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The synthesis of the theory of relativity and quantum theory

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ABSTRACT

It is said that the theory of relativity and quantum theory are independent of each other. Their relationship is like water and oil. Now, it is very important for modern physics to synthesize them. In Physics and mathematics, Super String theory is studied, but instead of it, the ten-dimensional world appears. Our world is a three-dimensional world . What is the ten-dimensional world? It is more difficult than the string which is of Plank length. In the ten dimensional world, physics is facing darkness and nothingness which man can not explain with the traditional physical words. The solution depends upon philosophy. I tried to synthesize them and succeeded. The following is an outline of my synthesis. Utility and relativity of mathematical truth Mathematical truth is not absolute but relative. In the universe (outside the solar system),there is no perfect line. Because , by the gravitation of large astronomical bodies , space and lines are curved. Mathematical figure and numeration depend upon the promise of mankind. These are not absolute. Physics, which is grounded upon mathematics in certainty, is also relative. It expresses not the whole of the universe but a part of the universe. Community and difference between the theory of relativity and quantum theory Community is the negation of absoluteness of physical attributes. Difference is the assessment for mathematics. The theory of relativity relies on mathematics but quantum theory does not always rely on it. According to circumstances, Niels Bohr and quantum physicists abandoned a frame of reference. The origin of the theory of relativity. The origin of quantum theory. In short, the theory of relativity and quantum theory are not perfect, they only irradiate a part of the universe. Man can reach the whole of the universe only by the philosophical intuition of nothingness and infinite (the principle of nothingness and love).

Introduction

Thirteen years ago (2002, February), I published The " *Philosophy of Nothingness and Love* " (Hokuju company, Tokyo) in which I expounded the movement of ' nothingness as reality ' which is the stream of life and the motion of the universe and world. From that standpoint, I want, offer a solution to the most important problem in contemporary physics; synthesizing the theory of relativity with quantum theory. My philosophy leads to the synthesis of the two. It has been said that the theory of relativity and quantum theory are utterly independent of each other, that their relationship is like water and oil. However, it is crucial for modern physics to synthesize them. In physics and mathematics, Super String theory is studied, which implies a ten-dimensional world rather than our normal world of three-dimensions. What is this ten-dimensional world? The ten-dimensional world is more difficult to understand than the string of Planck length (10^{-33}cm). In the ten- dimensional world, physics is facing a darkness and nothingness that man can not explain with the traditional physical terminology. The solution requires philosophy. At one time, Hajime Tanabe (1885~1962) a renowned philosopher and physicist in Japan attempted to expound this theme in ' A suggestion for a new methodology in theoretical physics '(*Hajim Tanabe Completely Works*,14th volume, Chikumaschobou) but he could not complete the task. All he could do was propose to physicists that an introduction of a complex variable function provided a hint for the solution of the synthesis. In contrast, I confronted the thesis directly and succeeded in providing a synthesis. The following is the essence of my synthesis. First of all, we need to reconsider mathematics, that foundation on which the certainty of physics depends. First, I ask, What is a mathematical truth? Then, I will go on to synthesize the theory of relativity and quantum theory.

Utility and relativity of mathematical truth

It seems that mathematical truth is universal and absolute, for example 1+1=2 ,3+4=7, and according to Euclidean geometry parallel lines continue infinitely until the end of the universe.

But these mathematical truths are realized only in the earth and space which surrounds our earth. Mathematical truth is probably uncertain outside solar system, not to mention the galactic system. Mathematics is a study that explains the world and universe with numerical formulae and numbers. Mathematical signs are the digits, 0 ~ 9, points, lines, curve, flat surfaces. And more, f means a function, $\int$ means integration, $\sum$ means a sum total, and $\cup$ is sign of sets. In short, mathematics is a kind of language that uses these letters, signs, points, curves and surfaces. In mathematics, values that show quantitative relations are always the same. Number and figure never move independently by means of our thought. The theme and aim of mathematics are expressions of quantitative relations. But there is limitation in mathematics: mathematics does not include subjective emotional judgment. For example, " I like lilies, but am ambivalent about roses. Because, roses are beautiful but they have thorns". Can mathematics express this emotional and ambiguous condition? No, it can not. The subject of

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mathematics is solution and expression of quantitative relations. Therefore, it does not include subjective emotional judgment and that is limitation on mathematics. This is an extreme case, of course. It is impossible to express the Japanese classic , "*The Tale of Genji "* using only mathematics. At least, no such a mathematics book has been published, yet.

Well, how about the description of the moving world, on the universe? It seems to as if our world stands still, but really, it moves. The earth is moving at a velocity of 30km per second around the sun , we move around the center of the earth about 0.5 km per second (rotation). Because of the expansion of the universe, the galaxies fly away from each other at a speed of 1500 km per second (1/20 of the light velocity) (" *Seeing the universe through the theory of relativity ",* Genichirou Hori,1988. NHK books, p.42). From these facts, it should be apparent that nothing is perfectly in still. Our world and space, the universe is moving. But we can not explain the moving universe at a stroke. To understand the universe as a whole, we make to stop it by abstraction and think of it as a static system. (Luckily, it seems that the world which surrounds us remains fixed.) First, we have to stop the movement of the world, then classify and divide it. When we do the standard for the division is our own bodies. We make furniture and houses for ourselves. Utility and practicality are of the existence. Even a skyscraper is built for the human body. The height between floors is about 2~3m. There is no building in which floors are separated by 30~50m. Buildings are designed as space for people are 1~2m high. Still more, one meter is almost the length that an adult opens both hands. The average height of an adult is about between 1~2m. The length has only been established and proved its utility for a long time. Along the way, man established the global standard that 1m is 1/40millionth of meridian line of the earth. But ordinarily nobody thinks of the length of meridian line. In ordinary life, it is enough to use the meter standard. We don't usually think that the metre is the length of the path traveled by light in vacuum during a time interval of *1/299,792,458* of a second.

A one tenth of 1m is 10cm and a one tenth of 10cm is 1cm.

The decimal system itself is only an agreement or rule. There is no necessary reason to use the decimal system. We might say that man has ten fingers. But if you include the digits of man's other limbs, his toe, you would get a Vigesimal system. If you think only of one hand five fingers, you get a Quinary system. A watch(measure of time) is Sexagesimal system. Moreover computer gets a binary system. A computer needs only 0 and 1.

Man does not need the other numbers (2~9). Strictly speaking, the decimal system is not absolute and neither the other systems. We are completely free to choose the system that we use. Because the decimal system is very useful, therefore its use spreads. Moreover, The number 1 is not absolute. Is a woman who is pregnant one or two people? By a Japanese law, an embryo is considered to be a human being from the 21 weeks of pregnancy. Abortion after pregnancy 21 weeks becomes murder. This means that one and two co-exist. A social rule or standard such as law fixes the number 1, 2, 3, 4, …..… Even one which is the simplest number is not fixed. Henri Poincarée (1854~1912)who has been called the greatest mathematician and physicist of the modern age and ' The last great scholar ' who prepared for Einstein's theory of relativity, says that;

Les définitions du nombre sont trés nombreuses et trés diverses; je renonce à énumérer même les noms de leurs auteurs. Nous ne devons pas nous étonner qu'il y en ait tant. Si l'une d'elles était satisfaisante, on n'en donnerait plus de nouvelle. Si chaque nouveau philosophe qui s'est occupé de cette question a cru devoir en inventer une autre, c'est qu'il n'était pas satisfait de celles de ses devanciers, et s'il n'en était pas satisfait, c'est qu'il croyait y apercevoir une pétition de principe.

Henri Poincaré, *Science et Méthode (1908)*, Flammarion, p.165

This proves that the expression of number is not absolute but relative. Nor are a straight line and the spatial coordinates absolute. A perfectly straight line exists only in our imagination. We can not inscribe a perfectly straight line. If one inscribes it on the earth, the line is a curve in fact since the earth is a sphere. If one inscribes a straight line with a ruler, it will not be perfectly straight line because of frictional resistance. If you enlarge the ruled line, the line is a surface. Thus we can not inscribe a perfect straight line. Furthermore, just as we can't inscribe a straight line, perfectly parallel lines do not exist. Because of the gravitation of yield of large celestial bodies, so too it follows that space itself is warped. As the result of warp, straight lines and parallel lines in fact curve. Therefore, perfectly parallel lines do not exist as a physical reality. They exist in our imagination as an ideal type. The founder of plane geometry was Euclid. Until now, it was believed that Euclidean geometry was absolute and universal true in the physical universe. But it is truth as it is pragmatically useful in daily life .

Poincaré also says above that mathematics is propelled into the kingdom of practice. According to him , mathematics requires absolute rigor. But because of absolute rigor and abstraction, it loses objectivity and living reality.

Mais croit-on que les mathématiques aient atteint la rigueur absolue sans faire de sacrifice? Pas du tout, ce qu'elles ont gagné en rigueur, elles l'ont perdu en objectivité. C'est en s'éloignant de la réalité qu'elles ont acquis cette pureté parfaite. On peut parcourir librement tout leur domaine, autrefois hérissé d'obstacles, mais ces obstacles n'ont pas disparu. Ils ont seulement été transportés à la frontière, et il faudra les vaincre de nouveau si l'on veut franchir cette frontière pour pénétrer dans le royaume de la pratique.bid. p.131~132

Functions which are a main theme in mathematics are derived with an aim to achieve practical application. He writes it down as follows;

Autrefois, quand on inventait une fonction nouvelle, c'était en vue de quelque but pratique; aujourd'hui, on les invente tout exprés pour mettre en défaut les raisonnements de nos pères, et on n'en tirera jamais que cela. ibid. pp 132~133

In this passage, there is a clear critique for a host of functions and the practice of mathematics. In philosophy, Henri Bergson is a case in point. He had a rare talent for mathematics and found a new solution for a long- standing problem mathematics during his high school years. The proof was published " New mathematics year book " in France. Later he was given Doctor of Science from Oxford university (1911, 52 years old). Eight years present to that, he demonstrated his ideas for mathematics in ' Introduction à la métaphysique ' (1903).

Il est vrai qu'elle(la mathématique) s'en tient au dessin, n'étant que la science des grandeurs. Il est vrai aussi qu'elle n'a pu aboutir à ses applications merveilleuses que par l'invention de certains symboles, et que, si l'intuition dont nous venons de parler est à l'origine de l'invention, c'est le symbole seul qui intervient dans l'application.Mais la métaphysique, qui ne vise à aucune application, pourra et le plus souvent devra s'abstenir de convertir l'intuition en symbole. Dispensée de l'obligation d'aboutir à des résultats pratiquement utilisables, elle agrandira indéfiniment le domaine de ses investigations. Ce qu'elle aura perdu, par rapport à la science, en utilité et en rigueur, elle le

regagnera en portée et en étendue. Si la mathématique n'est que la science des grandeurs, si les procédés mathématiques ne s'appliquent qu'à des quantités, il ne faut pas oublier que la quantité est toujours de la qualité à l'état naissant: c'en est, pourrait-on dire, le cas limite. Il est donc naturel que la métaphysique adopte, pour l'étendre à toutes les qualités, c'est-à-dire à la réalité en général, l'idée génératrice de notre mathématique.La pensée et mouvant, puf. 91édition ,1975, pp. 214~215

From this , we can understand that mathematics is a science of quantity and scale. Signs allow it to develop extensively in pragmatic application. But the use of signs conversely narrows its subjective field and living reality. As metaphysics is free from practice and utilitarian convenience, it is not bounded by the use of signs. Therefore it can research a wider field than mathematics and science.

Nietzsche, like, Bergson, penetrated the essence of mathematics and logic. The following passage is very suggestive from the point of view of human life and naked existence.

Die wissenschaftliche Genaurigkeit ist bei den oberflächlichsten Erscheinungen am ersten zu erreichen also wo gezählt, gerechnet, getastet, gesehn werden kann, wo Quantitäten constatirt werden können. Also die armseligsten Bereiche des Daseins sind zuerst fruchtbar angebaut worden. Die Forderung, Alles müsse mechanistisch erklärt werden, ist der Instinkt, als ob die werthvollsten und fundamentalsten Erkenntnisse gerade da am ersten gelungen wären: was eine Naivetät ist. Thatsächlich ist uns Alles, was gezählt und gegriffen werden kann, wenig werth: wo man nicht hinkommt mit dem „Begreifen ", das gilt uns als „höher". Logik und Mechanik sind nur auf das Oberflächlichste anwendbar: eigentlich nur eine Schematisir-und Abkürzungskunst, eine Bewältigung der Vielheit durch eine Kunst des Ausdrucks,-kein „Verstehen", sondern ein ein Bezeichnen zum Zweck der Verständigung. Die Welt auf die Oberfläche reduziert denken heißt sie zunächst „begreiflich" machen.
Logik und Mechanik berühren nie die Ursächlichkeit.

Nietzsche Sämtliche Werke 12 Nachgelassene Fragmente 1885~1889 p. 190 dtv de Gruyter Dünndruck-Ausgabe ,1980 Nietzsche insists that simplicity of calculation and measurement is only superficial and it can not penetrate into the anxiety, suffering and actuality of human existence. Mathematics and abstract logic explain only a superficial part of the world. Therefore, it is impossible to take mathematics as the foundation for certainty. To do so is to try to explain the whole by the part. To use a metaphor , the part is Rhode Island in USA and the whole is the earth(*The Crisis in cosmology*, Michael D. Lemonic, translated by Kenichirou Kobayashi, 1998, Koudansha, Tokyo p. 30). Our world of certainty is only the size of Rhode Island (the smallest state in USA),as opposite to the whole of the earth. Science can only light up Rhode Island, not the whole world. The rest has no light, it is infinite darkness. The dark world is infinite in extent, the expanse of the universe that science can not measure until its limit. This whole is beyond traditional notions and can only be grasped by intuition. Therefore, the limit of the universe is such that if one says that it exists, then it does but if one says that it does not exist, then it does not. This logic transcends being and nothingness. We call it Absolute Nothingness. This logic solves the most difficult problem in contemporary physics.

Commonalities and differences between the theory of relativity and quantum theory

Against the back drop of Euclidean geometry that dominated Europe for 2000 years, Descartes and Newton worked out a three- dimensional spatial system of coordinates. This system of coordinates was applied to engineering and architecture. It was the foundation of modern science and civilization. But it is only effective on the earth and the near space which surrounds the earth. The system of coordinates is useful for engineering and architecture, it is true but ,it does not express the reality of the universe. As mentioned above Bergson pointed out the limitation of modern science and mathematics. Specially, he wrote that a three dimensional coordinate space is only an abstract space and does not express reality. Einstein added to the three- dimensional coordinate a time axis, working out a four dimension space(Riemann space). But this is not enough to explain the universe. He used axes and three-dimensional coordinate based upon lines. Well, lines themselves are ideal, therefore, four dimension space is also ideal space. It is not perfectly account. Nonetheless, Einstein neglected absolute static space and abandoned traditional Euclidean geometry. But he did not give up mathematics and the coordinate notation. He adopted Riemann space. He relies on mathematics. But using a coordinate notation is to think of the moving and developing universe as a static system. To grasp the moving universe by means of static system means the introduction of some errors, blurring and uncertainty. This is a negation of static system and absoluteness. The negation of absoluteness is commonality between the theory of relativity and quantum theory. Niels Bohr puts it as follows:

(1) In fact this new feature of natural philosophy means a radical revision of our attitude as regards physical reality, which may be paralleled with the fundamental modification of all ideas regarding the absolute character of physical phenomena, brought about by the general theory of relativity. Can Quantum-Mechanical Description of Physical Reality be Considered Complete? *Physical Review*, Vol.48, 1935, p. 702

(2)In spite of all differences in the physical problems concerned, relativity theory and quantum theory possess striking similarities in a purely logical respect. In both cases
We are confronted with novel aspects of the observational problem, involving a revision of customary ideas of physical reality, and originating in the recognition of general laws of nature which do not directly effect practical experience. The impossibility of an unambiguous separation between space and time without reference to the observer, and the impossibility of a sharp separation between the behavior of objects and their interaction with the means of observation are, in fact, straight forward consequences of the existence of a maximum velocity of propagation of all actions and of a minimum quantity of any action, respectively._The ultimate reason for the unavoidable renunciation as regards the absolute significance of ordinary attributes of objects, ……The Causality Problem in Atomic Physics, *New Theories in Physics*, Warsaw, Joseph Pilsudski university ,1938 p. 25

(3)Notwithstanding all differences between the physical problems which have given rise to the development of relativity theory and quantum theory, respectively, a comparison of purely logical aspects of relativistic and complementary argumentation reveals striking similarities as regards the renunciation of the absolute significance of conventional physical attributes of objects. Discussion with Einstein on Epistemological Problems in Atomic Physics, *Niels Bohr Atomic Physics and Human Knowledge, 1958*, p.64

(4) From the above considerations it should be clear that the whole situation in atomic physics deprives of all meaning such inherent attributes as the idealization of classical physics would ascribe to object.Causality and Complementarity, *Philosophy of*

Science, Vol.4, 1937, p.293 From quotation (1), it is apparent that the general theory of relativity provides a radical revision of physical reality and the absolute character of physical phenomena. From quotation (2), we gather that the theory of relativity and quantum theory possess striking similarities in a logical respect and that it is necessary to renounce the absolute significance of the ordinary attributes of objects. From quotation (3), we see that we must renounce the absolute significance of conventional physical attributes of objects. From all three, we find it necessary to negate the absoluteness in physical phenomena. In respect of the negation of the absoluteness, the theory of relativity resembles quantum theory. Niels Bohr went no further than pointing out the logical commonality of both, but the negation of the absoluteness is very important and connects the theory of relativity with quantum theory. The negation of absoluteness of physical phenomena means that things are not independent but interdependent. Things do not exist by themselves absolutely, they exist with other things. For example, I sit on a chair but the chair rests upon the floor. The floor is part of a building. Furthermore, the building stands upon the earth. All things are not independent, but interdependent. I termed the negation of absoluteness as ‘ nothingness as a lack of subsistentia ‘ (“ *Philosophy of Nothingness and love*, Chapter II nothingness as the root of Kuu or enlightenment). Through the intuition of nothingness, Niels Bohr, Einstein and Heisenberg reached the standpoint of the negation of absoluteness. Niels Bohr expresses what I term , ‘ nothingness as a lack of subsistentia(substance) ‘ when he says that the whole situation in atomic physics deprives of all meaning such inherent attributes as the idealization of classical physics would ascribe to objects. The expression of ‘ deprives of all meaning ‘ refers to meaninglessness , nothingness as a lack of meaning. Is this striking similarity only an accident? No, it is not. The intuition of nothingness provides the ground for one to make this striking similarity. The negation of absoluteness through the intuition of nothingness is the common foundation of the theory of relativity and quantum theory. Against the commonality of both, the differences are quite simply proposed.

(5) Demgegenüber bedeutet die Aufrechterhaltung der Kausalitätforderung bei den einzelnen, durch das Wirkungsquantum gekennenzeichneten Lichtprozessen einen Verzichthinsichtlich der raum-zeitlichenVerhältnisse. Das Quantunpostulat und die neuere Entwicklung der Atomistik; Die Naturwissenschaften, Vol.16, 1928, p. 246

(6) Nach der Quantentheorie kommt eben wegen der nicht zu vernachlässigenden Wechselwirkung mit dem Meßmittel bei jeder Beobachtung ein ganz neues unkontrollierbares Element hinzu, wie aus den obigen Auseinadersetzungen hervorgeht, ist ja die Messung der Lagekoordinaten eines Teilchens nicht nur mit einer endlichen Änderung der dynamischen Variablen verbunden, sondern die Festlegung seiner Lage bedeutet einen Vollständigen Bruch in der kausalen Beschreibung seines dynamischen Verhalten, ebebso wie die Kenntnis seines Impulses stets auf Kosten einer unausfüllbaren Lücke in der Verfolgung seiner raumzeitlichen Fortpflanzung gewonnen wird.Eben dieser Umstand bringt deutlich den Komplementaren Charakter der quanten theoretischen Beschreibung atomarer Phänomene zutage,.....ibid. p. 250

(7) Seinem Wesen nach setzt schon die Formulierung des Relativitätsarguments die den klassischen Theorien eigentümliche Vereinigung der Raum-Zeitkoordination mit der Kausalitätsforderung voraus. Wir müssen deshalb bei der sinngemäßen Anpassung der Relativitätsforderung an das Quantenpostulat auf einen noch weiter gehenden Verzicht auf Anschaulichkeit im gewöhnlichen Sinne gefaßt sein, als bei den hier besprochenen quanten theoretischen Methoden. ibid. p. 257

(8) The causal mode of description has deep roots in the conscious endeavours to utilize experience for the practical adjustment to our environment, and is in this way inherently incorporated in common language. By the guidance which analysis in terms of cause and effect has offered in many fields of human knowledge, the principle of causality has even come to stand as the ideal for scientific explanation. On the notions of causality and complementarity *Dialectica*, Vol. 2 p.312 Presses Universitaires de France From quatation(5),(6),(7) , we can find differences between the two easily. The first difference lies in the negation of spatial coordinates. As the position and momentum of a particle have small errors, variation and indefiniteness to some extent, there is uncertainty in the variation and errors. Uncertainty is the nothingness of indetermination. In the nothingness of uncertainty, a system of coordinates does not function. Spatial coordinates which is the most certain tool of mathematics is not useful in such a context. Einstein negated Euclidean geometry and instead introduced Riemann space. Einstein relied on mathematics also. Bohr did not neglect mathematics but placed more emphasis on facts. As the result of that, he gave up the description in terms of coordinate space. This means freedom from mathematics. Afterward, Alexander Vilenkin was thoroughgoing in this respect. He wrote the report, ‘ Creation of universes from nothing ‘ (Physics Letters. Sect. B 1982) with only a few numerical expressions. The second difference between the theory of relativity and quantum is the negation of continuity. In the nothingness of indetermination , there is no continuity of space this is a quantum-jumping for example. This means a negation of the law of causality. We can not find the law of causality in the nothingness of uncertainty. We can find the law of causality only in the continuity and limited space. According to Bohr quotation(8), the law of causality has its roots in the only conscious endeavor which we use to adjust our experiences and have become a fixed element in our language and thought through experience a aposteriori. After human acquired the cognitive thought custom, the principle of causality came to stand alone as the ideal for scientific explanation. This is the sort of thinking, we find in philosophy. For example, Kitarou Nishida, Japanese original philosopher, says that the law of causality is only a custom of our thought(“ *Nishida Kitarou complete works*, I .vol. An Inquiry into the Good “ pp 56~57, Iwanami Shoten). Bergson has a similar view (Henri Bergson *Mélanges*. PUF, 1972, p.423).Instead of the law of causality, Bohr insisted on talking about complementarity. This is a quality which makes natural phenomena complement each other, though the result of experiments yields what looks like a contradiction. Even though there are so many contradictories on the surface, natural phenomena and conditions are realized in the whole. Kitarou Nishida called this the self-identity of absolute contradictories.(*Nishida complete works*, X vol. pp. 398~400). Einstein coined the term Relativity. In contrast, Bohr came up with the term Complementarity.

Thus I have discussed the commonality and differences between the theory of relativity and quantum theory. As a result, the burden of our work must be done on a dimension that transcends mathematical truth. The dimension free from mathematics is philosophy. Synthesizing the theory of relativity and quantum theory is the problem and mission of philosophy.

The origin of the theory of relativity

The theory of relativity is the negation of the absoluteness of physical phenomena and a lack of subsistentia from a philosophical view. As the world and the universe are moving, there is no absolute condition of rest and no absolute fixed space. As I remarked above , it seems to me that I am at rest, yet I am moving because of rotation and revolution of the earth. I can only understand myself in the moving world with all bodies moving each other. As the absolute fixed space is negated, there is no absolute center of the universe. My position in the universe is not determined. I only know my relative position in the universe. Such a negation of absoluteness expresses nothingness as a lack of subsistentia. A thing can't exist by itself but things exist interdependently with other things . We can only understand the universe relatively, as the negation of absoluteness. One of the methods of getting relative understanding is the three- dimensional coordinate space of Descartes and Newton. As there is no absolute position in the universe, every individual would be at the center of the universe. Everybody would be center of the universe. This is thoroughgoing subjectivism. Bohr also expounded such subjectivism. From the point of view of quantum theory, there is no distinction between subjectivism and objectivism. We must be both spectators and actors (Discussion with Einstein: *Atomic Physics and Human knowledge*. P.63).

In contrast to Bohr, Einstein originated the four-dimensional space. He added the three -dimensional coordinate to a time coordinate and introduced Riemannian Space. But Einstein's the theory of relativity is only a partial explanation of the universe and it is not whole of explanation of the universe. Above I demonstrated the relativity of mathematical truth, it is a limitation on the theory of relativity that it depends upon mathematics. Einstein liked elegant mathematical systems, order and harmony. But an elegant mathematical system is an ideal system that is separated from the reality by the continuous abstraction. This means that he upheld the value of classical physics and mathematics. Einstein's view could take him no further on this point. Therefore, there are two conflicting appraisal of his work. One sees him as a destroyer of classical physics and the other as a supporter of classic physics. Einstein moves between these two evaluations. Nonetheless he really did create the theory of relativity through an intuition of nothingness as a lack of subsistentia.

At one time, Nietzsche intuited nothingness and denied the existence of God, the Absolute. Similarly Einstein intuited nothingness and rejected the absoluteness of space and time. Nietzsche and Einstein are not directly connected. But they are related through the negation of absoluteness and nothingness as a lack of subsistentia. Nietzsche denied God, the Absolute that dominated world for three thousand years. Through his declaration of the death of The God, he insisted on relativity and individuality. Corresponding to this philosophical movement (Nietzsche's negation of absoluteness), Einstein intuited nothingness in the relation of physics and then proposed the theory of relativity that negated the absoluteness. Here, one might argue. " Einstein did not insist on nothingness. He did not mention the intuition of nothingness. "I think that I can overcome this objection.

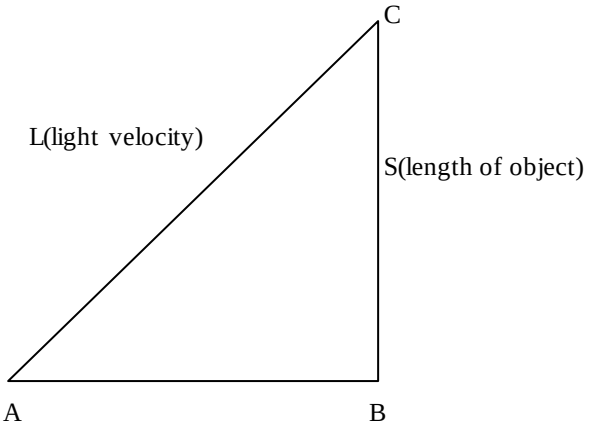
First, in the negation of absoluteness, nothingness functions as a negative word in our thought. No-thing is not-thing. And then not-thing is nothingness. This means nothingness functions pre-logically in our thinking. In Einstein' s thought, nothingness functioned as a result of his intuiting nothingness.

Second, he won Nobel Prize for the theory of photoelectric effect. In the theory of photoelectric effect, mass of photon is zero. In his research on light too, he faced nothingness(zero)

Third and this is decisive, the theory of relativity of Einstein itself realizes nothingness and infinity. According to the theory of relativity, when the velocity of moving body reaches to the velocity of light, the mass of the moving body is infinite. This is well known. How then does the shape and size of the moving body change? According to the theory, the moving body approaches the velocity of light, it shrinks in size (length). At the light velocity, its size (length) is zero (nothingness). Nothingness and infinity are realized at the same time. This proves that nothingness continues on to infinity and man can't separate nothingness and infinity. (I do not say that nothingness is identical with infinity.)My principle of nothingness implies that nothingness continues on to infinity that applies to the theory of relativity. The origin of the theory of relativity is an intuition of nothingness and infinity. This provides for the synthesis of the theory of relativity and quantum theory.

If I use a triangular figure, I can explain the simultaneous realization of Nothingness and Infinity. I refer to the book, " *Understanding the theory of relativity through diagrams* " Kazuyoshi Ikeda, Koudansha, Tokyo. In the second chapter, " A moving body shrinks " and the seventh chapter, " A moving body gains mass ", you can find information about this topic.

This book helped my understanding of the theory of relativity and supported my interpretation. The use of a triangular diagram makes it easy to understand the theory of relativity. This is an inverse proportional relation between AB and BC. Mass becomes infinity when L becomes light velocity.



V : velocity of moving bodies

V÷L . When V increases, AB grows longer. L does not change.

When V increases, BC shortens.When V becomes light velocity,S(BC) becomes zero (nothingness).

The origin of quantum theory

Quantum theory depends for its foundation upon the uncertainty principle. This principle states that if one measures the position of a particle, one can not determinate the precise velocity of the particle. Contrarily, if one measures the velocity (momentum) of the particle, one can not determinate the position of the particle precisely. Thus one recognizes error or blurring. This error means no-determination and uncertain nothingness. Werner Heisenberg faced uncertain nothingness in the particle world. In his typical report,' Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik ' (1927), he intuited uncertain nothingness of the position and the velocity (momentum) of a electron and then described the experience as uncertainty principle. In this same year, Heidegger who is the

great synthesizer of European philosophy intuited nothingness as death and published his book, *" Sein und Zeit "* . This is not an accident but is the inevitable result of philosophical intuition. Intuition is not limited to philosophy. It extends to every domain. Heisenberg intuited nothingness in physics and expressed it as the degree of freedom("Der Teil und das Ganze", Werner Heisenberg, PIPER Verlag,p.75) and uncertainty. Nothingness slips into mathematics and coordinates in space. Therefore, in quantum theory, one can not be bound by numerical expression or mathematics. Often one admits of logic jumps in quantum theory. If the results are good, then I have no problem in accepting them.

In a famous study of black radiation by Planck, he inserted minus 1 into the denominator of Wien's formula. He did not insert the minus 1 into the denominator because of theoretical proof. The only reason was that he allowed him to find an ideal graph. This operation is not admitted in mathematics. It is not sort of mathematics that one may intentionally insert minus 1 into the denominator in order to get an ideal graph. This ignores a serious rule of mathematics. Quantum theory uses mathematics as a convenience. Spatial system of coordinates is already negated. From the quotation (6), we can not neglect the interaction between observer and the devices of measurement. This means that the use of light always gives rise to some variation and observation always includes some uncertainty, blurring and error.

Still more, if one expands this error, uncertainty and indetermination, one can not definite coordinates in the error, indetermination and nothingness. It is when one tries to draw a line in a vibrating car. Therefore man can't make coordinates. In this indetermination and nothingness, the spatial system of coordinates can not be fixed. If one enlarges the scape of indetermination and nothingness to the size of the universe, the whole of the universe corresponds to the indetermination and nothingness. Outside the solar system, in the galaxy , a straight line would actually be a curve and a plane would be a curved surface. One can not measure this curvature. Therefore, a spatial system of coordinates can not be realized. From Mathematics and traditional physics, it seems that quantum theory lacks mathematical definition and is imperfect. However, in reality it is the reverse. The field mathematics and traditional physics is limited narrowly, as mentioned above. Bohr also says that however useful traditional physics and philosophy are , they are too narrow to comprehend new experience.

The lesson we have hereby received would seem to have brought us a decisive step further in the never-ending struggle for harmony between content and form, and taught us once again that no content can be grasped without a formal frame, and that any form, however useful it has hitherto proved, may be found to be too narrow to comprehend new experience. Discussion with Einstein on Epistemological Problems in Atomic Physics

Niels Bohr Atomic Physics and Human Knowledge, 1958 p.65

The traditional form of recognition(philosophy, especially Kant)of the mathematical and physical world view is limited. The standard traditional form of recognition is observation. Things that are clearly observed and determined exist. Existence is expressed on the coordinates. But , in opposition to that, from my standpoint, things that can not be observed and defined are whole of the universe. Existence that is observed and defined is only a small part of the universe. If we compare the size of the universe to the earth, we can only draw a map of Nara prefecture or Rhode Island on the earth. All other areas are in infinite darkness, width and uncertain nothingness. Niels Bohr intuited this nothingness. Nothingness escapes definition by equations and systems of coordinates. Imaginary numbers are only one of the expressions of nothingness. Definitions, theorems and formulae are fixed by thought and the practical utility of man. The world that is defined by abstract rules is limited.

In mathematics, there is big limitation on the starting point. Certain operations are indefinite and impossible. $0 \div 0$ is impossible, $0 \times X = 0$ is indefinite. As it is difficult to do mathematical operations on these notions, man excluded them from mathematics. But the principle of nothingness that I proposed includes indefiniteness and impossibility. Mathematics excludes these notions for the sake of convenience. In here, the values that one can recognize existence surely work firstly. But from the principle of nothingness that continues to infinity →eternity →transcendental-being, nothingness and infinity are continuous and all these are inseparably related to each other. Mathematics can not express this thought. Pascal says that man can touch infinity and think of the possibility of infinity(numerical continuity and extent of space), but man can't grasp essence of infinity and nothingness(Pascal,Œuvres complètes,Pensée. Pléiade, Gallimard,1954. p.1107). For example, there are an even number and an odd number among the natural numbers. Which is infinite? One can't express the sum total with any certainty. Therefore, man introduced the indefinite and the impossible. Mathematics develops with such a premise. Mathematics that uses numerical formula and the system of coordinates is limited in its ability to explain the universe. As the result of that, physics, which usually depends upon mathematics, has also a limit. Planck length and time are the proof of the limitation of physics. Physics cannot treat a smaller length than Planck length (10^{-33}cm) or a shorter time than Planck time (10^{-43}sec.). The smaller world than Planck length is the world of uncertainty. Heisenberg writes about the limits of science as follows;

To begin with, it is important to remember that in natural science we are not interested in the universe as a whole, including ourselves, but we direct our attention to some part of the universe and make that the object of our studies. In atomic physics this part is usually a very small object, an atomic particle or a group of such particles, sometimes much larger the size does not matter; but it is important that a large part of the universe, including ourselves, does not belong to the object. *Physics and Philosophy,* Werner Heisenberg, 1999. Prometheus Books. New York p. 52

Heisenberg knows the limits of science. Science can only treat a small part of the universe. In contrast, one can talk of the whole of the universe as follows. If one says that it is, it exists. If one says that it is not, it does not exist. Man can't specify it definitely. It transcends being and not-being. I call it Absolute Nothingness. It corresponds to the end of the universe in Macro. In a sense, quantum theory touched the real facts of the world and the universe. The world that is observed is the limited world and the world that is not observed is overwhelming widely. The world that is not observed is an uncertain area and is the openness of infinite possibility (nothingness). Then Bohr spoke of the openness of vast area of experience described by quantum theory. Mit Hilfe der Quantenmechanik beherrschen wir ein ausgedehntes Erfährungsgebiet, vor allem sind wir imstande, viele physikalische und chemische Eigenschaften der Elemente in Einzelheiten zu beschreiben. Die Atomtheorie und die Prinzipien der Naturbeschreibung; *Die Naturwissenschaften*, Vol. 18, 1930, p. 76

Today, one of the typical results from this vast domain is the existence of the neutrino . Recently, one confirmed its existence

and mass at last. Though the neutrino was predicted by W. Pauli 75 years ago, but scientists needed several decades, a huge mass of equipment and a large special budget (one hundred million dollars) in order to confirm the mass in Japan. The neutrinos that were observed were from Magellan galaxy, 160 thousand light-years. Neutrinos from the sun drench the earth some trillion pieces per a second and pass through our bodies. What is the neutrino on earth? We could confirm only 16 neutrinos out of the countless ones that pass by. Still more, there are other unknown particles which have not been confirmed in the universe. With saying to mass, for example one says that the mass of an unknown particle exists or the mass does not exist. For example, what is virtual particle? It appears, then suddenly it disappears. What is the reason for its appearance and disappearance? This shows that existence and nothingness co-exist(Absolute Nothingness). Finally, questions about hypothetical particles extend to ' vacuum energy'. According to traditional cosmology, there is no energy in space. But the expansion of the universe needs energy, because it is short of energy from the Big-Bang. The expansion of the universe explains vacuum energy. Then what is vacuum energy ? Vacuum energy and other particles are reality, the stream of life that passes through the whole cosmos, all things(I demonstrated , nothingness as reality, in "*Philosophy of Nothingness and love"*). As the reality is beyond words, it is called nothingness, nothingness as reality. Quantum theory and contemporary cosmology confronted the nothingness that transcends words, mathematics and physics. Theory of relativity intuited and expressed nothingness as a lack of subsistentia, while it persisted in using mathematical expressions about the moving universe.

In conclusion, the theory of relativity and quantum theory have in common the negation of absoluteness; both Einstein and Bohr intuited nothingness as a lack of subsistentia(substance). The theory of relativity insisted on the expression of the universe in mathematical term, on the other hand quantum theory, while respecting mathematics, is not always restricted by mathematics. From my view, they both express my principle of nothingness (nothingness continues to infinity → eternity → transcendent being) and then go on to separate their theories from my principle. After the separation, they developed their theories independently. The theory of relativity and quantum theory are only parts of my philosophy. Strictly speaking, my philosophy, the principle of nothingness and love, is the origin of the theory of relativity and quantum theory, and has already effected the synthesis of both theories.I read this paper at The Philosophical Association of Japan, 23 May 2004

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