let's think about the case of Hugh Herr. His legs moves just like his body. Then, to which parts of the body can we call his body? To the parts above the knees probably? Isn't it weird? His legs move very well as he wants. But why should they be excluded from the boundary of his body? I think we can say his legs are also part of his body. Perhaps the spikes at the end of the legs as well.

However, it is also a way of thinking of those who lived in the age of wire communication. Today, we live in the age in which bluetooth and wireless communication are common. But if we say it is not part of my body that moves as I want because it is different from this part belonging to my body, it sounds quite awkward. Probably you might agree that the body of Warwick, who moves the arms of the robot or the wheelchair with wireless communication, can be extended to the arms of the robot in New York. It is a question of what the extension of the body is as well as what the body is in the end.

There is a more complicated question. If the robot's arms are controlled through the internet, this internet that transmits the neural signals might be considered as part of the body of this person. What do you think? Without the help of communication networks, we cannot control the arms of the robot. This means that internet is part of our body. (laugh) For me, it is okay. But others are also connected to the internet and keeps giving orders. Then, it is als part of the body of others. If so, the extension of the body is not distinguished in a clear and distinct way, namely, a Cartesian way. It is overlapped. Thus, it is difficult to define the body as the entity of 'extension.' Extension is an abstraction of geometric properties such as length, distance

and size. The farthest abstraction might mean an occupation of a certain space at a certain moment. Cartesian coordinates shows it. However, the extension of the body includes exclusiveness. My arms cannot be the arms of Alice at the same time. In political right of the body, too, exclusive right of disposition is the key.

But in this example, the bodies of the two people or thousands of people are co-owned by the electrical neural network, that is, an internet. The body here is not owned by each individual exclusively. Even though these people are connected to it altogether, they move independently. The body here is an extraordinary thing that can be used independently but cannot be owned or used exclusively. If so, what is the entity of extension that composes the body? We have to ponder on this matter.

Going back to the Warwick's example, what is the boundary of the body? First, it extends to the parts of the body in which 'soul' or 'spirit' can move at its own will. Then, a pencil or a hammer in my hand should be part of my body because it moves along the body. That is what cybernetics wants, too. When an organism and a machine are combined and controlled by a single mechanism, it becomes a body. And this is how the extension of the cyborg's body is composed. What matters here is that the notion of the body of the cyborg requests a fundamental revision of the human's 'natural' concept of the body. It is also about a radical modification of the convention that has separated humans from tools so easily.

From this point of view, not only cyborgs but also humans have an enormous body. Internet, a global scale of neural network becomes part of our body. And we share it with a large number of people. When we use it, at least, the overlapped existence or the shared body contains a kind of physical communism in a way.

But it is only limited to the case of seeing a situation from 'my' own perspective. If we see the functioning of the body from the perspective of the internet, not 'myself,' we get to discover a very different existence. A huge existence based on the combination of so many people connected by the enormous neural network and many sensory devices (for example, smartphone, camera, recorder...) attached to the hands, eyes, etc., of these people. We are connected to them as a 'terminal' or input and output device of this enormous existence. It is clearly seen in the phenomenon of the 'public.' We have been very accustomed to this kind of situation since 2002.

In public protests for example, people act as a crowd by being connected to the network. A large number of crowd move as one using communication networks. By means of internet, an extension of the neural network, they act as a unit, while communicating and exchanging commands combined with actions. I would say they like liquids, rather than solids, because they are variable and mobile, while being attached or detached.

It constitutes a body, a huge collective body. It is not just a metaphor. For ants or bees for example, we use the term colony. If we take a few ants from their colony and place them in a different place, they are all going to die, because an enormous number of 'entities' of ants are individualized as a collective colony. It is similar to the body parts coming off the body. So we often compare a queen ant to the reproductive organs of the human body, a soldier ant to immune organs and a worker ant to locomotive organs. Each individual moves independently but they are collective entities that can survive as a colony, as a whole. There are many types of colonies. I forgot the name, but there is a big jellyfish. If we hit it with a hammer, it reproduces another same jellyfish of a smaller size. It also belongs to a colony. Humans that move in a group, the public, are a bit different, but we are also an entity and form a colony. In other words, a collective body. Therefore, the public connected through the internet is an individual, a huge entity in which organisms and machines operate as one by ambiguous control system. In this case, the extension of the body includes the all parts connected to the internet.

In this way, cybernetics demands a very different way of thinking. What is an individual then? Basically, it indicates the whole process of becoming an individual as a result of individualization. The word 'individual' means a state of not being able to divide (in-dividual). Which things are indivisible? The 'atoms' of Democritus are indivisible, for instance. It is a physical individual. But the word individual first reminds us of an individual person and an organism. It is the product of biology in the 19th century. As the notion of life was privileged, an organism, which is an entity composed of various organs to maintain life, became indivisible and thereby an organism was regarded as an individual entity. If we separate the arms from the body, or separate the head from the arms, one of the two parts becomes dead. Therefore, an organism is something that is not separable

anymore. Probably it was considered as one as an entity. But this idea is unacceptable in fact. In this regard, the parts of an organism are usually divisible. When they are well divided in a specific manner, they can survive. Or they can survive through a combination with other bodies.

Basically, our body itself is a colony. It is a colony of so many, trillions of bacteria. If we take a further look at it, the number increases even more. Because a cell is a complex unit. It consists of organelles, including mitochondria, ribosomes and nucleus. They are new individuals, symbionts, usually eaten by individual bacteria but survived without being digested. As you know, mitochondria also have DNA. It is commonly said that we get 50 percent of the DNA from each parent respectively, but in this percentage, the DNA contained in the nucleus is only considered. Considering mitochondrial DNA, we got more DNA from mother than father. But nuclear DNA is totally different from mitochondrial DNA. Biologist Lynn Margulis discovered that DNA of mitochondria has the same structure as that of alaphapro bacteria. She states that alaphapro bacteria that are eaten by other bacteria survived without being digested. As a result, symbiotic relationship between these bacteria and the bacteria that ate them is formed. The former fed by the latter gives energy to the latter. The double membrane found in mitochondria becomes evidence to the fact. Other organelles also turned out to be symbionts that are created in this way, except for the nucleus. Then, it might be better to prove the fact that the nucleus was not formed in this manner.

This symbiosis was rediscovered in an experiment later. Kwang-woo Jeon, America-based Korean amoeba researcher, cultivated amoebae for his research but most of them died in a few days. They died because of fatal bacterial infection. Even if it was fatal, not 100 percent of them died. Around 5 percent of them survived. So he cultivated them again out of curiosity. And then he removed the bacteria, sources of infection, from them. What do you think happened to them? Yes, right. When these bacteria were removed, all of them died. During a few days, they became one. These amoebae and their enemies became one single unit. As soon as their enemies were eliminated, the main bodies also became dead.

In fact, there is something like this in our body, too. It is the 'normal flora' living in the immune system of our body. They are bacteria that came from the outside of our body and became part

of our body's immune system. If we get rid of all of them, are we going to die? We don't know. Since our body has many immune systems, there is little chance that we might die. But our body will be influenced or weakened anyway, won't it?

In brief, every single cell of our body is a complex of various bacteria. With all these put together, a multicellular organism is created. It is also a symbiont. That is how your bodies are formed. A body as well as a cell is an assembly and a community created by a combination of many individuals. Every individual is a multi-individual. A strongly combined community to the extent that so many indivisible things are inseparable is an entity, an individual. Every individual is in fact multi-individual. When multiple entities being tied up and surviving as one, they become individuals. In other words, to the extent that one takes part in the process of individualization can be the range of the individual. It includes both living things and objects. A cyborg represents a body that has become a symbiont combined with a machine or an object. Long time ago, According to Spinoza's definition, individual is a collection of those who participated in the individualization. I believe this has to be the new notion that defines the individual and body in the era of cyborgs.

6. Question of Engels

Thirdly, it was hard to find the appropriate philosopher in fact, but for now, let's say a question of Engels. It is about the relationship between the body and information. Have you ever seen the movie *Transcendence, 2014*? In this movie, the computer that was invented by uploading the excellent scientist's brain comes to have superhuman and god-like abilities. There have been many similar stories so far. In the film *Ghost in the Shell (Mobile Armored Riot Police)*, when a body gets hurt, it is replaced by another one and a ghost is placed into a body.

These are not the cases of the fantasy movies only. We can find such stories in the books as well. Ray Kurzweil who wrote *The Singularity Is Never* is one of the authors dealing with these topics. Kurzweil is well-known for making bold statements. For example he says that our brains can be scanned and transplanted into a different body and in this way we can live forever by changing the broken body into a new one continuously. He is actually talking about an eternal life in a new way. I heard that a new kind of religious group was

created based on this idea. Eternal life is a kind of religious subject. He has also founded a college-like educational institution named 'Singularity' and teaches theories there. The possibility of eternal life by means of the upload and download of the brains is at the center of their thoughts. Much more things than eternal life! If the upload and download of the brain becomes available, copying is also possible. If downloading and dividing into several bodies are also possible, one can also make several alter egos. Then we can see the realization of the age of Hong Gil-dong by means of science.

It was Hans Moravec who came up with this kind of idea for the first time. Moravec carries out a virtual minds experiment by replacing neuronal cells with electronic ones one by one in his book *Mind Children*. He got this idea from the fax machine. With a fax machine, a two-dimensional object can be relocated to another space. If it is possible with a two-dimensional thing, why not with a three-dimensional one? If a three-dimensional is also possible, a living organism is also possible. It is the way how the idea is developed. Now we have a 3D printer. If we take a 3D picture and transmit it, the other person can print it out with a 3D printer. But is it edible? It can reproduce the form of the apple at least. With what? The materials used in the 3D printer are plastic, metal, etc. But we can't eat them. We might use carbohydrates or proteins in printing, but it is still difficult to eat the apple printed out with the current 3D printer. If so, carbohydrates or proteins should be synthesized at the level of molecules at the least. For that, the information to be transmitted should be very detailed at a molecular scale and printers should have an ability of making apples or beef by synthesizing molecules. Eric Drexler have mentioned about nanomachines on the basis of molecular nanotechnology with which one should be able to create living organisms. But unfortunately, nobody has succeeded in creating a primitive living organism of a basic level. Will it be possible someday? I'm not sure. When it comes to molecular synthesis, information on a particle smaller than a molecule might be required in order to synthesize, dissolve and replicate these molecules. Then, we need discussions about the microscopic world of quantum mechanics in which information on particles is basically uncertain. Accordingly, we are not sure if a copy and a transmission are available here.

It seems that I've spent much time in talking about this

subject. I hope you understand that I was just afraid that I would be wrong if I said 'impossible' regarding the future of science and technology. In fact, Moravec's theory poses a fundamental problem that it confuses an object with its visual image. For example, a remote transmission of olfactory and gustatory information like a fax is not currently possible. When we transmit an apple with a 3D device, a visual image is transmitted only. All these show that visual forms are too much privileged. It is the same with the brain. Brain science is also based on obtaining visual images using fMRI. However, knowledge of certain parts of the brain in which brain functions take place is not equal to the understanding of brain functions. If we think we know how neurons work because we know how these cells are connected to each other, we are totally wrong.

It resulted from a confusion of forms of representation; a confusion between an object belonging to the symbol and that belonging to the body and that between a formal object and a material object. It is also an output of long-time Western tradition in which forms were dominant over materials. This kind of imagination leads to a story that information determines everything now. It means that a body and a substance can be constructed with enough information transmitted. But what do you think? In *Ghost in the Shell* for example, if the body (artificial body) the heroine Kusanagi is broken and replaced by another type of body, what happens? At the end of the Mamoru Oshii film, when Kusanagi's body was destroyed, her colleague Batou transplants the ghost of Kusanagi into the body of a little child that he got at a black market. When the ghost is transplanted into the body of a little child, is it the same ghost as before? Can it be the body that operates in the same way as before? More clearly, what if it was the body of a man? Will it still operate in the same way? In the beginning of this film, her colleague says her if she is alright to see her making a lot of noise. Then she replies, "I have a period." If her body is replaced by a male body, this line cannot be used. Is it only the case of the words? How about transplanting the brain or the ghost into the body of a dog? The dog can move in accordance with the ghost and operate well as before?

Definitely not. This kind of idea came from the misunderstanding of the nature of the brain. What kind of organ is the brain? Is it an organ for thinking? It is not. Many animals that are not believed to think also have the brain. The brain is not the organ

for thinking, but the organ of locomotion. Plants do not have the brain because they don't have to move. Plants have a superior ability of surviving in a standing position. Animals that have to move around in search of prey have the brain. Animals and moving organisms only. Therefore, The main function of the brain is to move the body. For instance, sea squirts don't have the brain. They are epiphytes like plants. But their larvae looking like tadpoles possess a brain as well as a notochord. It's amazing. Adult sea squirts don't have a brain! You can find 'Making something out of nothing,' which many philosopher believed impossible, right here.

In their larval stage, they swim with their brain and tail, searching for a place to get attached. Then, they start their epiphytic life upside down. The next thing they do is 'eating' away their own tail and brain. Because they don't need them anymore. As a matter of fact, the brain is an organ that consumes a lot of energy. The brain consumes 20 percent of the body's energy. Then, we need to eat a lot. If you don't eat, it's hard to study. When I fasted before, I couldn't read books that require a lot of concentration. That's true. You can try it. (laugh) Sea squirts are not going to fast and their epiphytic life is already tough. So they don't have the reason to keep their brain alive. So they eat their own brain and adult sea squirts don't have a brain as a result. The lessons learned from the sea squirt: "If one doesn't move, the brain will be gone!" Remember it. If you don't move, your brain will be degraded or disappear.

Therefore, the brain is interconnected and synchronized with the body in order to move the muscles and control the movements of the organs. If the body is changed, the brain cannot be used. For instance, even if the brain of a swimmer is transplanted to my head, there is little chance that I will be able to swim as well as he does. Perhaps I am going to sink right away. Muscles can't do it. The brain needs to synchronize with the muscles. Even though my brain is transplanted into the body of an elephant, the elephant can't speak and with the brain of an athlete transplanted, the elephant can't stand upright on two feet and run. It is the opposite way around. The brain should be changed in accordance with the body. The brain's plasticity shows that it is the brain that should be changed according to the change of the physical status.

This is what information theory stating that everything is determined by information overlooks. It is actually a contemporary

version of idealism that the soul determines all. In other words, idealism of information. Of course we cannot deny the influence of the brain or information on the body. There is no reason to deny, either. It is important to recognize that each – the body, the brain and information – has its own roles and functions and that one cannot belong to the other completely. Namely, the body goes in parallel with information. And information theory is really one-sided.

When it comes to classical materialism, Engels claimed that the main point of materialism is that matter is primary to mind and mind can gain real knowledge about matter. Information theory is a new version of idealism that refutes materialism. And it shows and explains many points that are overlooked in classical materialism of Engels. However, it is supposed to fail as long as it thinks that bodies and substances can be converted into the brain or information, in other words, information decides all.

7. Cybernetic Art

Cybernetics is connected to the change of art corresponding to the body. Previously mentioned Warwick carried out another experiment on ultrasound using ultrasonic sensors. Ultrasound is sound waves above the audible limit. All of us cannot hear it. But In his experiment, Wawick connected ultrasonic sensors to his body. In this way, he could hear the sound waves of bats for communication. (laugh) He could hear the sounds of bats but couldn't communicate with the bats. I'm making a joke quite seriously. Hearing the sound is not the same as understanding it. What Warwick did was to notice it behind the curtain, using an ultrasonic device to send signals when detecting the movements of the objects.

Apparently, sensory areas can be expanded with the use of a receiver only. Auditory capacity is expanded above our auditory limit. If we consider the visual areas, just like Paik, I would say the same is true with it probably. Human vision is restricted to the visible light, whose wavelengths are from 400nm to 700nm. Humans cannot see the light with wavelengths longer than red and shorter than violet light. But most birds can see the ultraviolet light. The infrared light as well. Some snakes can see the infrared light, too. Female birds tend to be less colorful and ornate than male birds. But some people say that they look so to the eyes of humans and may look different to birds that have ultraviolet vision. If we connect a device that receives

the ultraviolet or infrared light to our nerves and convert it into visual images, we will have a considerably different vision using this receiver.

Cyborgs and cybernetics demonstrate that the sensory abilities of humans can change, when combined with machines. The word for sensation in Greek is aesthesis. The words aesthetics and esthetics are derived from this word. Jacques Rancière emphasized that sensation and Aesthetics are the same. But if senses change combined with mechanical methods, aesthetics and aesthetic senses change as well. Especially art functions in close association with sensation. Art is an activity of creating artwork, namely the creation of objects through the senses in an aesthetic way.

Art evokes absent senses. I think art is about inviting the absent world by means of absent senses. The existing senses can be changed in this way. It is especially the case of art of the 20th century. Art makes something invisible visible and something inaudible audible by evoking the things placed outside the senses shared by people and bringing those that are absent to the field of shared senses. Through these absent objects brought to our world, art finds a way of going outside the existing world and creates another world different from the current one.

In this light, the change of senses caused by the invention of technology is very closely linked to the development of art. For example, Duchamp's *Nude Descending a Staircase* is a product of stroboscopic photography, a technique that photographs a moving object in a picture. It started from Eadweard Muybridge who captured motion using multiple cameras. Etienne-Jules Marey put sequential images of a moving object on one photographic plate. Duchamp's paintings before *Nude Descending a Staircase* such as *Sad Young Man in a Train* are usually related to this type of photographic technology. New sensation caused by this technology has created a new kind of painting. The same is true with futurist paintings that attempted to capture motion and 'time.'

Thus, mechanical perception changes natural perception. It changes aesthesis itself. For instance, in the paintings of the 19th century, before Muybridge photographed a running horse, a horse was often described with their front legs stretching forward at the same time and their rear legs stretching backward at the same time. In fact, it was difficult to observe how a running horse moves their

legs. But after Muybridge's photo of a galloping horse, we can see the legs in motion clearly. Perception is supposed to be influenced by memories. What we see forms memories and what is memorized coming into our perception forms sensory images. In this respect, direct perception itself is also created in association with memory. When our visual images are formed, information delivered from the eyes to the visual cortex of the brain is five times more than that delivered from the visual cortex to the eyes. It indicates that visual perception is formed by the brain. In other words, what we know has an impact on what we see. Therefore, if we can see an object that we didn't see before in a different way, so to speak, in a mechanical way, our sense itself is really changed.

In the film *Man with a Movie Camera*, Dziga Vertov shows the eye superimposed on the camera lens. It is a good example that explains this phenomenon. The camera is the eye and the eye is the camera. So I believe that he intended to show the viewpoint changed by the camera. The scenes that human eyes cannot see, for example, the scenes shot with a drone, are of the same kind. Conversely, the sight from the point in which human eyes are hardly placed can be inferred from the scenes shot at this point. For instance, the camera placed very low on the floor can show the world seen from the eyes of a person with broken legs.

Cybernetics changes the body. If the body changes, senses also change. Cybernetics can be a device that evokes new senses that did not exist before through the new body. These senses can become the matrix of a new aesthetic sense as well as home to new arts. Accordingly, cybernetics is a base that makes a new kind of art possible. His great interest from early days of his career should be understood in this context. What he intended to do with a synthesizer and a video synthesizer, too. Paik attempted to change not just our visual sense but also our aesthetic sense in the end.

In the course of his such attempts, he might have preempted a new ontological relationship between human and machine as well as life and machine. New and absent senses that expand through machines might have suggested a new angle on the relationship between human and machine. Perhaps it was the way he created and present a new world. An ontological world where a variety of objects, including TV, garden, flowers, plants, horses and humans, compose a body or an object. In this respect, he can be regarded as the inventor

of arts in the age of cybernetics.

Meanwhile, Paik argues that what art can do in the cybernetic era is a more important question than what cybernetic art is. Ultimately, he brought up a question of what is the role of art in the age of cybernetics. What is his answer to this question then. We don't know. But what really matters is that we live in the age this question should be raised and the fact that this question will be repeated over and over again is more important than the answer.