Einstein, Kant, and Taoism

Y. S. Kim
Department of Physics, University of Maryland,
College Park, Maryland, 20742, U.S.A.

Abstract

It is said that Einstein’s conceptual base for his theory of relativity was the philosophy formulated by Immanuel Kant. Then, is it possible to see how Kant’s philosophy played a role in Einstein’s thinking without reading Kant’s books? This question arises because it is impossible for physicists to read Kant’s writings. Yes, it is possible if we use the method of physics. It is known also that Kant’s mode of thinking was profoundly affected by the geography of Koenigsberg where he spent eighty years of his entire life. We examine what aspect of this geography led Kant to create his philosophy upon which Einstein’s concept of relativity was based. It is pointed out that the Eastern philosophy of Taoism is a product of the geographical environment similar to that of Kant’s Koenigsberg, and therefore that it is easy to absorb Kantianism with Taoist background.

1 Introduction

From the philosophical point of view, Einstein was a Kantianist [1, 2]. It is also known that Kant’s philosophy was influenced by the culture of Koenigsberg where he spent his entire life [3]. In this article, we examine how Einstein’s thinking was influenced by the lifestyle of Kant’s birthplace.

According to Eugene Wigner, philosophers do not dictate others how to think. They only interpret how people think [4]. Then Immanuel Kant (1724-1804) formulated his philosophy based on the people he met throughout his life. Kant was born and spent his entire life in an East Prussian city called Koenigsberg. He was strictly a local person. Therefore, his line of thinking was thoroughly configured by the citizens of Koenigsberg during his time. In 1946, this city became a Russian city called Kaliningrad. Therefore, if Kaliningrad has a feature distinct from other places, we are interested.

According to Karl Marx, philosophers interpret this world in various ways. There comes the question of changing the world [5]. Marx was wrong if regarded himself as the philosopher and Vladimir Lenin as the person who would change the world. On the other hand, Marx was right if Kant was the philosopher and Einstein was the person who changed the world. Einstein was more than a philosopher. He was a
physicist. Thus, philosophers can help us, but we cannot solely depend on them for providing answers to what Einstein means to us. We are interested in how Einstein was able to formulate his physical ideas which changed the world.

In this paper, we are interested in the aspect of Kantianism that things depend on how observations are made, namely on the observer’s status of mind and on his/her environment. Modern physics is an observer-dependent science. In special relativity, the same physics can appear differently to observers in different Lorentz frames. The kinetic energy of a particle in one Lorentz frame can be written as $E = p^2/2m$ when the particle speed is much smaller than the speed of light, while it takes the form $E = pc$ when the observer’s frame moves with a speed close to $c$.

In quantum mechanics, we have a wave-particle duality. For observers who can see only particles, a particle looks like a particle. On the other hand, it looks like a wave for observers who can see only waves. Quantum mechanics is also an observer-dependent science, within the framework of Kant’s philosophy.

If Kantianism is a product of the geography of Koenigsberg now called Kaliningrad, the best way to study this geography is to go there and look at the place and talk to the people who live there and those who used to live there. For this purpose, I went there in June of 2005 and spent three days and two nights. Indeed, based on my observations, I am now able to assert that Kantianism, at least the aspect which affected Einstein, was a product of the geography of the city which served as Kant’s entire world.

Again, if we believe in Kantianism, the contents of this article depend heavily on who the author is, and how his brain was configured by his environments. The author of the present paper was born in Korea and came to the United States in 1954 after high school graduation. He received both undergraduate (Carnegie-Mellon) and graduate (Princeton) degrees in the United States. In addition, he has been teaching American students since 1962 after joining the faculty of the University of Maryland. He is in a position to compare Kant-oriented Koreans with American scientists with the Edisonian tradition.

In Sec. 2 I report what I observed and learned while visiting Kant’s city now called Kaliningrad. In Sec. 3 based on the observation I made there, we trace the history of Koenigsberg which led Kant to formulate his philosophy. We list in Sec. 4 various examples in our daily life which can be explained in terms of Kantianism. In Sec. 5 it is noted that modern physics is an observer-dependent science. It is then pointed out that the origin of this observer dependence can be traced to Immanuel Kant who constructed his philosophy based on the lifestyle of Koenigsberg where everything is observer-dependent.

In Sec. 6 we trace the history to see that Taoism originated in ancient China is based on different observers with two opposite viewpoints. I then venture to say that its historical origin is the same of that of Kantianism. We note in Sec. 7 that
Einstein did not communicate well with American physicists. The reason could be that Einstein was a Kantianist while the philosophy of America is yet to be defined. Let us tentatively call the American philosophy “Edisonism.” The distinction between these two philosophies is spelled out.

I started a systematic research on Einstein’s Kantian connection in 1995 while reading a book review by Marie Arana-Ward in the Washington Post, an influential newspaper published in the capital city of the United States. She was reviewing a book written about Kaliningrad by Anne Applebaum. Her review was much shorter than the book, and is to the point. With her permission I include her article in the Appendix of the present paper.

\section{Geography of Kaliningrad}

Immanuel Kant was born in an East Prussian city of Koenigsberg in 1724 and lived there until he died in 1804. He left the city once for a brief period to attend his father’s funeral. If Kant’s style of thinking was configured by the society where he grew up and worked, he had contacts only with the citizens of Koenigsberg. Then what aspect of Koenigsberg was so distinct from the rest of the world?

We learn history in order to understand what is happening today. Likewise, one way to understand history is to study what is happening now to construct a picture of the past. With this point in mind, let us see what is going on in Koenigsberg these days. Since Kant wrote his books in German, we are tempted to locate Koenigsberg within the territory of Germany, but it does not exist there. Furthermore, the city is now a Russian city called Kaliningrad, located at the Baltic wedge between Poland and Lithuania. Since 1945, Kaliningrad had been an important submarine base for the Soviet Union until recently. It still serves as a naval base for Russia.

The best way to study the geography of a city is to go there and look at the city and its surrounding areas. Indeed, for this purpose, I went to Kaliningrad in June of 2005. Because, the city’s primary function used to be to serve as a sensitive military base for the Soviet Union, it was impossible to go there during the Soviet era. The city is still an isolated place.

Before going to Kaliningrad, I attempted to contact a physics professor at the University of Kaliningrad, but could not find anyone. Thus, I had to arrange my visa and hotel accommodation through the Intourist, a Russian tourist company which has been operating since Stalin’s Soviet era. This tells us how isolated this city is. There are no railway connections from Poland, and I had to fly from Warsaw on a propeller-driven airplane, operated by a branch of the LOT Polish airline. Its flight schedule was erratic. It is possible for Russians there to go to Moscow by overnight trains, but they need transit visas to Lithuania and Latvia. There are no civilian
airports to accommodate jet airlines. In short, it is not yet completely safe to travel to Kaliningrad.

When I arrived at the airport, a German lady whom I met on the plane asked me whether I am interested in going to the city with her Russian friend who came to the airport to pick her up. I said yes, because the place was totally strange to me, and I would save sixty dollars on taxi fare. Both of them spoke German. This was precisely what I was expecting to see. Kaliningrad is now a Russian city, but its German root still persists. I stayed at a hotel called “Kaliningrad” located at the center of the city. Most of the hotel guests came from Germany. Many of them were born there before 1945, and I enjoyed talking with them. I am also one of those who had to flee in 1946 from my Korean hometown to avoid Soviet troops.

Before 1945, Koenigsberg was an important outpost for Germany, especially for those German politicians with a big ambition of expanding eastward. During World War II, Germans built powerful radio transmitters there to preach those in Baltic nations how great Germany is. While Soviet troops were advancing toward Berlin in 1945, Hitler ordered all the 400,000 inhabitants of the Koenigsberg region to move to western provinces of Germany, but only one half of them were able to flee and the other half were trapped by Stalin’s Soviet army.

Those trapped Germans were all sent to post-war construction sites in the Soviet Union, and the city became filled with Russians. The Lomonosov campus of Moscow State University was built by German laborers. With an understanding of Churchill and Truman at the Potsdam conference (July 1945), Stalin annexed Koenigsberg and its surrounding areas to the Soviet Union, and changed the name of the city to Kaliningrad. It was a big prize for Stalin because it gave him a much needed non-freezing harbor for his Baltic fleet.

What happened to Immanuel Kant known to and respected by the entire world? Germans of course are very proud of Kant, who wrote his books in the language they speak. They were not allowed to visit Kant’s grave during the Soviet era. How about Russians? Russian couples usually have their wedding ceremonies on Saturdays. After the ceremony, they visit the grave of their hero they respect most. Kant’s grave site becomes very crowded with newlywed couples on Saturdays. Indeed, Kant is one of the Russian heros. How do I know this? I was at Kant’s grave site and saw them when I was in Kaliningrad.

Kant’s grave is located outside an old church building located at the city center of Kaliningrad. Many prominent persons from Koenigsberg were buried inside the church. Kant was buried outside because he did not believe in Jesus. There is a museum dedicated to Kant in one of the church turrets. Russians, even during the Soviet era, did their best to preserve the historical items relating to Immanuel Kant. We shall continue this story of Kant museum in Sec. 6.

After the collapse of the Soviet Union, the Russian government did not and still
does not have enough resources to impose a strong influence on the region, and foreigners are allowed to visit the city of Kaliningrad. Naturally, many Germans come and spend money there. Russians love German money but want to maintain their firm control over the city and surrounding region. On the other hand, Germans like to have something for their money. They want to have their city back.

Germans built a brewery there and produce beer trademarked “Koenigsberg,” and I drank a bottle of Koenigsberg while I was in Kaliningrad. It was very good. Until 2005, their university was called “Kaliningrad State University,” but it was renamed to “Kant State University.” It is very safe to assume that Germans contributed a large sum of money to the university for this name change. German capitalists are very busy in constructing resort facilities along the Baltic coast of the Kaliningrad region.

For the same city, Germans and Russians have two different views. It is unlikely that there will be a violent armed struggle often seen in other parts of the world. Then it would be interesting to see how these two different views can be blended into the destiny of Kaliningrad. One place with the same destiny with two different ways of looking at the same place! With this background, we can trace the history of Kaliningrad or Koenigsberg.

3 History of Koenigsberg

In 2005, there was a celebration in Kaliningrad to commemorate the 750-th anniversary of the founding of the city. President Vladimir Putin of Russia and Chancellor Gerhardt Schroeder of Germany attended the ceremony marking this occasion. Exactly 750 years before, a rich and strong man built a castle at the top of a mountain there and proclaimed himself to be the king. This is the reason why the place was called king’s mountain. However, the land and its people existed many years before this Koenig. What did they do? What happened to them?

If we look at the map containing Kaliningrad, Lithuania, Poland, Belarus, and Ukraine, there are no natural barriers to isolate themselves from foreign invaders. Thus, anyone with a strong army could march into the area and impose his own management and his own cultural values. For this reason, the people there had to develop skills to accommodate many different ways of looking at themselves. I learned this from Applebaum’s book entitled Between East and West: Across the Borderlands of Europe [3], and its comprehensive book review by Marie Arana-Ward in the Washington Post (November 1994).

Then, what makes Kaliningrad different from Poland or Ukraine? The key difference is that this area has a large lagoon which can provide a harbor for the vessels navigating in the Baltic Sea. Thus, the city served as a fishing center for centuries.
Unlike Poland or Ukraine, this coastal area is blessed with generous rains. This allows grasses to grow providing good food to cattles. Kaliningrad was a center for cattles producing high-quality meats. While I was there, I enjoyed a steak of generous size.

Kaliningrad is also blessed with abundance of amber. There are many amber mines along the Baltic coast. Katherine the Great of Russia built an amber room in her palace from the ambers from this area. The original amber room was taken away by German troops during World II when they surrounded the city of Leningrad and occupied Katherine’s palace located at the place now called “Pushkin.” It is believed that the amber room in its disassembled form is buried in Koenigsberg, but its location is not known. A remake of this amber room is now in the Hermitage Museum of Saint Petersburg.

Thus, before politicians started giving names to the place such as Koenigsberg or Kaliningrad, this harbor city was a commercial center for the Baltic Sea, as Venice was for the Mediterranean Ocean. The region became richer and stronger, while accommodating many different points of view from different people from different places. The area surrounding the city became a small country called Prussia, with Koenigsberg as its capital city.

Prussia became so rich that it was able to purchase a large chunk of land west of Poland including the city now known as Berlin. Since this new area was close to Western European countries going through industrial revolution, it developed very rapidly, and Prussia’s center of gravity moved to Berlin. The original Prussia then became absorbed into a new empire called Deutschland, and it became a province called East Prussia. In Poland, this region is still called Prussia.

While there was a rich flow of history, Koenigsberg had enough resources to construct and maintain a top-class university, cultivating many outstanding scholars. Depending on political climate of the city, this university went through different names. The present name is Kant State University. Until 1945, the university constantly maintained its excellent academic tradition consistent with Immanuel Kant’s creativity. The university went through a dark age when the city was closed during the cold-war era. From 1945 to 2005, the university was called Kaliningrad State University. It served as a local institution providing college education to young Russians from the Kaliningrad region. These days, both Russians and Germans seem to agree on the need for reconstruction of its academic tradition.

In physics, the University of Koenigsberg was the birth place of mathematical physics. We know how to write down Coulomb’s law for two charged particles. The same law can be written in terms of electric field and Gauss’s law. Gauss’s law was extended to cover all Maxwell’s equations. The integral form of Maxwell’s equations was completed at the University of Koenigsberg, as Arnold Sommerfeld states clearly in his book on electrodynamics [6]. Sommerfeld was a student there.
Table 1: Although Minkowski formally declared the Lorentz covariance of Maxwell’s equations 1907, Einstein knew it before 1905 and was afraid of the physical world in which Newton’s mechanics and electrodynamics have two different transformation properties. To those who know only Maxwell’s electrodynamics, this world is Lorentzian. To those who know only Newton’s mechanics, the same world is Galilean. Einstein wanted to have one transformation law for both mechanics and electrodynamics.

| Space and Time | Maxwell | Newton |
|---------------|---------|--------|
| Lorentzian    | YES     | NO     |
| Galilean      | NO      | YES    |

While those Koenigsbergers were busy in studying Maxwell’s equations, Hendrik Lorentz of the Netherlands and Henri Poincaré of France were working on the mathematics known today as the Lorentz group. Hermann Minkowski from Lithuania was a graduate student at the University of Koenigsberg at that time. He became interested in whether Maxwell’s equations and their solutions are consistent with the Lorentzian world. He continued working on this problem while he was a professor at the University of Munich, where Einstein was a student. Einstein was not a good student to him (he was never a good student to anyone), but he sensed from Minkowski the Lorentz covariance of electrodynamics, even though Minkowski did not publish his work in 1907. Then, how about Newtonian mechanics? This is the question which confronted Einstein, as is illustrated in Table 1.

As I emphasized in Sec. 2, this is the type of question the citizens of Koenigsberg had to face throughout their history. This is precisely what Kant’s philosophy is about. Indeed, Kantianism is a product of the lifestyle of Koenigsberg.

4 Illustrative Examples of Kantianism

In order to gain a concrete grasp of Kantianism, let us examine some examples in the real world which can be explained within the framework of Kantianism. To physicists, it is impossible to understand physical or philosophical theories without seeing what happens in the real world. We shall discuss here limitation of observations,
observations with a fixed frame of mind, different manifestation of the same object, and construction of the true world based on different observations.

The Italian city of Trieste is known to physicists as the home of the International Center for Theoretical Physics. The center is about five kilometers from the downtown, and there is a bus connection along the beach where many beautiful girls swim and relax. When I was on the bus with my friend, it was half full, and I could see everybody including the driver. I told my friend everybody on this bus in woman. He then told me it is so because my eyes can detect only women. My friend was a physicist and knew how to speak the language of modern physics. I never found out whether it was so because there were only women or because of measurement problems with my eyes.

At a dinner time, I said that Trieste is an excellent place to stage a war. It has sea, mountains, islands, and beautiful ladies. A perfect combination! Of course, my comment outraged everybody, but military professionals would agree with me. In fact, many generals in the past chose this place to fight. Then what do I have in common with those military people? The answer is very simple. I was born and raised in Korea. When I was born, Korea was hosting Japanese troops. American and Soviet troops after 1945. Then the Korean War (1950-53) before I came to the United States 1954 after my high school graduation. This means that my body and mind were configured in the war environment. When I weigh things, I still compare them with the weight of the M-1 rifle of the U.S. army weighing ten pounds and its bayonet weighing one pound.

About 4,500 years ago, there was a king named Yao in China. While he was looking for a man who could serve as his prime minister, he heard from many people that a person named Shiyu was widely respected and had a deep understanding of the world. The king then sent his messengers to invite Shiyu to come to his palace and run the country. After hearing the king’s message, Shiyu, without saying anything, walked down to a creek in front of his house and started washing his ears. He thought he heard the dirtiest story in his life.

Shiyu is still respected in the Eastern world as one of the wisest men in history. We do not know whether this person existed or is a made-up personality. In either case, we are led to look for a similar person in the Western world. In ancient Greece, each city was run by its city council. As we experience even these days, people accomplish very little in committee meetings. Thus, it is safe to assume that the city councils in ancient Greece did not handle matters too efficiently. For this reason, there was a well-respected wise man, like Shiyu, who never attended his city council meetings. His name was Idiot. Idiot was a wise man, but he never contributed his wisdom to his community. His fellow citizens labeled him as a totally useless person. This was how the word idiot was developed in the Western world.

Idiot and Shiyu had the same personality if they were not the same person. How-
ever, Idiot is a useless person in state-centered societies like Sparta. The same person is regarded as the ultimate wise man in a self-centered society like Korea. I cannot say that I know everything about other Asian countries, but I have a deep knowledge of Korea where I was born and raised. The same person looks quite differently to observers in different cultural frames. While living in the United States with my Eastern background, I was frequently forced to find a common ground for two seemingly different views.

As an example closer to physics, let us look at a Coca-Cola can. It appears like a circle if we look at it from the top, while it looks like a rectangle from its side. The real thing is a three-dimensional circular cylinder.

Immanuel Kant emphasized the importance of the observer’s subjective viewpoint in his book entitled “Kritik der reinen Vernunft” whose first and second editions were published in 1781 and 1787 respectively. While Kant was interested in finding the real thing from different observations, he became to believe in absoluteness of the real thing.

However, using his own logic, he ended up with a conclusion that there must be the absolute inertial frame, and that we only see the frames dictated by our subjectivity. He noted that there are many moving bodies in the universe. To him, the earth also was a moving object, like all other planets or stars. He then became obsessed with the absolute frame of reference. There are still many who believe in the absolute frame. Here we cannot blame Kant too much for failing to come up with the principle of relativity. He did not have the benefit of Lorentz-covariant formulation of Maxwell’s equations.

We all know how Einstein’s view is different from the Kantian view of the universe. However, without Kantian philosophical background, it could have been very difficult for Einstein to formulate his relativity. He introduced a Lorentzian dimension for the time variable.

5 Kantian Influence on Modern Physics

Unlike classical physics, modern physics depends heavily on observer’s state of mind or environment. The wave-particle duality is a product of Kantianism. If your detector can measure only particle properties, particles behave like particles. On the other hand, if your detector can detect only wave properties, particles behave like waves. Heisenberg had come up with the uncertainty principle to reconcile these two different interpretations. This question is still being debated, and is a lively issue these days.

In special relativity, observers in different Lorentz frames see the same physical system differently. The energy-momentum relation for a massive particle is $E = \frac{p^2}{2m}$ if it is at rest. However, an observer moving with a speed close to that of light
would insist that the same relation should be $E = cp$. It was Einstein who was able to settle the quarrel between these two observers, as is illustrated in Table 2 [7]. This is a manifestation of Kantianism.

Table 2: Further contents of Einstein’s $E = mc^2$. Massive and massless particles have different energy-momentum relations. Einstein’s special relativity gives one relation for both. Wigner’s little group unifies the internal space-time symmetries for massive and massless particles. The covariant harmonic oscillators can explain why the quark model and the parton model are two different manifestations of the same Lorentz-covariant entity.

| Massive, Slow | COVARIANCE | Massless, Fast |
|---------------|-------------|----------------|
| Energy-Momentum | $E = p^2/2m$ | $E = \sqrt{(cp)^2 + (mc^2)^2}$ | $E = cp$ |
| Internal Space-time Symmetry | $S_3$ | Wigner’s Little Group | $S_3$ |
| Relativistic Extended Particles | Quark Model | Covariant Model of Hadrons | Partons |

Einstein, in 1905, formulated his special relativity for a point particle. It became known that particles have internal space-time symmetries. Massive particles have the spin degree of freedom when they are at rest. If they move fast or become massless, they preserve the spin along the direction of momentum, but the transverse components become contracted into one gauge degree of freedom. Is it possible to combine these into one Lorentz-covariant theory? This work was started in Wigner’s 1939 paper on representations of the Lorentz group [8], but was not completed until 1990 [9]. The second row of Table 2 illustrates this aspect of Kantianism.

The concept of spin comes from quantum mechanics. Thus, Wigner’s work constitutes an important component of the task of combining quantum mechanics with
Einstein’s special relativity. The remaining problem is whether quantum mechanics, with its probability interpretation, is consistent with Einstein’s relativity. Many people believe that the present form of quantum field theory is the answer to this question. They are partially right.

In order to combine quantum mechanics with relativity, we should know how to deal with its wave picture in a Lorentz-covariant manner. It is a trivial matter to build plane waves covariantly starting from the Klein-Gordon equation. The present form of quantum field theory leading to the Lorentz-covariant S-matrix and Feynman diagrams is based on those plane waves. However, because of this, field theory cannot explain standing waves in a Lorentz-covariant manner.

Let us look at the hydrogen atom. It looks like a localized probability entity if the atom is on the table. How would it look to an observer on a bicycle? The correct answer to this question is “We do not know.” This has been an agonizing question to Paul A. M. Dirac. He examined the role of the c-number time energy relation, light-cone coordinate system, and harmonic oscillators for representations of the Lorentz group. If we combine all of these ideas, it is possible to construct oscillator wave functions which can be Lorentz-boosted [10]. It is then possible to work out the third row of Table 2 by showing that the covariant oscillator produces three-dimensional harmonic oscillators for the quark model for slow hadrons and the parton model for fast-moving hadrons.

6 Kantianism and Taoism

During the years 1985 - 1991, I went to Princeton every two weeks to tell Professor Eugene Wigner stories he wanted to hear. Of course I was telling him about physics. In order to do this, I had to tune my mode of thinking to Wigner’s way of reasoning. I once asked him whether he thinks like Immanuel Kant. He said Yes. I then asked him whether Einstein was a Kantianist. Wigner said “Yes, Einstein was definitely a Kantianist.” I then asked Wigner whether he studied Kant’s philosophy while he was in college. He said No, and said that he realized he had been a Kantianist after writing so many papers in physics. This conversation took place in 1989 [4].

He added that philosophers do not dictate others how to think, but their job is to describe systematically how people think. Here, Wigner was talking about Immanuel Kant who formulated his philosophy based on the thinking mode of the inhabitants of Koenigsberg. Wigner then told me that I was the only person who asked him this question, and asked me how I knew the Kantian way of reasoning was working in his mind. I gave him the following answer.

I never had any formal education in oriental philosophy, but I know that my frame of thinking is affected by my Korean background. One important aspect is
that Immanuel Kant’s name is known to every high-school graduate in Korea, while he is unknown to Americans. When I mention Kant’s name to American physicists, they dismiss him as a philosopher having nothing to do with physics. The question then is whether there is something common between Eastern culture and Kantian philosophy.

I would like to answer this question in the following way. Koreans absorbed a bulk of Chinese culture during the period of the Tang dynasty (618-907 AD). At that time, China was the center of the world as the United States is today. This dynasty’s intellectual life was based on Taoism which tells us, among others, that everything in this universe has to be balanced between its plus (or bright) side and its minus (or dark) side. This way of thinking forces us to look at things from two different or opposite directions. This aspect of Taoism could constitute a “natural frequency” which can be tuned to the Kantian view of the world where things depend how they are observed.

Later in 1180 AD, a Chinese philosopher named Chu Shi rewrote Confucian doctrines within the framework of Taoism. The entrance lobby of the main building (commonly called Stalin Tower) of Moscow State University is decorated with a set of plaques of the world’s greatest scholars, including Socrates, Plato, Aristotle, and Marx. Chu Shi is also included in this set of wise people. His version of Confucianism, commonly called neo-Confucianism, is a strong philosophy governing all aspects of government and social order, based on Taoist understanding of the universe.

In 1393, Korea went through a revolution, and a new dynasty emerged with a new governing philosophy, namely neo-Confucianism. It was two hundred years after Chu Shi wrote his books in Fukien province (south-east) of China. This new Korean dynasty lasted for more than 500 years until 1910. It is generally agreed that this longevity is due to its ideology. Even though there are many Christian churches there, Korea can still be regarded as a Confucian-Taoist country. Its national flag came from one of the Taoist drawings addressing the symmetry of our universe. It could also be said that Korea’s recent progress in democracy and capitalism is largely due to its academic tradition inherited from this neo-Confucianism.

The story is the same for Japan. Japan sent many students to China during the Tang period, and Kyoto was initially copied from Tang’s capital city called Chang An. When the Tokugawa family was in charge of Japan from 1603 to 1870, their governing ideology was neo-Confucianism formulated by Chu Shi. While Japanese disagree, Koreans say that Japan imported neo-Confucianism from Korea by kidnapping Korean Chu-Shi scholars when Japan’s Toyotomi Hideyoshi invaded Korea in 1593.

Toyotomi Hideyoshi was the first person to unify Japan, but he was not satisfied with the Japanese islands. He fancied himself to be the ruler of the big land, namely China. In order to crown himself as the emperor of China, he sent his troops to Korea
in order to make his way to China. His troops fought in Korea for seven years. Even though his troops committed atrocities beyond human imagination to Koreans, he remains as a very interesting person among Koreans.

Toyotomi is of course remembered by Japanese as a great man. The Osaka Castle was originally built by him, but was burnt down by Tokugawa’s troops during the power transition. The Tokugawa family then built a bigger castle to honor him. Since he came from the lowest social class, there are many jokes about him. One of them says that he looks like a human being if monkeys look at him, while he looks like a monkey if humans look at him. This definitely is a Taoist-style joke. It is also a Kantianist joke.

Taoism is not only a tool for politicians but also provides a basis for scientific reasoning. If there is one side, there must be the opposite side. Thus, there are two walls in one-dimensional world, one on one side and one on the other side. Our three-dimensional universe is therefore bounded by six walls. We use this concept of box normalization in modern physics, especially in kinetic theory of gases as well in quantization of fields.

Japan’s Yukawa Hediki was quite fond of Taoism and studied systematically the books by Laotse and Chuangtse who were the founding fathers of Taoism. Many younger Japanese physicists used to complain that Yukawa was too philosophical, and did not listen to him. It is not unusual for children not to listen to their parents. While this was going on, I studied Yukawa’s papers very carefully.

During the later half of the 19th century, Japanese studied Western ideology diligently. Fukuzawa Yukichi was quite interested in the constitutional monarchy practiced in England. This is why Japan has a government similar to that of Britain. Fukuzawa is also known as the founder of Keio University, and his portrait is on the Japanese currency for 10,000 Yens (approximately 80 USD). During this period, Japanese scholars translated many books from the West. One of them was “Das Kapital” written by Karl Marx. While Chinese disagree, Japanese say that many Chinese became communists by reading the Japanese version of Das Kapital.

Likewise, they translated books written by Immanuel Kant. In the case of Kant, Japanese not only absorbed his philosophy, but also extended it to make their own version of Kantianism. Japanese were able to do this because they already had their own philosophical base similar to that of Kantianism, namely Taoist base. We shall return to this story in Sec. 7.

During the period from 1910 to 1945, many Koreans went to Japan to study. They studied Western ideologies including Marxism and Kantianism by reading books written in Japanese. With the same Taoist base, Koreans were quick to appreciate Kantianism.

Because Japan and Korea share the same philosophical base, it is very easy to understand and appreciate papers written by traditional Japanese scholars such as
Yukawa. My publication record will indicate that I studied Yukawa’s papers before becoming seriously interested in Wignerism. Indeed, I picked up a signal of possible connection between Kantianism and Taoism while reading Yukawa’s papers carefully, and this led to my bold venture to ask Wigner whether he was a Kantianist in 1989, and to my recent venture to Kaliningrad.

I would like to stress that Taoism is not confined to the ancient Chinese world. It forms the philosophical base for Sun Tzu’s classic book on military arts. Sun Tzu is a very popular figure among young people in the United States these days. My maternal grandfather was fluent in the Chinese classic literature, and he was particularly fond of Sun Tzu. He told me many stories from Sun Tzu’s books. This presumably is how my Taoist background became stronger than those of other Asian scientists.

Sun Tzu’s form of Taoism is practiced frequently in the United States. Let us look at American football games. The offensive strategy does not rely solely on brute force, but is aimed at breaking the harmony of the defense. For instance, when the offensive team is near the end zone, the defense becomes very strong because it covers only a small area. Then, it is not uncommon for the offense to place four wide-receivers instead of two. This will divide the defense into two sides while creating a hole in the middle. Then the quarter-back can carry the ball to the end zone. The key word is to destroy the balance of the defense.

There are two opposite views of everything in Taoism. Does this mean that we should take only one view and discard the other? No! The truth is somewhere between them. Finding the harmony between these two opposite views is the ideal way to live in this world. We cannot always live like Shiyu, nor like Idiot, mentioned in Sec 4. The key to happiness is to find a harmony between the individual and the society to which he/she belongs. The key word here seems to be “harmony,” and this is what Taoism preaches us.

To Kantianists, however, it is quite natural for the same character to appear differently in two different environments, again as the case of Shiyu and Idiot. The problem is to find the absolute value from these two different faces. Does this absolute value exist? According to Kant, it exists. It exists if we find something common to both. This sounds very much like Taoism.

Finally, let us examine how Taoism was developed in ancient China. After the last ice age, China was sparsely populated. On this vast land, there were many isolated pockets of small tribes. Then they came to the banks of China’s great rivers, namely the Yellow and Yangtze Rivers. There, they developed agriculture and commerce, using the fertile lands on the river banks and transportation system provided by the waterways. Then there came communication problems among different groups of people with different languages. They started to draw pictures to communicate, and sing songs to express their feelings toward others. It is well known that Chinese
characters came from drawings. It is also well known that Chinese, unlike other languages, has tones. Their spoken language has tones because of its musical origin.

In addition, those Chinese had to develop the skills of accommodating the views of others. This became Taoism. Taoism was not dictated by a single philosopher or group of philosophers. It became a philosophy because philosophers attempted to document the way how the people think. This aspect is strikingly similar to the way in which Kantianism was developed from the lifestyle of Koenigsbergers.

7 Einstein and American Physicists

Einstein came from Germany to Princeton in 1933, and he lived there until 1955. He liked America and became a American citizen in 1940. Yet, Einstein did not communicate well with American physicists. People are wondering why?

In order to give my answer to this problem, I have to confess that I have been having problems with Physical Review referees since 1970 when I started asserting my own views in physics. I still have problems, but my important papers have already been published in the appropriate sections of the Physical Review. For this reason, I can entertain myself these days whenever I receive hostile reports from the referees. Whenever I receive those reports, I assume Einstein had the same problem with American physicists.

This does not mean that I do not respect American physicists and their tradition. I learned about Thomas Edison before Einstein. Not many American physicists know, but I know that Lee de Forest found out in 1906 that the grid in a vacuum tube can regulate the flow of current from the anode to cathode. De Forest never found out that this has something to do with the traffic of electrons, but his discovery was the starting point for electronic industry which changed the entire world. De Forest was an excellent American physicist, but he would have had difficulty in talking to Einstein.

In my opinion, Thomas Edison was the best American philosopher. Edisionism is not restricted to experimentalists. Like all American physicists, I write papers when I do not have ideas. I obtain new results while writing papers, and this is true even for the present paper. While writing this paper, I got an idea that Taoism developed in ancient China has the geographical origin similar to that of Kant’s Koenigsberg.

Then, is there a documented version of Edison’s philosophy? Yes, let us look at the Gospel of Matthew in the New Testament. Go to Ch.7, vrs. 7 and 8. Ask, and it shall be given you; seek ye shall find; knock, and it shall opened unto you. For every one that asketh receiveth; and he that seeketh findeth; and to him that knocketh it shall be opened. The New Testament is a very important philosophical document if we insist on philosophy. The only problem with the Bible is that it is too easy to
Since I have been in the United States since 1954 after my high school graduation, since I have been teaching American students since 1962, and since I have an adequate number papers published in the Physical Review, I am fully qualified to regard myself as a bona-fide American physicist. Yet, when I think and write, I am relying on my Eastern tradition which I explained in Sec. 6. I become excited when I find an explanation of fast-moving particles in terms of what happens to them when they are rest. I usually get referee comments that I do not say anything new for particles at rest when I talk about those at rest. They are not able to sense the other side of my story, namely what happens to observers on bicycles.

More recently, I become excited when I find out what happens in optics in terms of what I know from particle physics. Thus, to American particle physicists, I look like an optics man, not one of them. To optics people, I am not one of them, because my papers start with what I learned in particle physics. I am in a situation similar to Japan’s Toyotomi Hideyoshi mentioned in Sec. 6, who looks like a monkey to humans while looking like a human being to monkeys.

I was of course aware of this problem and have been looking for a solution for many years. I am still continuing my effort along this direction. Of course the solution consists largely of understanding of the cause of the problem. My tentative conclusion was that I am a Kantianist while Americans in general are not, but I was eager to find a convincing evidence to support my assertion.

This is precisely why I went to Kaliningrad last summer even though the trip was inconvenient if not dangerous. I visited the Kant museum twice while staying there. The museum dedicated one room for the books written about Kant’s philosophy. There are many books written in German and many in Russian. This is not surprising because Kant wrote his books in German, and the museum is under Russian management. What is surprising is that there are many books written in Japanese. There are also Japanese scrolls hanging on the wall. These scrolls contain quotations from Kant’s books written in poetic Japanese.

Since many people in the world write books in English, one would expect some Kant-related books written in English. I could not find any. I was surprised, but not surprised from my experience with English-speaking people in the United States. This is a clear evidence that, while there is a resonance frequency in the Japanese way of thinking tuned to Kantianism, there are none in the Anglo-Saxon culture. I knew this before, but I was able to confirm this in Kaliningrad. This was one of the happiest moments in my life. As I said before, Japan and Korea share the same philosophical base, and I am very proud to be a Kantianist.

I was happy also because I can now tell why Einstein was not able to communicate with American physicists. Einstein was a Kantianist, while Americans are not. Americans are Edisonians, and they have their reason to be proud of themselves. I have
no complaints because I am also an American physicist in the Edisonian tradition, and the United States has been very nice to me.

**Concluding Remarks**

In this paper, we attempted to understand Kantian influence on Einstein in terms of the geography and history of Koenigsberg. It is possible to understand the problem without reading Kant’s books if we use the method of physics, namely abstraction from the things we observe in the real world and then apply the abstraction to predict what would happen in other parts of the real world. Using the same method, we found what happened in ancient China from what happened in Kant’s land of Koenigsberg.

Some of my younger Asian colleagues complain that they are handicapped to do original research because of the East-West cultural difference. I disagree. This difference could be the richest source of originality.

I decided to write this article because it is too difficult to read Kant’s books. I complained to one of my German friends that there are only two sentences on one page of his books. My friend disagreed. He said Kant’s one sentence usually covers two pages. Thus, the best way to understand his philosophy to write my own articles about him, in the tradition of Thomas Edison.

**Appendix**

I started doing my research presented in this paper while I was reading a book review written by by Marie Arana-Ward of the Washington Post in November of 1994. She was talking about a book by Anne Applebaum entitled “Between East and West, Across the Borderlands of Europe” (Pantheon, New York, 1994). Since this review is much shorter than the book and explains the geographical origin of Kantianism, I append her article to this paper with her permission.

THERE ARE FEW PLACES on earth as politically volatile as the lands that lie between Russia and the rest of Europe. Both coveted and despised, this protean corridor of unobstructed terrain has been a stomping ground for every grandiose politician - East or West - whose imagination was ever kindled by dreams of conquest.

“For a thousand years, the geography of the borderlands dictated their destiny,” writes Spectator deputy editor Anne Applebaum in her probing portrait of the territory that embraces eastern Germany, Lithuania, Belarus, Moldova, Eastern Poland and the Ukraine. “Five centuries ago an army on horseback could march from a castle on the Baltic to a fort on the Black Sea without meeting a physical obstacle greater than a fast-running river or a wide forest. Even now, a spy running east from Warsaw to Kiev would find nothing natural to obstruct him.”
And so for centuries the people of these frontiers endured carnage and plunder, slipping in and out of identities faster than a cartographer could record the changes: Mongols invaded, and then Turks, Swedes, Muscovites, Moldovan princes, Cossacks, Teutonic Knights, Polish kings, German emperors, Nazis, Soviet hordes - each raid more catastrophic than the last. The Swedes destroyed the cities, the Cossacks set fire to the villages, the Teutonic Knights brought on a holocaust, wiping out all trace of indigenous Prussians. "But most of the time," writes Applebaum, "the Polonizations and Prussifications and Russifications came to nothing. The borderlands were simply too wide and too empty, it was too difficult for any invading nation to maintain permanent rule."

Because of this failure to bring about long-term change there were, until recently, no nation-states as we know them today. "For a thousand years the people of the borderlands spoke their dialects and worshiped their gods, while the waves of invaders washed over them, mingled, receded, and washed over them again." Today a traveler can encounter a native Pole, a person raised in the Soviet Union, a citizen of the new Belarus - and they in fact may all be one man, an individual who has never set foot outside his father’s village.

A borderland peasant asked his nationality in the 18th century probably would have replied tutejsj - “a person from here.” That sense of the existential still persists. A scene in Gunter Grass’s The Tin Drum captures the mindset: It is 1945, and as Soviet soldiers pour into the borderlands, terrorizing the locals, the protagonist’s grandmother refuses to flee east or west, “I am not German enough!” she cries. “And I am not Polish enough, either!” She belongs to her potato field; it is the only allegiance she considers worthwhile.

After the war, it was Stalin’s plan to have the borderlands “disappear into Soviet Russia: Call it ethnic cleansing, to use a phrase coined later in another context, or call it cultural genocide. Either way, it was very successful.” The region was transformed beyond recognition. Whole nations slid beyond memory, and we in the West hardly took notice, Kiev became a Russian city, Lithuania a Russian province, and the colorful, variegated cultures of the borderlands were relegated to the dusty shelves of emigre bookshops.

Applebaum’s Between East and West is a heroic attempt to bring the region back into our collective consciousness. Armed with 35 maps and a “forensic passion,” she leads us into this forgotten land, holding a close mirror to its villains and heroes and letting us see it warts and all.

She begins, fittingly, in Kaliningrad - Koenigsberg - a district once famed as the City of Enlightenment - Kant’s city - before it was purged of Prussians and reravaged centuries later by Soviet troops.

“Sprechen Sie Deutsch?” someone asks her on the streets of the now hideous city. The man is a Belarusian from Pinsk, a slave laborer in a German prison factory
during the war. It is the first of a multitude of encounters that will lead Applebaum - and us - to a clearer understanding of who these people are and how history has transformed their lives.

In Lithuania and the Polish kresy - the outlying, disputed hinterland, Applebaum encounters the core of hatred that has set neighbor against neighbor for 50 years. Before the war, some Jews, encouraged by Soviet propaganda, had collaborated with the communists; some Lithuanians, encouraged by the Nazi propaganda, had helped send Jews to concentration camps. “Afterward,” writes Applebaum, “no one remembered that the Red Army had also murdered Jews, or that the Nazis had also murdered Lithuanians.” The outcome had been too dire to parse history that finely: One in ten Lithuanians was either dead or deported. Several million Poles were forcibly removed from their homes in Lithuania, Belarus and the Ukraine, and sent West. “When it was over, the mixed multiethnic kresy had disappeared forever. Most of the Poles were gone from the region, most of the Jews were dead.” But the bitterness remains.

Applebaum negotiates the region intrepidly, suffering the hardscrabble existence of a traveler in these parts, looking up improbable witnesses, hitch-hiking with drink-sodden peasants, arguing history with strangers on the street. Her insights are sharp, her sympathies far-ranging. Always there is an unblinking eye on her subjects’ life stories, a finger on history, and a well-tuned ear for subtle ironies and unexpected poetry. Whether negotiating with a slick Mafia hotel manager in L’vov or bedding down with a pestiferous anti-Semitic harridan in Nowogrodek, Applebaum reveals an intelligence and sensibility that are rare in this brand of quick-sweep expeditionary journalism.

But the book is not free of flaws. As we progress from Kamenets Podolsky to Kishinev to Odessa, we sense a progressive impatience in our host. When she wraps up her trip and boards a boat for Istanbul and “the West” with a distinct sense of relief, we cannot help but recall her initial statement of purpose: that what she had set out to find was “proof that difference and variety can outlast an imposed homogeneity; testimony, in fact, that people can survive any attempt to uproot them.” Applebaum’s rush to be done with her book ultimately leaves her reader hanging on that question. We understand that history has made the people of the borderlands at once indomitable and chameleonesque, but that is our conclusion; Applebaum never tells us hers.

That said, Between East and West is an indispensable guide to a little-known region that may prove as decisive in our future as it surely has been in our past. As Churchill wrote when the various nations of the borderlands first proclaimed their independence, “When the war of the giants has ended, the war of the pygmies begins.” We would do well to know the territory
References

[1] Y. S. Kim, in *Symmetries in Science VIII*, edited by B. Gruber (Plenum, 1995). See pages 255-268.

[2] D. A. Howard, Physics Today 58, No. 12, 34 (2005).

[3] A. Applebaum, *Between East and West, Across the Borderlands of Europe* (Pantheon Books, New York, 1994). There was a comprehensive to-the-point review of this book by Marie Arana-Ward in the review section of the Washington Post (Sunday, November 20, 1994).

[4] E. P. Wigner, private communication (1989). See Sec. of this article.

[5] Karl Marx, on the marble plate at the entrance of the main hall of Humboldt University (Berlin, Germany).

[6] A. Sommerfeld, *Electrodynamics* (Academic Press, New York, 1952).

[7] Y. S. Kim, Phys. Rev. Lett. 63, 348 (1989).

[8] E. P. Wigner, Ann. Math. 40, 149 (1939).

[9] Y. S. Kim and E. P. Wigner, J. Math. Phys. 31, 55 (1990).

[10] Y. S. Kim and M. E. Noz, *Theory and Applications of the Poincaré Group* (Reidel, Dordrecht, 1989).

[11] Y. Tanikawa, *Hideki Yukawa: Scientific Works* (Iwanami Shoten, Tokyo, 1979).

[12] Sun Tzu and Sun Pin (translated by R. D. Sawyer), *The Complete Art of War* (Westview Press, Boulder, 1996).