

# PHILOSOPHY OF SCIENCE

## Some Topics

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### I. *Anarchism in science.*

The idea of scientific anarchism comes from the thought of some philosophers of science of the modern age. In the past, there was some understanding concerning the position of scientific knowledge which believes that scientific knowledge has been proved to be the highest form of human knowledge. People in the world seem to believe that there cannot be anything that has the power to be against science. In the court, scientific knowledge seems to play the most important role to convince the judge that the evidence given by science is the thing that cannot be doubted. This is the example of the highest position of scientific knowledge over other kinds of human knowledge. In the view of some philosophers of science, the understanding of this position of science has to be seriously criticized. And one among the results that come from this is the thing which is called *scientific anarchism* that we are talking about.

The word ‘anarchism’ in philosophy means the idea which states that there cannot be the central unit of anything in the universe. In political philosophy, anarchism argues that the state cannot know the detail of the life of people in the country, so, the best thing that the state can do for the highest benefit of people is to rule *less* as much as possible. The state has the function only to provide the necessary things in the life of people such as the police to deal with crime, the army to protect the country, the doctors to deal with people’s health, education to cultivate children, and so on. This function of the state is concerned with administration alone. The policy, for example what to be taught in the schools, must not be the duty of the state because the whole country is too big and inside the big country there are so many different needs of people that cannot be served with one

single policy from the central power of the country which is the state in traditional sense.

Political anarchism might be the thing that some people do not understand. I understand these people. When we talk about politics, one thing that we should be always aware of is that there are many countries in the world. The more the country has the central power which is strong, the more the competition between this kind of country and the countries which do not have the strong central power might be the thing that we can imagine what would be the final result. Communist China can compete with the USA in terms of politics and economics because the communist China rules the country with the strong central power. But inside the country, people in China know that they do not have freedom to do so many things, while people in the free countries such as the USA can do these things.

The thing that I would like to say concerning anarchism is that this philosophical concept might work not well in some area such as in politics. I think we might not have the country in the world that can be said to be the anarchist country in the sense that the state just acts like the servants of people. Even in the most democratic countries, finally the thing that we have found is that they still have the government that acts as the policy giver and rules the country to the aim that has been set up by the political party that wins the election. This is not the anarchist country.

However, anarchism could be powerful and reasonable in some area of human activities. Scientific anarchism argues that the first thing that we should question concerning the human ideas is that among the existing human ideas, can we say that science is the best, and for that reason we should put scientific knowledge at the highest position over other kinds of human ideas in the world.

Paul Feyerabend, one of the famous philosophers of science who support the idea of scientific anarchism, says in his book, *Against Method*, that every idea in the human world shares the same position, and for this reason, we cannot say that science has to be put on the highest position over other human ideas. I think for understanding the thought of this philosopher, we need to understand what is the thing which is called the human *idea* according to scientific anarchism.

The human idea means everything that comes from the human consciousness and it has some effect over the thought and action of human

beings. Some persons in the world could believe that there are some things invisible existing in natural world. In the view of these people, these unseen things play the role behind the balance and harmony of things in the world. We call this idea the *gaia* belief. According to people to believe in this idea, when human beings consume natural resources without the awareness that man is just part of the world, and never the master of things in the world, the balance and harmony of things in the world would be affected, and that would lead to the great harm to the world and to man in the end.

Science is the human intellectual activity which is based on an epistemological principle called empiricism. According to empiricist principle, knowledge has to be supported with sense perception of human beings. The *gaia* idea has the contents which are partly not based on human sense perception. In the view of science, this part of the contents of the *gaia* idea cannot be accepted as knowledge. In the view of Feyerabend, saying that this part of the *gaia* idea is not scientific is not the problem. But the problem will happen suddenly if we think that the *gaia* knowledge, which is not scientific knowledge, has the value for the world and the life of human beings less than science.

I think we have some way to understand the argument of Feyerabend. The human life is the thing which is highly complicated. We need so many things to make our life happy and valuable. The good life is the life that does not think and act in some specific ways alone, but thinks and acts with the reason and emotion that merge everything together. Scientific knowledge in its traditional sense is a kind of knowledge that stresses something only. The thing which is stressed in science is the thing that can be called the scientific truth, and this kind of truth is the thing which is based on sense perception. I myself accept that this kind of truth is the thing that is of highly usefulness in some situation. When I sick, I like to go to the hospital where medical science has been adopted as the tool for curing my sickness. This does not mean that I believe in science more than other kinds of human knowledge. But the basic thing that plays the role behind my decision to go to the science-based hospital is my belief that to live a happy life the person needs some principle for thinking and action. My personal principle is that I would accept things when I see some rationality in them. Exactly, I do not believe in science, but I believe in the principle that there must be causal relation between things in the world.

When I go to the science-based hospital, they would tell me that what is the cause of my sickness and that cause can be cured by what. It could be possible that in some cases they could say to me that they do not know what happens to me because the scientific tools used by them are not able to detect the cause of my illness. Even in this case, I think I would say OK to them. Science might not be able to know and cure everything in the life of people. That is not the thing that I hope from science. But I see that there is the thing which is called rationality in science.

However, happiness in the life of human beings does not require rationality alone. I know that besides rationality, there are so many things that we need to be the conditions for having a good life, which is the life that understands things in the universe and is the happy life. In some cases in our life, it could be possible that we need other things more than rationality, and this is the reason why I have the inclination to understand and accept the scientific anarchism of Feyerabend.

I have some example for the discussion more deeply about the idea of Feyerabend. Suppose I am extremely sick, and when they bring me to the science-based hospital, the doctors say to me that I have some kind of disease which is new for them. They explain to me that if I need the hospital to do something for me, they would try. But during that time there would be something happens to me. That is, I could lose my consciousness and that means I would become the person who cannot talk or express my feeling with my family. They explain further that if I decide to come home, this thing might not happen to me and I can die with my last consciousness which knows that I am dying among my beloved persons such as my wife and my children.

Now, I have to ways to choose. The first way is to try to fight against the sickness with science. It could be possible that I win. But the chance for winning is just 50-50. If I do not win, I would become the vegetable for the certain time and die without the chance to know I am dying among the persons who I love. The second way is to accept everything that would happen in terms of the things that are caused by nature. In utilizing this way, there is nothing that I must try to fight against. Buddhism which is the religion that I have adopted as my spiritual guiding light might have so many resources for me to make my last days with my family become the most valuable time in our life. There could be some pain happening from the sickness. I think that if the pain is not so much, I would try to live with

it. On the contrary, if the pain has been increased so high, nature might shut down my consciousness and I would die.

Between these two ways, I will not say that which one is better. I raise this dilemma to point out that there could be some choice in the life of people that does not follow the suggestion of science, and we can find that this non-scientific choice is the valuable thing not less than science. This is the point that I would like to present. If there could be something that has the value not less than science, the idea given by Feyerabend might be something that we can understand.

Finally, social philosophy and philosophy of science might be two things that we cannot separate. And this is the thing that Feyerabend fully understands. The good society in the view of the philosophers who support scientific anarchism must be the place where social norm such as the law allows things which are not science to be other choices for people in the country if they need. The law of the country which does not allow other human ideas such as traditional medicine is the sign of the not free country. The state can have some rule to protect people from the possible harm to happen to people from everything which claims that I know what is the truth of the human life and the world. And this has to apply to science too. In the view of Feyerabend, science can be the source of the harm to humankind. Atomic bombs can never be created in the world if science has not been developed. But the happening of atomic bombs is not the reason to ban scientific research. In the same way, the happening of the harm to human beings from non-scientific ideas is not the reason to prohibit the things which are not science in the country. The state has to consider these things case by case. We cannot claim that it is science only that can give people the truth. There could be other kinds of truths in things which are not science.

## *2. The relation between the history of science and philosophy of science.*

We might understand the idea of Feyerabend much more from the thing that we are considering in this section. Exactly, one of the factors that compose scientific anarchism is that the belief that science is human intellectual activity which is based on certain principle *is not true*. The philosopher who proves this thing is Thomas Kuhn. According to the

historical research of science undertaken by Kuhn, we cannot say that all scientific work undertaken by scientists in the history is based on the same principle which might be called the scientific method. There is no such a thing in the history of science.

The brief detail of the research by Kuhn might be something like this. The thing that Kuhn has in his mind before starting the research is that: is there some share principle in scientific activities done by the great scientists in the history, and that shared principle might be the thing that we can call this is the foundation of science. Kuhn carefully explores the work done by these great scientists, and the finding is so amazing that he does not find the shared principle as said. The same thing that he finds in the work of the great scientists is that every scientific knowledge which is called scientific theory created by individual scientists is based on the personality of the scientists themselves. This fact later gives rise to the theory which is accepted widely in the philosophy of science at the present which states that *there might not be the objective knowledge in science*. Scientific theory is *subjective* in the sense that it much depends on the personality and belief concerning things in the universe of each scientist.

The revolution in science according to Kuhn is the thing that happens from two main conditions. The first condition is that there is the serious problem occurring to the old theory which used to be accepted widely among the scientists in the community. For example, the theory of Newton has been used among scientists for a long time. One day the scientists have found that this theory cannot explain the behavior of some planet in our solar system. The second condition is that normally when there is the problem occurring in the old good theory, the thing that the traditional scientists like to do is to solve the problem by the way of adjusting the theory in such a way that the new theory would solve the problem and it remains the same theory as created by the first scientist (in case of the theory that we are talking about, that scientist is Isaac Newton). When there was a problem happening to the old theory which has been adopted by the old community of science, the scientists in that old tradition (which is called by Kuhn as the *old paradigm*) would try to solve the problem. In the history of science some problems as said were solved. But there were the new problems that continued to occur and when the new problems come to the point that there was no one in the old tradition of science can solve these new problems, this would lead to the thing which

is the new attempt by the scientists in the old paradigm to solve these problems from the new visions. The theory of gravitation given by Einstein seems to be able to solve the problems that cannot be solved by the theory of Newton. And this is why the new theory of Einstein has been adopted to be the *new paradigm* as we have seen today.

The new theory of Einstein is based on personal view of Einstein himself. The thing that we should understand from the research by Kuhn is that we should not understand that there is some truth concerning gravity that Newton cannot see for some limitation of Newton, and Einstein is the scientist who can overcome that limitation and sees this truth. There is no objective truth in science. Einstein himself has explained this thing very clearly in his book, *The Evolution of Physics*. In the book, Einstein says that there are some things that nature does not allow human beings to observe with sense perception. This limitation is the common thing well known among the scientists of the world. Scientific theory is the attempt of a scientist to know things that nature does not allow us to know with sense perception. Suppose three persons come inside the dark room and the darkness in the room makes them not able to see anything. They hear some sound. It seems to be the sound of animal. The fact is that they cannot see the thing which is the origin of the sound. They need to know this thing. We might understand that when eyes cannot be used, the thing that these three persons would use must be something like imagination and reasoning. In philosophy, we have a word that refers to the method used by philosophers when sense perception cannot be used. This thing is usually called speculation. It seems that Einstein is talking about a way which is similar to speculation. The sound of that thing is the thing that appears to human sense perception. This can be compared with the phenomena which are believed to be the result of gravity such as the falling of things to the ground. It has been said that Newton sees the falling apple, and that leads to the creation of the law of gravity. The thing that appears in sense perception of Newton is the falling objects such as the apple. But the thing which cannot be seen by human beings in the world is the thing which plays the role behind the falling of things in the world.

As we know, there are two kinds of knowledge in science. The first one is the *law*, and the second one is the *theory*. Now we are talking about the theory which plays the most important role in the world of science at the present. The law is the statement that talks about things that can be

observed with sense perception of human beings. For example, the statement that “bodily objects fall to the ground at the same time if we drop them at the same time” is the law. We can observe everything mentioned in this statement. But the statement of Einstein which says that gravitation is the curvature of space contains two things. The first thing is the thing that we can observe with sense perception. But there is the second thing which cannot be observed with sense perception, and the second thing is the main condition that makes this statement a theory. We see the falling objects. Newton and Einstein also see this fact not differently from other people in the world. We think that this fact is the phenomenon which has been caused by something which is called by Newton the gravity and by Einstein the gravitation. (Note that these two scientists use the different words because their imagination concerning this thing is not the same.) Newton imagines that between two large objects such as the sun, the earth, and the moon, there is the unseen force which unites them together. This force has been called by Newton as the gravity. The statement which says that “there is the unseen force between the sun and the earth and between the earth and the moon and this force is the explanation why the earth moves around the sun and the moon moves around the earth” is the theory because it talks about the thing that we cannot observe with sense perception. The things that we can see are the sun, the earth, and the moon. And the moving of earth around the sun, and the moving of the moon around the earth are the things that we can observe with sense perception. Suppose Newton just says that the earth moves around the sun and the moon moves around the earth, this statement would not be the theory. It would be the law.

Law and theory in science play the role as the knowledge that give us some prediction of nature. Einstein says in his book that we have referred to previously that as far as the theory can give the correct prediction of nature, that theory would be used by the community of science. The problem that happens to the theory of Newton is that it cannot predict the behavior of some planet in our solar system anymore. And this is why the community of science has turned to the new theory given by Einstein. The reason why the theory given by Einstein has been used by the community of science as the new paradigm is not that the new theory of Einstein can attain the truth of the universe more than Newton. Einstein himself understands well that some day in the future, there must be something that



cannot be explained with his theory. And if there are a lot of these things, that means the death of his theory like other theories in science that have been abandoned by the community of science in the world for the reason that they cannot be used to explain and predict things in the universe anymore.

The point that we are considering now is concerned with the idea of Kuhn which states that all scientific work undertaken by the scientists in the world cannot be understood as the thing which is based on the objective principle, as so many people in the world understand. When Einstein thinks of the new way to solve the problems that occur to the theory of Newton, we would not find the thing that can be said to be the objective principle. The creation of the scientific theory in the view of Einstein can be compared (very well) with the creation of art such as the composition of music. And this is why Einstein himself says that the reading of Dostoyevsky gives him so much insight to work as the scientist. In the words of Kuhn, the new theory is usually based on the new personal viewpoint and imagination of the scientists themselves. In the imagination of Einstein, the space is not the thing which is totally empty as we understand. The space can be curved with the large amount of the mass. The sun in Einstein's imagination is composed of the great mass. And this could result in that the space around the sun might not be just the plain empty space as we understand. On the contrary, the space around the sun is curved and the planets that move around the sun are moving *along* the path in the curved space.

From the thing that we have said above, we can say that the new theory of Einstein has been based on the new imagination of Einstein himself. To use imagination in working of Einstein is the thing that people in the world who are interested in science well know. However, we should understand that even though science can be considered as the intellectual activity of human beings which is based on personal wisdom, this does not mean at all that we can do anything and say that this is my scientific work. Finally, all theories in science must have at least two properties. The first one is that the theory must have the power to explain things in the universe. The thing which is called 'natural selection' in Darwin's theory cannot be proved with sense perception. That is, Darwin himself cannot bring this thing to show us and say that this is the thing that I call natural selection. This idea has been accepted not for the reason

that Darwin can prove that natural selection really exists in the universe, but for the reason that this idea has the great power to explain why things in natural world are as we have seen. Second, the theory must be the thing that can be falsified. The statement which says that “God is the creator of the universe” is not the falsifiable statement. But the statement which says that “ $E=mc^2$ ” is the falsifiable statement. The statement that can be falsified is the statement that allows two things. First, it allows that there can be the things that would suggest that things believed and predicted in the theory are wrong. Second, it allows that if there is something happening and the theory cannot explain or solve this thing, the theory will accept that it is the false theory and it will not be used anymore. The belief in God as appears in religious texts in the world cannot be proved to be false, so this kind of statement cannot be counted the scientific theory. It is religious theory!

### *3. The problem of pseudoscience*

In the view of some scientists in the world, science is the pure principle undertaken for pure knowledge. This understanding has been adopted among some scientists in the world for a long time. If we think that science is the pure principle for having the pure knowledge, to say that there is something which should not be called science because it is not based on the pure principle is something that we understand. The question concerning this understanding has been raised in the books written by Feyerabend. In the view of this philosopher of science, the separation between science and pseudoscience should be understood within the conditions. That is, if there is the thing which is called the objective principle to have the objective knowledge and we would call this kind of knowledge science, the separation between science and pseudoscience is reasonable. But the thing that we have found in the work of Kuhn is that there is no such a thing in science. That is, science has been based on personality of the scientist. Under this condition, to say that there is the thing which is not science is very hard. In the past, in the view of some philosophers of science, such as Karl Popper, the evolution theory of Darwin has not been accepted as science. Popper says that the idea that given by Darwin looks like metaphysical more than science. From this perspective, it could be possible that for some scientists and philosophers of

science in the world, the thing given by Darwin is pseudoscience, and not science at all.

At the present, some scientific theories look more metaphysical than the idea of Darwin. For example, we have the idea that the universe becomes from the big bang. There is no way to prove the big bang. If we think that things in science have to be the things that can be proved with sense perception, the big bang theory is not science, and for some scientists this could be counted pseudoscience.

In many countries, people have traditional medicine. In the view of some scientists in the country, the traditional medicine should not be counted science because it has not been based on the objective principle. In the view of Feyerabend, *we cannot say that traditional medicine is pseudoscience because exactly modern medicine and traditional medicine are all based on personal belief of the ones who give rise to these things*. One thing that would help us to understand the idea of Feyerabend concerning science and pseudoscience is the fact that scientific knowledge used in medical science has been changed all the time. In the past, around ten or twenty years ago, people believe that eating eggs two per week is not good for health. But at the present, the scientists tell people that you can eat as you like. What happens? Nothing, in the view of Feyerabend. This is the normal thing that must happen in science because scientific knowledge is based on personality of the scientists. Some day in the future, the scientists could say to me that dear professor, you cannot eat eggs more than two per week again. And the result would be the same: can I have something to argue against the scientists! Sometimes, they look like fortune-tellers!

Finally, Feyerabend says that to have the most fruitful way to understand science and other wisdom of human beings, we should not say that there is something which is science and something which is not science or pseudoscience. In the view of Feyerabend, we have some way to consider the ideas given by people or thinkers in the world. Normally, Feyerabend argues, it is very hard to find that the ideas used in the community of human beings are not useful in terms of the supporting conditions of understanding and moral practice. Animism is the common thing to be found in villagers of the world. This 'practice and belief' plays the important role in the life of the villagers. Certainly, this practice and belief is not based on the way utilized by some scientists such as Darwin or Newton. But we can say that this tradition of belief and moral practice is

based on the contemplative thought of people who give rise to this thing not differently from the work of Einstein and Darwin. The difference just lies in that the villagers have their own way to understand things in nature. So, the thing that we should use as the tool for understanding the activity which is not science is to consider how it affects the life of people in the community. It could be possible for us to find that some kind of animism produces happiness to people more than science.

#### *4. Cause and effect*

In the view of some scientists such as Isaac Newton, the universe has been created to be subject to the eternal laws, and these laws are the creation of God. This belief is not scientific, but religious faith of Newton. It seems that if we start with the metaphysical or religious belief, the idea of cause and effect that would deeply affect our consciousness might not be different from the thing that happens to Newton. In Buddhist philosophy, the idea of cause and effect is not different from the version which is adopted by Newton. The difference just lies in that the Buddha does not teach that there is God to create the universe and the law of nature (which includes the law of cause and effect.)

The understanding of cause and effect has the direct influence over the image of science in the consciousness of the scientists. In the view of Newton, science is the tool for understanding the greatness of God. The universe has been created so perfectly by God. The more the scientists discover the truths of the universe and tell people these truths, the more the greatness of God would be understood by people, especially those who do not believe in religion and in God. One of the results of this kind of belief is that the idea of cause and effect adopted in the theory of this kind of scientist would be eternal. That is, they believe that God has created things in the universe to be under the eternal law of cause and effect. The Buddha also believes that there is eternal relation between desire and suffering in the life of people. This can be understood to follow the eternal law of cause and effect in the mind of the Buddha.

The philosopher, David Hume, says that the concept of cause and effect is the creation of the human mind. According to Hume, we do not have any foundation to claim that if we see that there is the causal relation between two things, say A and B, this relation of them has to be eternal as

believed in religion or metaphysics. It seems that modern science agrees with Hume. In the view of scientists in the world at the present, the theory which states that there is the causal relation between two things just claims that we believe that when there is A, there would be B. But no scientist in the world at the present thinks that this relation of two things has to be like that forever. When we have some medicine that has the power to cure a kind of sickness, this can be understood in terms of cause and effect. Hume says that no one in the world can claim with necessity that tomorrow we would see the sun rising at the east. It could be possible that there is something happening to the sun and that is the condition that makes the sun do not rise at the east as we have seen before. In terms of logic, this is possible. In the same way, even though from our observation at the present, the medicine A has the power to stop the sickness B, from this we cannot say that this relation must happen like this tomorrow. The understanding of cause and effect among the scientists at the present follows the thought of David Hume.

#### 5. Conclusion: some thought from the author

I think it might be well if I say something concerning the whole thing that we have considered in this paper. The following are some of my thought.

First of all, I consider science as the *principle of thought* rather than the *activity done to have knowledge*. I know that is the meaning of science in the mind of some scientists and some people in the world. There are many things in the world that I personally accept, and the reason behind my acceptance of these things is that they have been based on some principle. Principles are the important things, in my opinion, because principles would make us have the potential to live a happy life in this world. Note that finally I have related science to happiness of life. The principle that acts behind the activity done by scientist in my opinion is simple. It states two things. First, ultimately the thing which we should accept as knowledge must be the thing that has the relation with our life. In some case, I accept the concept of God if this concept would benefit me to have the happy life in the world. Note that the concept of God that I am talking about is the one that can do something with my life, not just the belief in something and that thing never has the relation with my life. I

consider science in terms of the thing that has the real relation with my life within this sense.

Second, I have considered science as one thing among so many things in the world which are called by Feyerabend as the *ideas*. Religion is another idea that I think I need in my life. Art and music are the ideas as well. These ideas state that the happiness of life need something that we cannot consume like food, cars, books, and so on. Art and music give us something that science cannot give. In the same way, the things given me by religion are the things that I fully know I can never get from science. However, I never look at science as just a tool for having material things such as the telephone or the computer. In one part, *science is the way of thinking*. Gandhi says that man thinks first, and then becomes the thing that they think. I do not need to explain what is the way of thinking given us by science in this paper. The thing that I would like to say is that the essence of science lies in the way that science looks at things in the world. I accept that from the history of science, we can understand that scientists have their own ways in looking things in the universe, and in the view of the philosophers like Kuhn this seems to suggest that there is nothing to play the role as the shared principle among the scientists. But I feel that man must have something deeper in their soul (I do not mean the metaphysical soul; I am talking about the deepest part in the human consciousness) which can be said to be the universal essence. But this thing, I agree, is not needed in the working as the scientist. This thing is needed when you think about the whole universe as the being that needs to understand the hidden truths that unite things to be the single universe!

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