I. Newtonian View of Universe is lonely.
--- Atoms in the vast empty space-time is a reflection of the way the modern men feel of their existence ---

1. Introduction. Where we stand now.

Newton formulated his Mechanics, some 800 years ago in the beginning of the Industrial Revolution. It was an instant success. What was new in the Mechanics was the Mathematics of Differential Calculus, which was a language capable of constructing descriptions and predictions on the basis of "infinitesimally" small segments. According to the Mechanics, if one knows a very very small fragments of the universe, one can know everything, including what will happen in the future. The sense of power generated in the minds of people then was enormous. For the first time in the history that it knew, human intellect became powerful enough to replace "Prophecy" by "Scientific Prediction”.

One must appreciate this revolution in human intellectuality. Before that time, people had suffered from "false prophets", "demigods", and corruptions of religious institutions etc., for long time. Often, their spiritual needs were taken advantage of. Finally, people got a “sure thing" which was "true" as far as they can see, and accessible to anybody who learned the art of the language. It encouraged and empowered Europeans to go out for the adventures of colonial explorations and manufacturing industries. It liberated their minds from fear of unknowns. Man no longer needed to fear the Nature!

It was not that there was no navigational technology to get to New continent. Columbus already knew navigation by stars in 1400s. By the seventeen century, accurate clocks were in navigational use to tell the position of a ship in the middle of ocean, within a precession of 100 miles or less. But for a large scale transoceanic trades to develop, a few brave men and desperados were not enough. They needed something more to make range number of people to feel "confidence" in themselves, not only for the voyages, but also for "investments". Newtonian Mechanics gave that. Spaniards may have braved rough Atlantic Ocean in their quest of Gold in the New continent. But they were not free from the sense of "adventure" in the haphazard voyages. British after Newtonian Mechanics had "deterministic knowledge" of the Future. They could rationally calculate their fortunes, thinking that occasional failures and accidents were exceptions, not the rule. In the peak of the British colonial trading, the returns of investments were like 400%. There were risks and losses, of course, but

the colonial trades were not risking for 10% profits like investments today do.

Today, even English speaking people, by and large, do not know the meaning of the trade and consequently would not understand what a great confidence giver Newtonian Mechanics was. They think that Newtonian Mechanics is just a "physics". It was the backbone of the Imperialism, if not the essence of the culture. And one ought to note that the "Power" of the Europe name from the "confidence" in knowing the universe. we know that people and group of persons can perform a lot efficiently when with confidence. If we are to think of ways to empower people, the first thing to do is to build confidence in themselves.

But, you might ask me; "Why then is Europe in a decline today?" What happened to the confidence by Newtonian Mechanics? Did the physics change?

The physics indeed have changed. But I shall talk about that later. It is more important to think about what we think as "knowing" first. The knowledge of Newtonian Mechanics was a "knowledge" at the particular historical situation. It was the "environment" that made it "effective" and "powerful". Newtonian Mechanics contained many flaws from the beginning. It was merely one way of "perceiving" the world, not a "Truth". As much as it was useful in the circumstance, people can take it as a "Truth" and "the Description of Reality". At least it was advantageous to believe in it, say for the "power of positive thinking", even though it was not true, or even be wrong.

But, Newtonian Mechanics contained metaphysical assumptions which were not visible. Newton himself did not see himself making assumptions. A philosopher I. Kant was very much impressed by Newtonian Mechanics and wrote a critique --- ironically titled as "critique of pure Reason" ---, but he failed to see alternatives to the implicit assumptions. He ended up saying that Newtonian Mechanics is the Truth, and all human thinking ought to copy the style. Today, in retrospect, we would say that the metaphysical assumptions are like "prejudices" and invisible to those who are prejudiced by them.

However, the irony is that what Kant discovered was that no logical system of thoughts, if they have to be constituted from "atoms" of propositions, can be built without "basic assumptions", which are indeed "prejudices" in the sense they can not be justified, though they can be believable immediately.

In Mathematics, and Logics, the basic assumptions are called "Axioms". They are not "prejudices" because they are explicitly said. The first "Axiomatic" system known to the European science was that of Euclid Geometry. (Euclid himself did not axiomatize the Geometry, but Geometry was simple enough to be reduced into a set of axiomatic propositions soon after it was rediscovered by Renaissance scholars.) It so happen that the scholars instinctively suspected one of Axioms of Euclid Geometry. The suspected axiom was that about "Parallel line". The axiom said that there can be one and only one parallel line to a any given line passing a given point outside the line. Other axioms were short in expressions --- such as "There is a point on a line between two points on the line" etc. ---.

If you have done some geometrica1 exercises, you would know that the Axiom of Parallel line is very powerful one used very often. You would say that the axiom cannot be false, otherwise the whole Euclid Geometry word collapse. You are right in one sense, that is, the axiom is not false. It so happen that there were two alternatives to the

Parallel Axiom. And without changing any other axioms, one can build two different geometries known as "Non-Euclid Geometries" There are "not false" just as Euclid one was. And Einstein et al found good uses for Non-Euclid Geometries and many others which they made up after the discovery of the freedom in geometries.

Kant was wrong only in that assuming that "There can be one and only one Truth". It turned out that there can be many "truth". Or one could say that there is no "truth" in any of geometries. Mathematicians and physicists today prefer the later version. They would say that "science" is not knowledge of Truth. Science try to be "helpful" to people, not asserting the authority of being Truth.

Unfortunately, the majority of "scientists" and academics even today are still in the medieval habit of asserting Truth, and do not like to acknowledge "non-truth" status of their "sciences". They are ignorant of the foundation of science. I would imagine, even after you learned of the freedom of choices in theoretical constructions, you do not like to admit that what you are believing is "non-truth". Your intellectual megalomaniac tendency would not like to settle for being merely "helpful suggestions", but like to assert "Truth". Intellectualism is an expression of "Machismo" which is also a cover up for the fear of modern individual cut off from Love relations.

One has to appreciate how lonely and fearful it is to see Newtonian cosmology in order to understand why the modern intellectualism had emerged with the triumph of Newtonian Rationality in the Industrial Revolution.

It is a contradiction of Dr. Faust who was an all-powerful intellectual on one hand and yet being a lonely kid looking for Love on the other hand. Dr. Faust, in the play written by J.W. Goethe at the time Germany was coming to the Scientific-Technological Age. Goethe was a writer, poet, a close friend of a philosopher Hegel, but also a "scientists" as well. He did understand the “pang” of the coming age. The pang was intellectual in the case of Goethe, but did convey, the pain and bewilderment that many of people, particularly the newly emerging "proletariats" under the misery of the industrialization, felt. One may have to read Marx's account of the lives of laborers then. Our capitalism was built not only on the blood and sweat of working people but also on the alienation of the people driven out of communal life --- i.e. a network of affectionate relations among peasants ---. We note, however, even Marx thought it a "progress". It required up-rooting of the old "Cosmo1ogy". If we are to look the “adapting problems" of the Natives in North America in a parallel with the history, we would also see the significance of "Cosmology".

Then, what so terrifying was Newtonian Cosmology? We are so brainwashed that we do not see the problem. We would say that Newtonian worldview is the true view of the Reality. It cannot be viewed in any alternative way. The Space-Time is there as Newtonian Mechanics says, independent of whatever we feel. We recall faintly that Einstein changed the worldview completely, but only a few among us dare to look at the universe in alternative senses.

Not that Einstein got it right, but he opened possibilities for different Cosmology. After Relativity of Einstein, there emerged Quantum Theory which stayed puzzling for a long time, but now coming to suggest us alternatives to Newtonian view and stimulated revival of "communal" senses of the universe. Thanks to those developments, we are now in a position to look back Newtonian World View and sense the problems in it. We no 1onger need apology in talking of our feelings in the ways we look at the Nature and the World, if not "Spiritual" Realms.

2. The Characteristics of Newtonian view of the World.

The characteristics of Newtonian view of the World are summarizable in a few brief statements. It says;

i) The Universe is a large empty Space-Time. Isolated Atoms exist in the vast vacuum. The Atoms are independent from each other and incapable of changing.

ii) There is no "Cause” --- the Religious notion of cause is denied by Newton, his "Force" is not "cause", despite the popular misunderstanding to be otherwise.

iii) There is no "Prophecy". There is no "Purpose", "Reason", but accidents of conditions.

iv) Changes have to be "Forced". And motions can only follow course "determined" (dictated) by the Mechanics of the Force. One simply has to be powerful enough to supply all energy needed for the desired motions.

v) Human Intellect is capable of knowing everything and to any accuracy desired. Hence, the courses of motions are controllable by Human Intellect.

vi) The Universe and everything taking place in it can be "measured" and treated in "Linearized Approximations". (This is not from Newton himself, but held by the followers.)

Against such a set of assumptions, there have been several objections. A notable one among pre-Einstein time was that by E. Mach. Mach contended that there can be no such thing as Atom. He viewed that everything and anything is "related" to each others. An object is nothing but a symbolic representation of a "nexus of relationships" perceived by humans as a thing. The Universe, then, is far from being "Vast Vacuum", "Nothing", "Emptiness", but the theatrical stage of the relationships to unfold upon it as a drama. Even a minute grain of sand cannot move without moving the entire Universe in a complimentary mode. Mach advocated what we now call "Holistic View" of the World.

Oriental natural philosophy some three thousand years before stated that nothing is immutable, unchangeable, nor independent. We have yet to hear from Native Philosophy as to those issues.

Even within the Classical Physics, since emergence of Electromagnetic Field Theory in the 19th century, the "Empty Space" view of the Universe gradually gave away to more "sticky, filled-in" feeling of the Space. The vast "vacuum" of the Universe became something other than "nothing". Rather, the "Field" concept made people to imagine and feel that there are "flows" of something invisible to us but nonetheless affects motions within. We can look at many pictures which M. Faraday drawn for the "Field". They are remarkably beautiful. C. Maxwell who mathematized Faraday's images into equations, also have drawn pictures, such as the Universe filled with "vortexes". The only step missing was rebellion against the "god-like regularity" of Time Measure of Newtonian Universe. When the Time is also understood as a Dynamical entity, Einstein's Relativity was born (1905). In that sense, we can view that

Relativity was the first step by the modern intellectual to regain the "Enchanted Universe" that ancient people had.

[After reading this, don't you ever say that Indians do not have the concept of time. They had a "Relativistic" sense of time. And in occasions like hunting Buffalos, they had to have split-second precession in their coordination of actions. They did that by "spiritually tuned in". Otherwise, they could not survive. We, on the other hand, only have the "clock time" and have hard times coordinating our actions with people. We only know how to compete in Time, not cooperating. In WWI and II soldiers were often killed by the artillery fire from their own side, because of in-coordination in Time of the scale of minute.]

Interestingly, by Relativity, Time ceased to be an absolute measure, symbolizing the Newtonian Rationality. We now can appreciate why "primitive" people used to talk of Time as if an animated entity. Hegel's notion of "spirit" as something to do with "Historical Time" was an attempt to revive the ancient Myth. But it was not understood in the Age of Newton. It would be respectable now, except that Hegelian sense of "spirit" is almost forgotten by the modern bourgeois intellectuals. [See Hegel on "Reason in History". The famous remark of Marx "Knowing is not mere interpretation, but changing of the World" was in reference to Hegel's Philosophy of History. Marx did not actually negate Hegel but stressed actions, Hegel did not deny "practices" either. The rhetoric of those Germans are excessively colorful, but often misleading. We need to read them with less polemical intensity but with more meditative reflection. Then we can appreciate what problems they were struggling with. Both of them tried anti-Newtonian view, but could not win the day. In terms of physics, I would make a parallel between the Electromagnetic Theory of M. Faraday and C. Maxwell with Hegel and Marx, respectively.]

We can compare such thoughts with the Western notion-prejudice of individual and see what implications the Western society 1ed by Individualism has to pay for the assumption. Of course, the Western culture call it "Science" and deems the thinking in the mode to be "Rational". Aside from punishing "individuals" for their crime and make them pay taxes, the western Metaphysics has no useful function. Rather, it forced upon itself many problems, among which Alienation of human lives and fighting wars and competitions are but two examples.

As noted before, the Western Metaphysics did make people to seek Power, Domination, in a conceit. But the results are less than praiseworthy. Its ill-effects and "pollutions" (both in substances and on minds) overweight any benefits that it brought upon the humanity. It was an "inappropriate" physics, in that sense.

The conceitedness comes in thinking that the "individual" can control deterministically whatever motion-change one desired. Humans simply do not have the energy to supply the motions. Rather, things do not happen by "Force", but by "Triggers" in the sense a huge avalanche can be triggered by a mere whisper, when it is ready. Humans parasite on the Gifts of circumstances. Humans depend on the conditions of the Nature, just as a baby depends on the Mother. The baby cries and the Mother comes. But it would be a caricature of conceit, if the baby thinks it control and command the Nature, let alone "Force" the Nature.

The conceit from ignorance for itself is rather innocent. The western scientism went further than that. In its megalomaniac conceit coupled with the "lonely" view of the universe drive it to "conquering" other people in the context of colonialism. They could not see the relationships that come back to themselves. Their notion of knowledge was "isolationistic" and they thought they are above and beyond reactions. They saw everything including people as "objects" to be taken advantages. People in the old communal life would not dare thinking like that. But the age of science made it legitimate and praiseworthy calling it "rational", "intelligent".

The generosity of the Nature and people of the colonies let the "spoiled child" of the Europe abusing them go on a while. We note that even Marx failed to recognize the Gifts of the Mother Nature, in terms of fossil energy resources which enabled scientists and technologists to enlarge "productive power". The industrialization would have been impossible without exploitation of the fossil energy resources. Marx did not see it, because he was like anybody else at the time believed in the hostile view of the Nature and thought that economy is based on "scarcity", rather than "Gifts" of plentitude.

In retrospect, we would say that he ought to have noted the impossibility of the exchange economy without surplus. The origin of exchange economy is in Gift Giving in the surplus plentitude, not in the postulated "scarcity" of the Classical Economics. But the Newtonian View of the universe is a fearful one. What is not hostile cannot be taken serious by it. And, here we might reflect on the distinction between "Work" and "Play". Today, we might operationally define "work" to be that which is pained and "Play" to be that which is not paid. But, then we have trouble as to house works that many of women do. They are not paid. Are they not "works"? In terms of the Gift economy, we can appreciate them as "Gifts". But what the theory of economics do with "gifts"? It brushes off gifts as "irrational". Although Marx advocated "dialectical" thinking, he could not deviate from the culture of the

Rationalism prevalent in his time. what is not either "Forcing" nor "Forced" is irrational and could not be a part of the intellectual work.

[As to the origin of "Economy", Max Weber. The Theory of social and Economic organization would be a good introduction. K.H. Wolf, The sociology of Georg Simmel; K. Polanyi The Great Transformation, are also recommended. The later developments in the field called "Economic Anthropology" are interesting, but I do not know good introductory text. Marx is said to have learned something from Iroquois Indians, but it seems that he missed a great deal, perhaps because it was a secondhand knowledge. For this, see M.K. Foster et al (ed.) Extending The Rafters.

Native Americans appear to have no compunction to write books about their wisdom. They probably do not understand the western intellectual hang-up about "writing on stone" to make oneself "Immortal". My native friend, despite my prodding, pleadings and coercions, remains very "shy" about writing anything. It reminds me of Inuit way of non-assertion. It appears that they do not think they can be great help to others, perhaps because of the long memory of oppression on native culture in the North America. Only way to get to their wisdom seem to be "stealing" the wisdom held in deep secret by snooping around them. It is almost as bad as asking questions to Zen masters.]

As to the "Cause" and "Prophesy", the modern physics after Einstein, came to think of various interpretations, including the "Time that goes backwards" and "Multi-dimensional Time". The problems are not solved. We know without "purpose" that projects our thoughts into the Future, there can be no use of knowing anything. Yet, it is the most troublesome problem in sciences. It involves Time dimension where our ordinary Logics fails. I would say that the notion of "knowing" in the western intellect is an illusion. But then, we need something as alternatives which are not yet found.

I would imagine the future of cosmology has more to do with time or Time Dimensions than spatial extent of the Universe. Christian metaphor of the "one Linear Time as a measure" is too incompetent to deal with the universe. We need a dynamical sense of Time(s) which perhaps creates and annihilates. There are some attempts by physicists as to those kinds of Cosmology. At moment, however, ordinary people would reject them as insanity. They appear to be comfortable in Newtonian illusion and much rather stay in it till some catastrophe to drive them out of it. Basically, it is Fear of unknowns that keep them there. Unfortunate thing about the state of "Freeze in Fear" is that the catastrophe so invited by it may be worse. A good therapy

in such a case is to suggest "crazy" cosmologies as fun-fantasies of tinker-toy plays. One cannot be creative in the defensive posture. To be courageous and creative, one way is to behave like children playing with the Mother Universe. Suppose there were some elements of eroticism in the play, I would imagine she would laugh and forgive us.

As to the "Linear Approximation", I need to talk of mathematics a bit. The Differential ca1culus, which Newton, Leibniz and Seki invented almost at the same time, is a way of imposing Linear net of "Measures" on what are not Linear.

And Newton's Mechanics talks of the "second Order" terms in the linearization. The mathematical expression for "Force" reads as "the rate of changes of the rate of changes" (of positions of atoms,/objects). The change is not linear when pictured on a graph paper. The graph paper is the ideal of "the net of linear measures". The deviations from straight lines on the graph paper is like "sins" and needs "explanation". Scientific "explanation" is a ritual of "exorcism". By explaining one is pardoned. In that sense "explanation" is an "excuse". And by the ritual, one gains a confidence.

Newton's genius is in that he came up with a way of explaining: away the deviation from a straight line (linearity) by saying in the second order linearization one get a straight line. If not, one go on to the higher order differentials. Another psychological advantage is that by "differentiation" one get a number which gives an illusion of "constancy". Hence, even though the differentials are not "objects" but rather "relations", one can refer to them as if they are "objects". Given our fear of motion/change, this conversion of "changing relation" to "constant object" is a good psychotherapy. But there is a price to be paid for it too.

The notion of "Measure" itself is a way of converting unknowns to "constants". We humans are "ephemeral". We know that. And that is why we desire "eternal constants". Our science is from such a "sentimentality", though we think we are "macho" in doing sciences.

Another thing to be noted is that the Linearity ideal also comes in the way "Statistics" is used to assert knowledge. We note that Newton could not have reached to The Laws of Motion by statistical Analysis of co-relations. But, we still cling to the linear notion and correct all sorts of statistics. Mathematically, it is easy to see that Statistics does not "prove" anything. The best it could do is the "negation of negation" --- double negatives of the kind such as saying "I have no evidence to say you have not killed your mother", which the statistical scientists take as a good ground to say "You have killed your mother" ---.

However, you try to tell that social scientists today. You would be considered insane. Because they "believe" in statistics as the only scientific way to know something. Even if they understand your mathematics and an elementary exercise in logic, they cannot stop their "belief", because their intellectual pride and incomes depend on it.

The "Measuring" is, in mathematical jargon, a "mapping", "projection" onto the line of Real Number. Why such a simple operation is thought so important? The answer seems to be that scientists and the public in general worship The Linearity. Something curved is "crooked" and evil. If it come back to make a loop, that is the dreaded Vicious Circle which the Western Religions tried so hard to negate. There is nothing in Newtonian Mechanics, as a mathematical system to object to Vicious Circles. And in fact, the loop structure is very important in Engineering of "Feed Back". But the Western Science is not completely free from its religious heritages. Despite its brave renunciations, the Western Science is a part of Christianity, and carries taboos on thoughts.

[As to these points, perhaps Max Weber may be a good reference. See The Protestant Ethics and The Capitalism. L. White The Historical Origin Of Environmental Pollution is also a good reading. "Some of my best friends" are Christian ministers. They agree on these, and go on to Liberation Theology. If you like to have "antidote" to my "poison", perhaps H. Kung On Being a Christian, and Does God Exist., may be of good reference, though Kung is an excommunicated theologian. Interestingly Kung talks on Mathematics at a length. Mathematics and Physics are products of the Western Culture, yet they contain the seeds of their own death. From a point of view of the "Ephemerist", that is good. The life of any individual entity, dogma, institution, ought to be finite, so that they can be replaced by better ones. That instance of eternal constant, immortality, is the problem.]

After going through the troubles of mathematics, modern science, and relate them to our environmental and social problems, we would come to convince ourselves that we do not need any apology talking of "Spiritual problems" of the Modern Age.

[J. Habermas edited a book titled "Observations on The Spiritual Situation of The Age". MIT press 1985. It is a book in "social science". But to use titles like that is no longer "crazy". I suspect it may even become "fashionable" soon.]

If we look at the present situation with respect to Nuclear Arms Race, at an annual cost to us like 800 Billion Dollars, it becomes outrageously obvious that what we lack

is not "scientific knowledge". Scientific knowledge is good, if helps us. If not, we need to think them out. Science does have its way of death within itself. If one does enough of "scientific investigation" on the science itself, its limitations and even follies become undeniable. In that sense, self-critical "sciencing of science" is important.

Another way of getting out the old science is to listen to what are repressed. As the cases of axioms demonstrated, opposites of widely held beliefs may be worth studying as the means of gaining alternatives. It is said that a great truth is great because its opposite is also true. Or one might say when one (system) becomes self-closed, its life is near the end. It means the loss of learning capacity. It happened to Euclid Geometry, and to Newtonian Mechanics. Hopefully our curiosity for unknowns would not die. Certainly, it appears that the curiosity with Cosmology is in its rise now.