'I Don't Believe in Signs'

by Lyndon H. LaRouche, Jr.

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The world as a whole is currently impelled toward threatened, early, general, physical breakdown-crisis of the trans-Atlantic monetary-financial system. The breakdown itself could be averted by methods which amount to a return to the outlook expressed in the great reforms made by President Franklin Delano Roosevelt. If that needed reform is to be brought about, the special impediment which must be overcome, is found in the fact that the generation now dominating current trans-Atlantic power centers, that born between, approximately, the close of World War II and the onset of the steep recession of 1957-1958, has lost two earlier generations' essential connections to those lessons of the Franklin Roosevelt recovery and the 1939-1945 war which had been crucial for the defeat of Hitler's empire, connections which were also indispensable for the recovery which followed during the immediate two post-war decades.

The kernel of the disorientation which pervades among the pace-setters of today's currently reigning, upper twenty percentile of political and economic power, is the delusion known by such currently popular titles as "information theory," "post-industrial society," "post-modernism," and "globalization." It is presently urgent that those currently reigning expressions of Sophistry be identified as such, and that the contrary, appropriate measures for returning society to relative mental health be adopted.

On that subject, about six years back, the late, redoubtable Mark Burdman referred my attention to a book, Doron Swade's ***The Cogwheel Brain,*** which, at Mark's prompting, I reviewed for ***EIR*** at that time.[1] As Swade's title frankly implies, that book, although authored by a writer with specialist credentials, was also notable for its expressed character as a piece influenced by post-modernist modes in Sophistry, as this was expressed in its representation of the Charles Babbage whose conceptions are the root of the Twentieth-Century development of the electronic computer.[2] The issues which Mark posed for my attention then, have a new kind of relevance for the rising new adult generation of today,

Mark's following message to me is still notable today on that account. I repeat it now:

"I think you will find this book both interesting and infuriating. You can do with it as you wish.

"I have read it through and found the 'story line' compelling, but the author is either uninformed, or crazy on basic scientific/epistemological matters, e.g., with his page 84 equating Leibniz and von Neumann, as both mathematicians involved with 'symbols,' and so on.

"Swade, the author, repeatedly mentions Babbage's ties to the European continent, with [Alexander] von Humboldt, French circles that are descended from Lazare Carnot, etc.; but, this is never developed in any detail. Swade is obviously uncomfortable, and perhaps angry, with Babbage's attacks on English science, in his 1830 writing, ***Reflections on the Decline of Science in England,*** and elsewhere.

"Swade is a key guy in something in Britain called the 'Information Age Project,' founded in the 1970s, about which we have to find out more. He gets very involved in what seems to me, in any case, to be a phony discussion, about whether the modern computer owes a great deal to Babbage, or not. I say 'phony,' because even from the evidence of this book, Babbage made fundamental contributions in other vital areas, such as machine tools, manufactures, engineering, etc. Obviously, he is someone of considerable importance, still at this moment, with the present British discussion, post-Third Way,

1. Lyndon LaRouche, "Who Was Charles Babbage?" ***EIR,*** May 19, 2000.

2. Doron Swade, ***The Cogwheel Brain*** (London: Little, Brown and Company, 2000). Cf. Philip and Emily Morrison, ***Charles Babbage and His Calculating Engines: Selected Writings by Charles Babbage and Others*** (Dover Publications, 1961).

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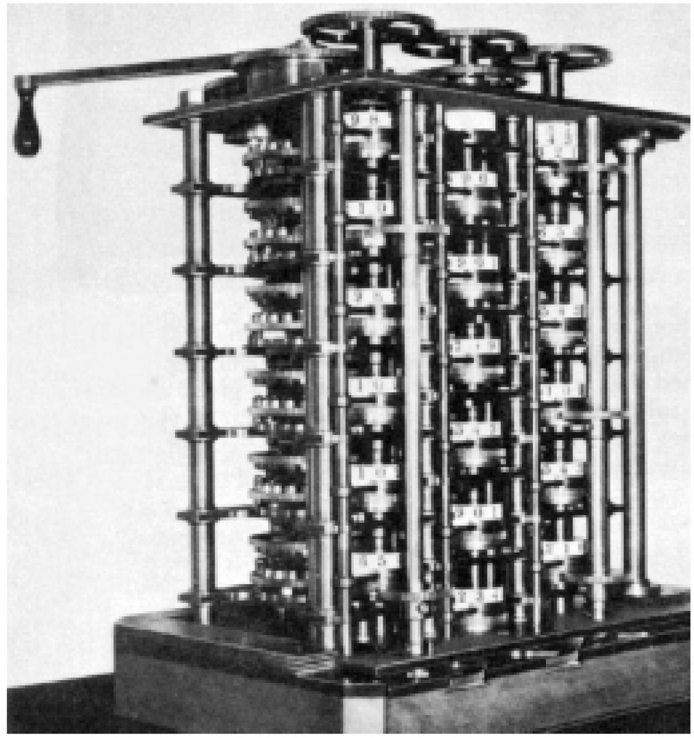


Charles Babbage (1791-1871) and his Difference Engine. The importance of emphasizing "the Charles Babbage lurking within the design of every competently functional, modern digital computing system," LaRouche writes, "is that there is no magical distinction in principle of underlying conception, between the original, root conception for future computing machinery by Babbage, and the most modern such electronic device."

about the destruction of real industry.

"I was also pleased, that the book never mentions Darwin, T. Huxley, etc., since almost any book these days on 'English Science' starts from these creatures.

"Anyway, I hope you find it interesting.—Mark."

I did: then, and, as you shall see, now.

Since then, a new generation of young adults has emerged as a significant force in political life, thus, hopefully, establishing new foundations for the leadership of our society over the coming half-century, or longer. So, the core of the argument which I made in that review, should be restated now, but with the inclusion of new terms of reference, terms cohering with that refreshed approach to science occupying the emerging adult generation typified by the LaRouche Youth Movement (LYM).

The point to be made here is, given today's existential degree of world-wide policy crisis, that we proceed, as relentlessly as may be necessary to do that job, to defend the future fate of humanity against one of today's most popularized, and most ruinous hoaxes, the delusion examined in these pages under the title of so-called "information theory."

In referring to that hoax called "information theory," I am emphasizing the destructive effect, on the mind, and on the world economy, of the widespread influence of the body of pseudo-scientific dogma spread, under sundry labels, as the influence of persons such as Bertrand Russell, Norbert Wiener, and John von Neumann. I emphasize those gentlemen's adherence to a cult which was propagated in such forms of expression as von Neumann's superstitious notions of "artificial intelligence," as that same cult is associated with such locations as the related, published work of Marvin Minsky and Noam Chomsky under the auspices of MIT's Research Laboratory of Electronics (RLE). It was this wretched ideology, launched in the U.S.A. of the 1940s as the "Cybernetics" project of agencies such as the Josiah Macy, Jr. Foundation, which has been the crucial ideological feature of the method by which the once mighty U.S. economy, among others, has systematically destroyed itself over the course of the 1968-2006 period to date.

That use of the term "intelligence," as the term is misused by those post-modernist ideologues, expressed an intended deception. That deception expressed the intent of the circles of Bertrand Russell, Russell's acolytes Norbert Wiener and John von Neumann, and also the wretched Margaret Mead et al., to destroy the world of U.S. President Franklin Roosevelt. That was, and remains a deception which must be uprooted, lest the still spreading weeds of such delusions cripple the minds of an already all too credulous humanity, lodging them, thus, within a self-inflicted, presently threatened lurch into a new dark age: a dark age comparable to that which wiped out an estimated one-third of the population of mid-Fourteenth-Century Europe.

The most efficient treatment of that subject which I have placed at issue here, lies within a topical area, the science of physical economy, in which my special expertise in long-range economic forecasting is outstanding, on record of performance, in the world of today. It was my 1948 recognition of the central fallacy of the argument which Professor Norbert Wiener presented, in his ***Cybernetics,*** which led me directly to those researches of 1948-1953 which, in turn, led me to my own original discoveries which were added to the domain of Leibniz's science of physical economy. What first impelled me toward my own original, 1948-1953, discoveries in economics treated as a branch of physical science, was this 1948 recognition of the fundamental error employed by Bertrand Russell's dupe Norbert Wiener as the basis for Wiener's own, and Russell dupe John von Neumann's brutish misconception of the essential nature of the human individual.

To clear up the widespread ignorance and confusion on this subject, we must begin here by reaffirming certain essential elements of sanity respecting the origins of that modern electronic digital computer which, while, on the one side, an integral part of life today, has also been cruelly misrepresented as a potential, or even actual medium of "artificial intelligence," and has been made, thus, into a temple of worship for the devotees of a modern Sophist cult, the radically reductionist, logically-positivist sophistry of so-called "information theory."

I have made the essential argument in numerous locations over recent years, and in earlier times. This time, I restate the crucial point from a fresh standpoint, with some points added which, among other purposes served here, are crucially significant for their bearing on work, on physical-economic animations, which is ongoing at this time.

1. The Birth of the Modern Computer

The history bearing upon Babbage's most notable discoveries within what became the development of digital computer systems, is fairly summarized as follows.

The roots of those relevant strains of modern physical science in which the valid currents of modern European science were developed, are found chiefly in the implications of the founding of that modern European experimental physical science by the Fifteenth-Century ***De Docta Ignorantia*** of Cardinal Nicholas of Cusa.[3] This development was also expressed at that time by the crucial discoveries of such contemporaries of Cusa as the Filippo Brunelleschi who applied the catenary function to construction of the cupola of the Cathedral of Florence, and by explicit followers of Cusa, such as Leonardo da Vinci and Johannes Kepler. Cusa student Leonardo da Vinci's invention of the principle of modern weaving machines, is a particular contribution by Leonardo, which, in this instance, led into the development of the programming of computers, that by the route of Babbage's adoption of the punched-card system, for weaving, of Joseph-Marie Jacquard.

That development of scientific calculating machines, which led into the Twentieth-Century development of the general purpose electronic computer, began with the development, first, of such a machine built by Johannes Kepler, one crafted by him to assist his calculations for astronomy. Secondly, a copy of what Kepler described as his machine, was crafted by Blaise Pascal. Thirdly, Pascal's work was the starting-point of reference for the then revolutionary technological development of the early general-purpose scientific calculator, by Gottfried Leibniz. Fourth, the development of the design for the mechanical forerunner of the modern digital computer, was chiefly a reflection of the influence of Gottfried Leibniz on Babbage's invention of the mechanical model for the modern electronic computer. Full circle, back to Kepler's astronomy: on his own account, Babbage's discovery was prompted by his continuing close personal association with Britain's leading astronomer of that time, Sir John Herschel, and also with the followers of Kepler and Leibniz among those broader European circles of Babbage's personal acquaintance, as typified by the scientist Alexander von Humboldt, the latter both in Germany and the Monge-Carnot Ecole Polytechnique program in France.

In that historical context of the time, the context of the rising influence of Carl F. Gauss's revolutionary discoveries in astronomy, Babbage's close personal association with the celebrated son of the celebrated astronomer Frederick Wilhelm Herschel, was of crucial importance in prompting Babbage's undertaking the development of designs for his mechanical calculating devices.[4] This was a reaction to a re-

3. The term "experimental physical science" signifies the exclusion of *a priori* assumptions, such as those associated with Euclidean, or modern reductionist mathematics and physics doctrines generally. Although anti-Euclidean physical geometries were characteristic of the work of the Pythagoreans and Plato, for example, and were prescribed by Carl F. Gauss's teacher Abraham Kästner, the explicitly thorough application of anti-Euclidean physical geometries was formally introduced by Bernhard Riemann's 1854 habilitation dissertation.

4. The genesis of this invention by Babbage dates from the formation of the Cambridge Analytical Society, approximately 1811, prompted by the circulation of an hilarious, but shrewd denunciation of the so-called Newton calculus, a denunciation presented in a celebrated composition written by Babbage, John Herschel, et al., under the title of "The Principles of pure D-ism in opposition to to the Dot-age of the University." The authors referenced John Herschel's celebrated father, as the German from Hannover who was the only competent mathematician in England at that time. This fact respecting the dilapidated state of science and industry in early Nineteenth-Century England correlates with the fact that the young English-speaking U.S.A., which had been founded under the leadership of the scientist Benjamin Franklin, had a level of productivity approximately twice that under the British monarchy at that time. The economic power commanded by the

curring problem within the work of modern astronomy: the toil of building accurate arithmetical tables: most notably, since the work of Tycho Brahe and the genius who superseded him, Johannes Kepler. However, excepting the importance of Babbage's recognizing the utility of Jacquard's punched-card system, as a needed approach to variable programming of Babbage's design for calculating machinery, the kernel of the discovery which served as the model for his development of the approach used in modern calculating machinery, was, otherwise, contrary to the sophistries of Swade, essentially Babbage's own.

The importance for science of undertaking such mammoth calculating activity, had been made clear by the way in which Kepler recognized, and treated the errors in the work of his predecessor Tycho Brahe. Where Aristarchus of Samos had proven the Solar principle of astronomy by the method of *Sphaerics* employed by Thales et al., the study of eclipses of the Sun and Moon, Kepler not only revived the standpoint of Aristarchus, but used the Sun-Earth-Mars alignments to define an apparent margin of error in orbital characteristics of the Solar System. This apparent error required a reworking of the statistics collected by Brahe, that with the degree of precision which not only settled the issues posed by the apparently anomalous form of the Mars orbit, but demonstrated an elliptical orbit for the Earth itself. The method of Kepler was given a second, stunning proof in Carl F. Gauss's experimental proof of the Keplerian character of the asteroid "belt," a proof which reverberated among the circles of Herschel and Babbage.

Such were the challenges which the work of Carl Gauss had presented to the work of Babbage's friend and collaborator Herschel. Massive work in detecting and checking data, was now made obligatory by the successive work of Kepler and Kepler's followers through Gauss's stunning discovery of the asteroid orbits. The problems addressed were physical-geometric, not arithmetic, nor simply algebraic, in essential quality; the curvatures must be measured in detail, and this required massive calculations based on repeated observations, observations which must be measured in the precision of great detail. Additionally, it was the evidence of typical errors in the work of those employed to carry out these calculations, which impelled Babbage to discover machines which could reduce greatly this significant factor of error by human calculators in compiling of astronomical tables at that time.

The reasonable forms of debates respecting the respective validities of the design of both Babbage's intention and his machine, have usually reflected practical problems of Nineteenth-Century production methods, rather than actually principled errors in Babbage's intentions. The actual difficulties had been the practical impediments, during the Nineteenth Century, to building a set of machines based on Babbage's design in England at that time, the lack of development of the required precision in then existing machine-tool practice. This practical factor is what, chiefly, delayed the construction of a full-scale Difference Engine according to the intention embodied in Babbage's design. As subsequent developments showed, only quantitative improvements in technology of production, over time, were required, to refine the physical construction of machines based on Babbage's design, in the successive steps of successful development of the so-called Hollerith machines which preceded the development of electronic digital computers.

Author Swade indulged in the sophistry of appearing to debate the question, which among the sundry known rivals and professed followers of Babbage's intention have actually claimed or denied knowledge of the predecessor's, Babbage's, designs? That issue, as posed by Swade, is best characterized as an example of flagrant sophistry.

In such matters, let the evidence speak for itself. The only honest question is, whether or not Babbage reflects the same principle on which competent modern general-purpose calculating machinery has been premised. To answer the question of how Babbage's development of his discovery was premised, and proceeded, we know, that since Babbage was prompted by the relatively recent fame of Carl Gauss's discovery of the asteroid orbits, and the fact that this accomplishment had given crucial proof of the method of Kepler against the followers of Galileo and the Newtonians, Babbage and his friend Herschel must be understood as deliberating in that context. In this light, the apparent prompting of Swade's sophistical evasions is seen, as Mark Burdman's message to me suggests: presently continuing official British hostility, in the tradition of London's Newcomen Society hoax, to Babbage's part in the authorship of both the 1811 Cambridge piece, "D-ism and Dot-age," and, as Swade himself indicates, Babbage's own 1830 ***Reflections on the Decline of Science in England.***

Today, the specific, continuing importance of emphasizing the Charles Babbage lurking within the design of every competently functional, modern digital computing system, is that there is no magical distinction in principle of underlying conception, between the original, root conception for future computing machinery by Babbage, and the most modern such electronic device. It is the development, applications, and implications of the electronics, which is new; the rest, the root of the matter, is traced to the conceptions employed by Babbage.

The working point in this report on that subject, is that anything lacking in principle in Babbage's own original development, is, of principled necessity, also lacking in the un-

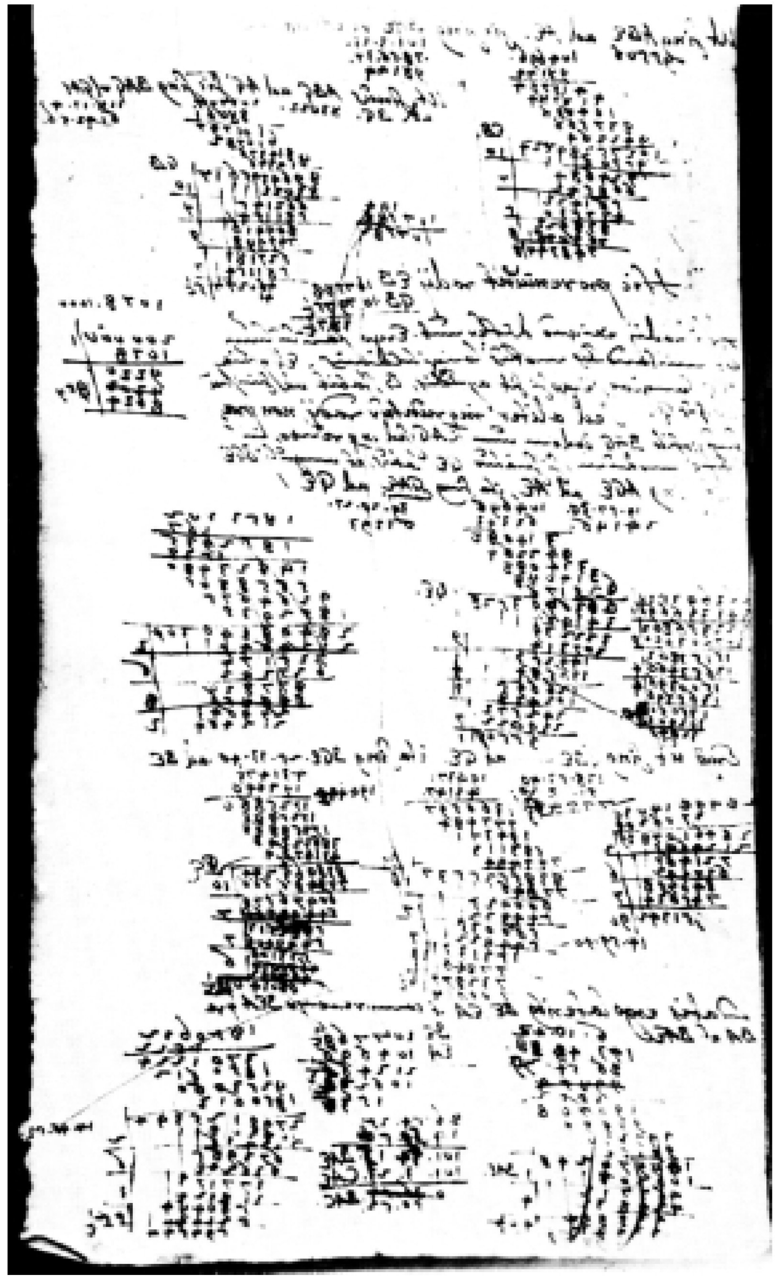
British monarchy reposed in the strategic advantage, since February 1763, of the British East India Company's international role, in sucking the blood of much of the world outside Britain itself. Since then, the British monarchy represented, thus, an imperial form of the Anglo-Dutch Liberal system, a system which is the forerunner of what is represented by the alliance of the pro-Nazi Lazard Frères/Banque Worms circles of France with the Bilderbergers of today. (A Bilderberger is a meatball composed of an assembly of scraps of human flesh.)

derlying concept of design of any digital computer-system employed today.

This limitation of computer design, then as now, is not a fault in itself. Good computers in working condition, while they still "live" their usually fragile short lives, carry out the commands uttered, in concert, by human designers, manufacturers, and operators. The problem of such computers to be examined here, is not a failure in the original conception of the digital computer itself; the fault to be corrected is typified by the case of the foolish imagination of that man, whose admiration of a department-store dummy, prompts him to propose intimacies to the poor dummy—and, perhaps, to beat the poor she-it which failed to respond with the enthusiasm which the enamored gentleman demanded.

A Sophistry by Swade

Swade's particular incompetence, is expressed in the way he purports to weigh the claims of Babbage's authorship of the principled features of digital computing machinery. This strongly suggests that either Swade was ignorant of the relevant fundamental issues of Seventeenth- through Nineteenth-Century physical science, or (in a stretch) that he, for political reasons, *had chosen to appear to be ignorant of those issues.* Putting the class of "Rube Goldberg" inventions aside, the crucial issue posed by the digital computer, whether mechanical or electronic, is the issue which places Kepler, Leibniz, Gauss, and Riemann, among others, on one side, and the empiricists and positivists, such as Descartes, Newton, D'Alembert, de Moivre, Euler, Lagrange, Cauchy, Kelvin, Clausius, Grassmann, Helmholtz, et al., on the opposing side.

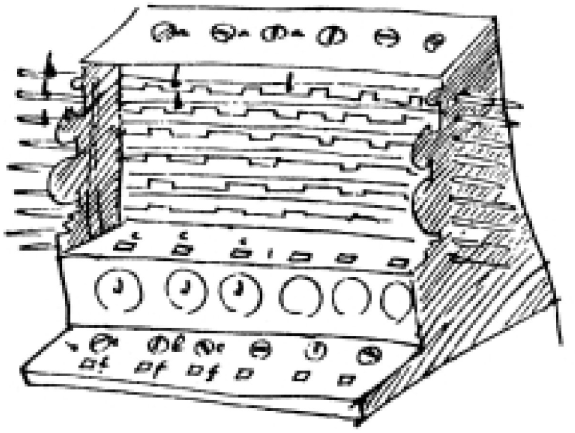


A page of Johannes Kepler's notebook shows his earliest calculations on the orbit of Mars. His notebooks are filled with laborious calculations—a strong motivation for his development of a calculating machine.

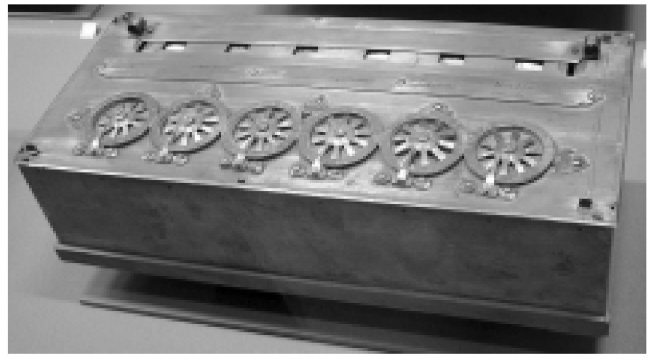
The issue of the computer, as reflected in the pathological arguments of Russell, Wiener, von Neumann, Minsky, Chomsky, et al., is the issue of what de Moivre is credited as first to name "imaginary numbers." This is the issue to which we shall return attention in a later chapter of this present report. For our immediate purposes at this instant, it is sufficient to note that Swade's sophistry on the matter of Babbage's originality, depends implicitly upon his apparent scientific illiteracy respecting the issues of reductionist method.

There are two most notable things about the nature of Babbage's discovery itself. First, it is a true, patentable type of invention; but, we should recognize that, just as neither judges nor Monsanto are to be considered legitimately as deities, Babbage's discovery does not involve any discovery of what should be, in principle, a non-patentable discovery of a true principle found in nature, such as the discovery of genetic types. The same distinction applies to the subject of the fraudulent claims, as by both Norbert Wiener and John von Neumann, to have discovered a universal physical principle in support of their respective, fraudulent claims to discovery of the respective, non-existent principles of "information theory" as a form of "artificial intelligence."

In contrast to the duped devotees of virtual creatures cast in the likeness of creatures from the fantasy-world of H.G.



Kepler's friend Wilhelm Schickart (1592-1635) was a mathematician, draughtsman, and mechanic, who built this calculating machine, following Kepler's conceptual design, in 1623. The machine was destroyed by fire, and all that remains are two sketches by Schickart. This is believed to be the first real calculating machine in the world.



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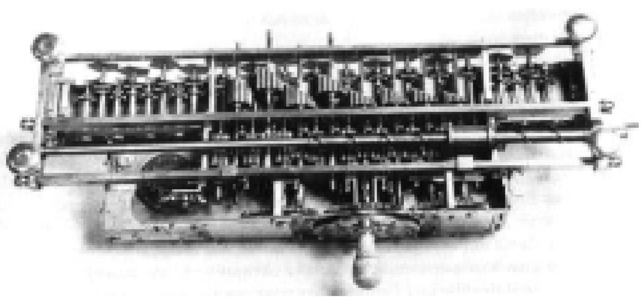
Blaise Pascal's (1623-1662) calculator was based on the principle of the Kepler-Schickart machine. It, in turn, was the starting-point of reference for Leibniz's calculator.



Gottfried Leibniz's (1646-1716) general-purpose scientific calculator. Babbage's invention was chiefly a reflection of the influence of Leibniz.

Wells' Dr. Moreau, which were implicitly creatures such as those imagined by Wiener, von Neumann, et al., the crucial fact is, that individual human intelligence is the expression of an actual, distinctly specific principle of the universe, a principle corresponding to the fundamental, principled distinction, creative intelligence, of human beings from either the mere higher apes, or the ideology of those certain modern "environmentalist" politicians who monkey maliciously with mankind's destiny today. Unlike the Minsky and Chomsky who tried to make a virtual monkey of their collective self, no animal, nor machine, however elegant, might be able to exhibit an intrinsic quality of intelligence operating within the composition of that species' design.[5]

I made the relevant distinction, first, in early 1948, when I acquired loan of a pre-publication review copy of Wiener's ***Cybernetics.*** In part, at first, the book was delightful. Much of the gain in production techniques associated with computer technology, was identified, in germ form, within parts of Wiener's book. Yet, as much as the book had first pleased me on that account, I was soon angered by the sophistry of "Cybernetics," which Wiener had added to an otherwise interesting argument: the notion that actually human intelligence could be reduced to a Machian sophistry called "information theory." From that moment on, I reacted to the book, as if instinctively, with a dedication to demonstrate the deadly threat to humanity in radical reductionist Wiener's somewhat seductive "information theory" hoax.

This distinction of man from beast, defines the leading issue treated here, the issue of the inherent fraud of the claims for the alleged existence of "information" and "artificial intelligence" as principled categories of existence. However, the most certain proof of the fraud in the referenced claims of Wiener, von Neumann, et al., lies within the bounds of showing the nature of a principle of true creativity, a principle which does not exist in the systems of a reductionist mathematics such as those of the Sophist Euclid, or of such modern, empiricist successors of that Euclid as Descartes and the devotees of Sir Isaac Newton, Norbert Wiener, and John von Neumann.

Computers and Economies

Practically, the digital computer and linear programming became synonymous in the practice among many leading schools of economists and others of the early post-World War II decades. For example, as a matter of principle, the most significant among the uses of modern electronic, digital data-processing systems, from my standpoint as a physical economist, is the applications of what has been named "linear pro-

5. Lest some reader lapse into an unthinking interpretation of H.G. Wells' intention in the latter's writing of that venture in "science fiction," Thomas Huxley creation Wells' moralizing intention in that novel, was to argue that do-gooders should give up trying to elevate ordinary working-class people into the status of equals to the ruling oligarchy of English-speaking society. "You will only enrage those whom you propose to elevate."

gramming," as applied, for example, for governmental operations typified by Professor Wassily Leontief's contributions to the analytical correlation of the standard statistical economic reporting on national product and national income, for the purposes of assembly of the relevant U.S. government and related data.

The now recently deceased Leontief, who had been trained under the Russian Kondratieff famous for the notion of "Kondratieff Waves" in technology, did make a major contribution to the development of national accounting practice. He is distinguished from the "ivory tower" school of modern positivist radicalism by his essential sanity. However, to the best of my knowledge, he seems never to have grasped the actually dynamic nature of a truly non-linear physical-economic process. That is to say, "dynamic" in the sense of the Pythagorean *dynamis* or the definition of *dynamics* presented by Leibniz as the solution for the incompetence of the work of modern sophist René Descartes on the subject of physical science.

Strictly speaking, linear programming would always be intrinsically a failure, if it were employed as a method of medium- to long-term policy-shaping. Since it is intrinsically, ontologically, a mechanistic technique, it is axiomatically unsuited as a tool for representing a truly dynamic process of the type which any real-life economy is. Linear programming sometimes explains some bad practices of business or government management of an economic process, which is useful, but, since economic progress is intrinsically non-linear and dynamic, linear methods could never design a successful economic process.

Therefore, the inherent limitation, and potential defect attached to all forms of linear programming, is, that while the linear methods of quasi-Cartesian mechanics can report some among the effects of the application of a new principle, those methods are inherently incompetent for defining the process of change which connects what are, in physical principle, two or more successive phase-states of an economy undergoing the effects of a change in set of employed physical principles.

This is not to imply that Leontief's work itself was incompetent; quite the contrary. The question to be posed is: competent for what intended mission? Leontief himself said as much, in effect, in his late 1950s quarrel with what he described as the "ivory tower" fanatics associated with Tjalling Koopmans et al.

In principle, what Leontief charged against Koopmans et al., was not really a new issue at that time. It had already been the essential point at issue, made by Gottfried Leibniz, in pointing out the essential fraud of René Descartes' attempt at a formally mechanistic explication of what are ridiculously simple, false notions of physical principles. At issue was the error made by the defenders of Cartesian and Newtonian method, such as D'Alembert, de Moivre, Euler, Lagrange, Laplace, and Cauchy, in their fraudulent attacks on Leibniz's infinitesimal calculus and the related, subsuming principle of Leibniz's catenary-cued principle of universal physical least action. This was the issue addressed by the followers of Leibniz, such as Carl F. Gauss, against D'Alembert et al., in Gauss's 1799 doctoral dissertation.

The most characteristic feature of any actual economy, is a willful, characteristically non-linear, dynamic principle of action which is absolutely lacking in all known living species excepting the strictly definable creative powers of the individual human mind. This principle of action is expressed as the changes in economy effected through the discovery and employment of a universal physical, or related principle. In all competent physical science, this same distinction is expressed as the original discovery of what appropriate tests demonstrate to be a universal physical principle.

That distinction is of crucial importance for understanding the root of the essential incompetence of any effort to treat usually taught and practiced varieties of accounting or actual economics as scientific. The crucial issue of the entire controversy is the following.

Whereas all lower forms of life, the animals most notably here, have a limit on the size of living populations, the human species does not have that form of limitation. Were mankind a variety of higher ape, our species' population-potential would be in the order of the higher apes, perhaps a few millions living individuals at any one time during the recent one to two millions of years. The existence of more than six billions living human individuals today, that on a higher level per capita than ancient or medieval times, or even recent centuries, expresses a power of the human species which is absent among the beasts.

That notion of power is associated with the use of the term *dynamis* by Pythagoreans and Platonists of the ancient Classical Greek culture of which European civilization's best achievements have been an outgrowth since. In ancient, pre-Euclidean Classical Greek instances, *dynamis* is a principle of *physical geometry,* not today's usually taught classroom geometry. The pre-Sophist, anti-Euclidean notion of physical geometry rejected any attempt, such as that of the Sophist Euclid, to treat geometric forms of existence as "self-evident." The doubling of the cube by construction, by the Pythagorean Archytas, the construction of the series of Platonic solids by the circles of Plato, and the later discoveries of the *Pentagramma Mirificum* by Napier and then Gauss, are examples of the way in which the Classical Greek scientific tradition defined universal physical principles in terms of construction within the medium of *a synthetic, physical geometry,* as Bernhard Riemann defined a modern form of such a physical geometry.

The measure of performance of a physical economy is the increase of the power, in that sense, of the society's population. This increase is associated with the effects of discovery and application of both universal physical principles respecting man's action on nature, and the development of Classical artistic principles of composition through which the willful social action within society is able to shape higher qualities of cooperation in society, as by development of natural law.

The measure of the performance of an economy lies within the economy of a certain population and territory as a whole, not an aggregate of the apparent gains in merely some part of the economic system. Thus, whereas digital systems can measure certain among the shadows of an intrinsically non-linear action, they can not measure the actual action itself.

Therefore, any competent science of economy must be a science of physical economy, rather than a monetary system.

What monetary systems have done, from the known surviving archeological evidence of ancient Mesopotamia on to today, is to assume that simple linear aggregations of things are the characteristic of cultures. So, modern Venetian and related doctrines assume, as Adam Smith and his predecessors did, that there are mysterious beings acting from under the floor-boards of the universe, beings casting crooked dice to determine which dwellers above shall be enriched and which impoverished, which shall be master, and which shall be slave.

Since all universal physical principles are expressed in mathematics as the efficient action of infinitesimals, as I shall emphasize below, no linear system, such as taught accounting doctrines, can actually account for the role of "investment" in discovery and use of the physical principles upon which depends any actual improvement in an economy, per capita and per square kilometer.

The relevant feature of the modern computer is, on principle, as old as humanity's earliest explorations of the subjects of astronomy, especially the development of a scientific method of astronavigation corresponding to the Egyptian notion of *Sphaerics* adopted by the Pythagoreans and Plato. However, historically, the modern idea of constructing a general-purpose machine to assist in making relevant calculations, is focussed around the implications of two qualitatively distinct sets of discoveries, the discovery of universal gravitation, as this occurred, uniquely, in the work of Johannes Kepler, and the correlation of the implications of Kepler's own discovery with the defining of the principle of "quickest pathway" by Fermat.

However, on a deeper level in the history of European civilization, the notion of such kinds of principles expressed in the form of those two discoveries, was already grasped in European civilization no later than the work, on the subject of what was identified as *Sphaerics,* by the Pythagoreans and Plato. The use of the physical principle of the catenary, by F. Brunelleschi, to construct the cupola of the Cathedral of Florence, and the articulation of the method of modern experimental physical science by Nicholas of Cusa, formed the basis for the relevant work of avowed Cusa followers such as Luca Pacioli and Leonardo da Vinci.

Although the relevant concept of principle was set forth by Cusa, the crucial step toward the practice of modern physical science, and toward the development of the modern general purpose computer, was the work of avowed Cusa follower Johannes Kepler.

With those qualifications taken into account, Kepler (not Copernicus, and certainly not that charlatan and house-lackey of Venice's Paolo Sarpi, Galileo) was the founder of the general practice of the modern experimental physical science prescribed, as to principles, by the Nicholas of Cusa who already echoed the discovery of Aristarchus of Samos made long before Copernicus. It is to be understood, respecting the origins of the computer, that the first known step toward crafting a general purpose computer was made by Kepler, to aid him in processing the vast mass of calculations through which he ridiculed the fraudulent constructions of the Roman hoaxster Claudius Ptolemy, and corrected the systemic errors in method and conception of both Copernicus and Kepler's own immediate predecessor Tycho Brahe. These specific distinctions are of crucial importance for their relevance to any competent understanding of the role of modern physical science in economy, and are also crucial for sorting myth from reality in the role of modern computing machinery developed since Kepler's contribution.

Kepler's discoveries involve a massive mathematical labor, starting with the uncompleted work of Tycho Brahe, and proceeding to correct important errors in Brahe's work, while, at the same time, completely redefining the experimental design of the system of the observations made by Brahe and others earlier.[6] Until recently, with relatively rare exceptions, most of this work of Kepler remained unknown to modern physicists generally, most notably among English-speaking populations victimized by the cults of Galileo and Newton; whereas, a bowdlerized misrepresentation of the discoveries, as promoted by the sophist Galileo Galilei, prevailed among the devotees of Isaac Newton and their followers. That ignorance of essential features of Kepler's work, an ignorance promoted in attempted defense of the relatively popularized, synthetic image of the person of Isaac Newton, has done great damage to understanding of even the rudimentary aspects of a competent modern physical science in general, and a physical science of economy particularly. As the case of Kepler's elliptical orbit attests, the most crucial issues are elementary ones.

However, it must be noted, that the usual fallacy encountered in treatments of Kepler's and related work today, is the evasion of the issue of the efficiency of universal physical principles, such as gravitation, by substituting the mere alge-

6. The discovery of a heliocentric orbit had been made by Aristarchus of Samos. Kepler's discovery was of a principle of heliocentric gravitation for the Solar System as a whole.

braic form of representation of an apparent effect, for the actually efficient principle itself. In the extreme expression of that error of reductionist method, the idea of the physical principle as such is eliminated, by putting a mere mathematical formula in place of the notion of an efficient principle.

To present and resolve the leading issues which a sane understanding of the abilities and limitations of the digital computer demands, it is most useful to compare the principle of gravitation, as Kepler actually discovered it, with the fundamental principle of a competent physical science of economy. In other words, we must recognize the inherent, physically principled limitations of the modern general-purpose computer, and also the functional principle of successful physical economy, as expressed in the ontologically actual (not imaginary) form of the Leibnizian infinitesimal, as Leibniz's uniquely original discovery of the infinitesimal calculus directly echoed Kepler's discovery of the infinitesimal as the characteristic functional feature of the planetary orbit.

Computer Animations

This distinction which I have just made above, is the key to an invaluable quality of practice which I have introduced into our association's economics practice.

During the 1950s, as part of my professional work as a consultant in economics matters, I had seen it to be necessary to bring the notion of *dynamics,* in Leibniz's sense of the term, into ordinary economics practice. My view of the subject of dynamic economic models, as opposed to mechanistic, linear ones, can be compared with the use of the concept of *dynamics* by V.I. Vernadsky, for defining the special chemistry of the Biosphere, as I have emphasized that in my 2005 "Vernadsky and Dirichlet's Principle."

The principle is the same employed for music, as by the conductor Wilhelm Furtwängler's notion of "performing between the notes." The principle of the Pythagorean *comma,* as applied to the method of well-tempered counterpoint of J.S. Bach, is the relevant consideration. In all cases, economy, biogeochemistry, and Classical polyphony, we are dealing with phenomena which have the quality of an anti-Euclidean physical geometry. This is the same principle established for modern physical science generally by Bernhard Riemann's founding, and development of an explicitly anti-Euclidean geometry. This is a physical geometry from which all *a priori* assumptions of definitions, axioms, and postulates are banned, in which only experimentally established universal physical principles exist for science, as also for Classical artistic composition and related practice.

In such anti-Euclidean systems, as outlined by Riemann beginning his 1854 habilitation dissertation, the only "dimensions" permitted are universal physical-experimental principles. On this account, Riemann's habilitation dissertation represents a return to the implicit core-principle of the method of *Sphaerics* employed by the Pythagoreans and Plato. In physical economy (which is to say real economy, as distinct from a mere monetary-financial system), it is the gain in what Norbert Wiener misnamed "negative entropy" which is of essential relevance.

For example, my work of 1948-1953, which carried me to the point of successfully defining a physical-economic function in economy as a Riemannian function, prescribed that economic processes must be defined implicitly as physical-economic processes, such that performance of monetary-financial systems must be judged, as I have written here earlier, from the standpoint of a physical, non-monetary process. This means treating all relevant physical principles of human activity as a process which is to be assessed for its relative, physical "anti-entropy." This means, that the development of the universe to a higher state of organization, as the case of the emergence of the Solar System from the Sun illustrates the point, is expressed in the form of mankind's discovery and expression of additional universal physical principles. This implicitly defines the physical significance of a Riemannian species of hypergeometrical notion of dynamics.

In the simplest practical application of this outlook on the U.S. economy, considering evidence over a lapse of time such as the recent sixty years, we use the annual changes in the physical statistical characteristics of the U.S. political county, as the convenient political-economic unit of approximation required for today's analytical work. We then compare changes in physical-economic parameters, so, county by county, over a span of decades. We take into account an increasing number of physical factors. In this process, our attention must be principally focussed on two kinds of phenomena portrayed by using this approach. We are contrasting linear patterns with significantly non-linear patterns. We must be chiefly concerned with significant non-linear effects of a sort we might otherwise associate with such matters as "changes in quality of life" experienced in counties.

The study divides the county's physical-economic processes between what may be best classed as the working distinction between "basic economic infrastructure" and direct production, the latter as by private enterprises. Power, water, public transportation, health-care facilities, schools and related, and so on are featured as "infrastructure." Agriculture, manufacturing, and privately supplied technical services not included under "infrastructure," compose the second principled category.

The relatively greatest importance is attributed to those characteristically non-linear changes in patterns associated with addition, improvement, or loss, or deterioration in categories of elements of infrastructure and the private sector. Typical, in the 1968-2006 interval, is the often catastrophic degree of entropic collapse of county economies caused by loss of technologically progressive family farming (as distinct from large-scale corporate farming), and by replacement of skilled, capital-intensive employment by low-skilled forms of non-capital-intensive, so-called "services employment."

The most significant categories within such studies are relative capital-intensity, level of scientific technology, relative "energy-flux density," and addition or removal of specific forms of technology from production or infrastructure, either by elimination, or merely by technological or other forms of attrition. These are the typical correlatives of manifest "non-linear" discontinuities in the observed function. The sharpest manifestations are associated with the introduction of a newly adopted physical principle for practice, or a loss of the participation of such a principle which would probably result in a discontinuous form of collapse within the local economy.

In reviewing such developments over the 1945-2006 interval to date, we must recognize that the phenomenon of the Sixty-Eighters represented the coming to adulthood of the relevant portion of the sociologically upper twenty-percentile of the "Baby Boomer" generation born between, approximately, 1945-1957. The hard-core "Sixty-Eighters' " countercultural trend of hatred against technological progress in economy, against so-called "blue-collar workers" and progressive family farming, represented a shift in cultural impulse, away from the science-driver trends in the economy under President Franklin Roosevelt, as continued, with approximate consistency, through the assassination of President John F. Kennedy, toward what Zbigniew Brzezinski hailed as a radically entropic form of "technetronic" cultural change, the change carried through by the successive Nixon and Carter Administrations.

That was the predecessor for the more violent destruction of the world economy led by the Synarchist financier circles associated with André Meyer's protégé Felix Rohatyn, whose proposed pro-globalization policies would reduce the sustainable population of the planet, from the present level of more than six billions, to about the levels which the planet "enjoyed" during the period of Europe's mid-Fourteenth-Century "New Dark Age."

Thus, what we are measuring in reviewing the physical-economic realities of the post-1968 U.S.A. is an accelerating entropy in the economy, and conditions of life of the U.S.A. as a whole.

When I refer to computer "animations," my emphasis is on showing the effects of adding, or removing one or more physical principles from the economic process represented. It is to be borne in mind, that analytically useful forms of computer animations are, conceptually, an outgrowth of the use of lapsed-time photography, especially the use of such techniques for assisting the mind of the observer in seeing the determined, "intentional" patterns of motion, as in comparison of the growth patterns of some weeds with those of other plants. I have recommended the use of computer animations generally, but I have emphasized, properly, that it is the instances of authentically "non-linear" functions, such as those associated with the addition or removal of an applied physical principle in the process represented, which is what we must prefer to discover and represent.

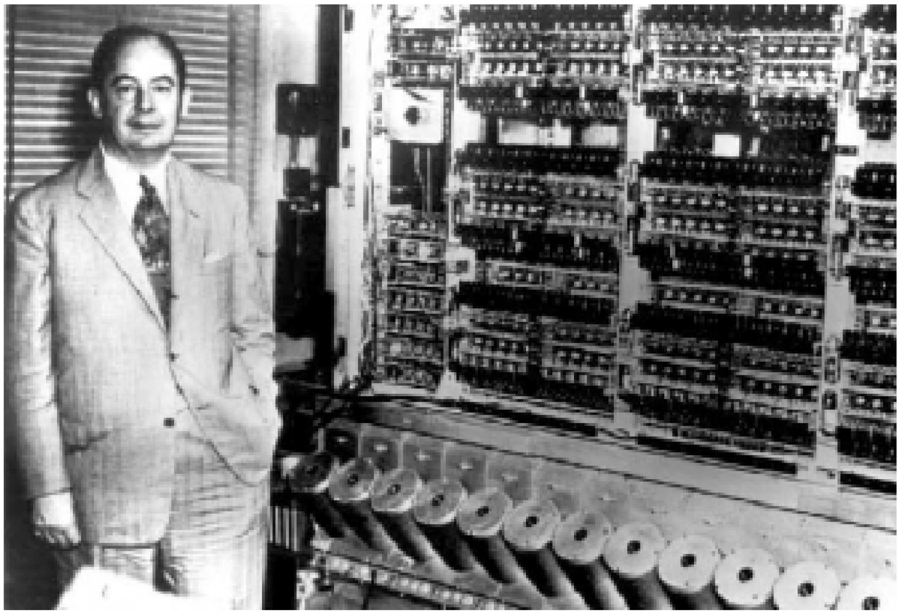
2. What Is 'Non-Linear,' Strictly Speaking?

Perhaps, this may seem curious, but, within the bounds of physiological limitations, opposite to digital computers, true scientists tend, within limits, to become better thinkers, if slower, as they grow older. The same is true in principle among great Classical artists, except that the waning of powers of vision and hearing tend to constrict their sensory experiences, performances, as similar problems of ageing impair the scientist's capacity for certain types of hands-on experimental work. The root cause for this apparent anomaly in human physiology, is that, as Russia's V.I. Vernadsky made clear during the closing decade of his life, the human individual belongs, as Mosaic ***Genesis*** 1 prescribes, to a qualitatively higher domain of existence than any form of animal life. *Man, when functioning as a human being, is mortal as animals are, and therefore subject to frailty; but, man is neither a mere machine, nor a mere animal. Human creativity is not an animal quality; whereas, human stupidity does appear to qualify as an animal quality.*

In other words, just as living processes have a chemistry which does not exist in the abiotic behavior of the same atomic elements, so analogously, the functional distinction of the human mind is absolutely set apart from the domain of animal ecology by those creative (e.g., *noëtic*) powers which are unique to the internal life of the individual human mind. The effect of these *noëtic* powers can not be communicated directly from one individual to another, as if by "wiring," but only replicated through the principle of "resonance," as typified by the role of irony in Classical poetry, or by methods such as conductor Wilhelm Furtwängler's "performing between the notes."

As Vernadsky's argument, respecting the Noösphere, implicitly requires, the human cognitive powers which are expressed by original discoveries of universal physical principles, such as Kepler's discovery of gravitation, or Archytas' doubling of the cube entirely by physical-geometric construction, are the expression of a universal physical principle, in the same sense that the chemistry of the dynamic action of living processes includes actions which do not occur among the same elements in non-living processes. We are dealing, thus, with what are to be regarded as distinct, but interactive physical phase-spaces, in that sense.

Cognitive creativity, as this distinguishes the human individual from the beast, is the expression of a specific physical principle, but it is a principle which supersedes the merely living phase-space, just as life is a universal, principled, physical phase-space, distinct from the inferior, non-living phase-space. It is the physically efficient action, on the living domain, by the higher principle expressed by human creativity of the type which the Classical Greeks knew as *dynamis,* which prompts the living tissue of the human being to perform



John von Neumann with his ENIAC computer. Von Neumann's superstitious notions of "artificial intelligence," along with the Cybernetics project of Norbert Wiener et al., "has been the crucial ideological feature of the method by which the once mighty U.S. economy, among others, has systematically destroyed itself over the course of the 1968-2006 period to date."

dynamic actions in categories, which we recognize in Archytas, Plato, Kepler, et al., which do not occur in the lower species.

On the "down side," so to speak, the human mind can be trained, by the kind of misuse of its specifically creative powers which Aeschylus' Olympian Zeus demands of mortal men and women, to cause mortal human individuals to suppress those creative powers, as the fraudulent Sophistry of Euclid did with the discoveries of those physical principles of geometry which had been made earlier by such as the Pythagoreans and Plato. Such has been the tendency toward effects we encounter in philosophical reductionism, such as empiricism and pro-Machian positivism generally, as those earlier hoaxes of D'Alembert, de Moivre, Euler, Lagrange, et al., had been exposed as such by Carl F. Gauss's 1799 doctoral dissertation, and the related hoaxes of Immanuel Kant's *Critiques* and the Romantic positivism in law of G.W.F. Hegel. The effect of Mach's pernicious influence on the training of the human mind, is typified by both the case of Sigmund Freud, and the savage, fraudulent attacks on Max Planck by the German-speaking followers of the Mach cult during the period of World War I. These defective personalities, such as Freud and some among the Machians, did not lose those human powers, as Freud, for example, had brilliant moments; rather, those powers were largely suppressed, and, in that process, the creative potential was often expressed in the form of a reductionist perversion.

The fact that our universe is composed of three distinct, but interacting sets of principles, is, in itself, the basis for an ontological proof, that the interrelationship among the three categories of principle, shows the existence of a higher principle, a higher, subsuming, "fourth domain," under which the three respectively distinct phase-spaces are integrated into a single dynamic system.

For those reasons, the reasons illustrated by Plato in his ***Parmenides*** dialogue, the fruit of these creative powers can not be communicated within the bounds of an arithmetic, nor of a Euclidean geometry. In the matter of creativity, all deductive-inductive method fails absolutely.

Thus, the human individual has a quality of potential immortality which is not available to any lower form of living process. As Nicholas of Cusa emphasized, animals, at their best, may achieve implied immortality only through their participation in an absolutely, distinctly higher form of existence, mankind, as man's immortality is located in participation in a higher domain, the "fourth domain," the universe of the Creator.

The contrary views, such as the Sophist view adopted by Euclid's ***Elements,*** defines an essentially linear, flat-Earth universality of the parallel postulate. Substituting a non-Euclidean postulate for the parallel postulate, improves the appearance, but does not bring the dead back to life. Remove the arbitrary assumptions of Euclidean or other implicitly "flat-Earth" geometries, and nothing is left for science but a dynamic system, a finite and self-bounded universe which is implicitly a Riemannian form of hypergeometry.

That situates the following parameters for treatment of the subject of the radically positivist rant of Russell, Wiener, von Neumann, et al.

To sum up the argument with which I have introduced this chapter of my report: the effect of this qualitative distinction of mankind from beasts, is demonstrated in a manner which coincides with Vernadsky's conception of the qualitative, universal distinction of three qualities of perceptible existence in the universe: the non-living processes, the domain of living processes known as the *Biosphere,* and the third, higher domain, the domain of mankind, which Vernadsky named as the *Noösphere.*

As Vernadsky's work in biogeochemistry shows, the barrier between the domain of the abiotic, and of the living processes and their fossils, expresses a universal physical principle. So, there is a principled barrier which sets the human individual above the beasts. Mankind is the only species which can willfully increase its potential relative population-density, per square kilometer of the Earth's total surface. This distinction is the only competent basis for defining, and assessing the quality of the practice of economy.

Thus, as I have presented the argument in my "Vernadsky and Dirichlet's Principle," Vernadsky's work done during the closing decade of his life, rounded out the proof that the physical universe, as we experience it, is divided among three categorical, but dynamically interacting domains: non-living; life and its specific products; and, the processes of cognition which set the human individual into a category in a higher, third domain, outside the domain of other living processes.

Vernadsky defined these distinctions in terms of *dynamics,* as Leibniz introduced the term "dynamics" into modern physical science. Instead of locating action within the extended, specifically Euclidean domain of René Descartes and his British and continental empiricist followers, Vernadsky's conception of dynamics is, like Leibniz's, a faithful echo of the science of *Sphaerics* associated with the scientific discoveries of the Pythagoreans and Plato. Real universal action occurs within an *anti-Euclidean* physical geometry, as this is best typified for modern physical science by the work of Bernhard Riemann.

So, as I stated at the outset of this present chapter: those who employ their mind, more emphatically, for the kind of acts of creative insight which we associate with discoveries of universal physical principle, and the like, rather than the lower order of deductive-inductive argument, tend to strengthen their intellectual powers, in certain respects, as time passes, relative to those whose mental habits remain relatively "ossified" over time. The class of phenomena associated with this distinction, can not be traced within the bounds of biology as such, but obliges us to take into account the fact that cognitive action, such as that associated with discoveries of scientific principle, expresses a power which is of a higher order than biology, and acts thus upon it, *dynamically.*

This distinction corresponds in intention to the assignment, in ***Genesis*** 1, of a higher mission to man and woman. No animal species can increase its potential relative population-density, but only man, and that through means of the higher, cognitive function through which such effects as the discovery and use of higher orders of universal physical principles are generated by those non-degenerate cultures which have contempt for, and hate the satanic figure of the Olympian Zeus of Aeschylus' ***Prometheus Bound.***

This dynamic quality of mind is typical of the best known among ancient Classical Greeks, such as Thales, Heraclitus, Solon, Archytas, Socrates, and Plato, but lacking in their notable adversaries. The proper use of the term "dynamic," as employed by Leibniz in opposition to Descartes and Descartes' followers, is a modern expression derived from the intention of the Classical Greek Pythagoreans' use of "*dynamis,*" and has a modern ontological connotation corresponding to the Classical Greek usage of Plato et al. respecting the application of the notion of an efficiently physical, rather than a merely formal geometry.

For convenience at this point, let us describe the significance of that use of the term "dynamics," as it appears in contrast to the radically reductionist systems of modern empiricist and positivist ideologies. In this way, we shall provide the reader an intellectual map of the topics to be discussed in the following pages.

Kepler's Self-Bounded Universe

The universe of Riemann and Einstein, for example, is a *dynamic* system, of a type best described, as I have above, as *finite and self-bounded.* That means, for example, that gravity, as discovered uniquely by Johannes Kepler (but not the modern sophists Galileo and Newton) is *an efficiently universal physical principle.* This means, in other words, a principle of action as extensive as the universe, in a universe which extends no further than is reached by the universal principle of gravitation. Our universe is therefore self-bounded, and finite in that sense. Its bounds are expressed in mankind's expanding accumulation of discoveries and applications of universal physical principles.

Therefore, as I have said, each discovery which meets the requirements of a universal physical principle, is also as extensive and bounded as gravitation is to be defined as bounded. The principles which satisfy that requirement, interact universally, to produce those commonly bounded effects which are discovered in the course of mankind's expanding knowledge of experience.

Therefore, all physical action in the universe is defined by a physical geometry which expresses the universal interaction of universal physical principles. The universe is, therefore, pervasively *dynamic* in these terms. It is the adducibly distinct categories of dynamics which define the distinction of the otherwise interactive abiotic, Biosphere, and Noösphere. The interaction among these three domains defines the experimental domain of the known universe as a unified set of phase-spaces as a whole.

The issue of human practice so posed, thus assumes the form of: *How does man, through aid of his sense-apparatus, know, with certainty, of the existence of any universal physical principle?* For modern physical science's practice, Johannes Kepler's discovery of universal gravitation, presents what appears to me now, to be the best choice of illustration of the notion of a universal physical principle as an intrinsically non-linear, or *transcendental* function of the type which required the development of not only Gottfried Leibniz's own, uniquely original discovery of the infinitesimal calculus, but the addition of the revolutionary change in mathematical physics carried out by Bernhard Riemann's development of an absolutely anti-Euclidean physical geometry.

The leading accomplishment of Riemann for physical science in general, was to go beyond the limits of elliptical functions, including the limits of Abel's work, to explore and develop deeper implications of Gauss's passing attention to the subject of hypergeometries. (By which I mean to reject the attempt to inflict Riemann with support for a discovery which the caught-out plagiarist and hoaxster Cauchy had copied from a paper he had stolen from the writings of the deceased Abel. The stolen paper turned up, at Cauchy's death, in a cataloguing of the materials carefully filed among Cauchy's possessions.)

Consider the principle of gravity in this way, a discovery made uniquely by Johannes Kepler. I use this case here to illustrate the quality of intention which should underlie the use of animation in treating the subject of physical economy.

The *mistaken description* of Kepler's discovery would be to say, that the planet, such as Earth or Mars, follows an elliptical pathway within the Solar System. The *competent choice of scientific language,* says, that universal principle known as gravity, repeatedly compels the planet to follow what becomes an elliptical pathway. The principled character of that action which might be portrayed at the blackboard of mere Euclidean geometry, as by pins and strings, or by an appropriate cross-sectional cut of a cone, expresses methods which have nothing in common with the ontological character of an elliptical Keplerian orbit. The crude options are typical of the usually miseducated student, as among the followers of Descartes and Newton. The correct method defines the need for a Leibnizian development of an ontologically infinitesimal calculus.

It was a conception consistent with the latter, appropriate choice of language, which impelled Kepler to present two challenges to the future mathematicians who might continue to perfect his own original discovery. This conception by Kepler, as addressed successfully by Leibniz, Carl Gauss, and others, through the work of Bernhard Riemann, is the key for understanding the proper function which animations should perform in study of the lawful principles governing the patterns of behavior of the U.S. and all other economies—whether the government, or governments, agree to this, or not.

The two challenges delivered by Kepler were, first, to develop *a truly infinitesimal calculus,* and, second, to define, not a mere mathematics as such, but a mathematical physics of *elliptical functions,* the latter premised on the crucial experimental evidence of Kepler's work: that it was the gravitation which generated the *ontologically infinitesimal* form of action corresponding to an ellipse. All competent mathematical physics must be proven within the bounds of those two, interdependent aspects of Kepler's own original discovery. These same two considerations are also, appropriately, the foundation of a competent science of physical economy.

On the first count, the vector which impels the planet along the generated orbital pathway, changes in each instant, no matter how small the estimated lapse of time during that instant. In other words, contrary to the empiricist Newtonians such as Euler, Lagrange, Cauchy, et al., the orbit is, *ontologically, absolutely infinitesimal.* The action which this infinitesimal expresses is, in actuality, not imaginary, as de Moivre, D'Alembert, Euler, et al., insisted; it expresses the efficiently acting presence of the universality of the principle expressed, for example, as gravitation. On this account, Kepler assigned the task of creating a calculus of the infinitesimal to future mathematicians.

To restate the core of that argument: gravitation is not a matter of an interaction (as if at a distance) among discrete bodies, but a pervasive action by a universal existence upon the universe in which any body is situated, *dynamically,* at any time. All universal principles have that same efficient character expressed in their effects.

Within the bounds of European civilization since the ancient Greece of Thales and Solon of Athens, this fact about universal physical principles would tend to be grasped more or less readily, as it was by the Pythagoreans and Plato. The impediment to clear thinking has been the type of reductionist Sophistry typified, for geometry, by Euclid's ***Elements.*** The reductionists' assumption that action occurs among discrete bodies within a predetermined, linear ordering of a purely formal physical space-time, is the induced quality of insanity which continues to be the leading obstacle to sanity respecting matters of science to the present time.

Rather than accepting the fact that sense-perception is the shadow which the real universe tends to cast upon our sense-organs, and, then, seeking to discover the experimental principles which show us *the process of generation of a real universe beyond the shadows,* the reductionist interprets sense-perception—the shadows cast upon the senses by reality—as reality per se. The pathetic effect of the reductionist assumption is, in effect, something akin to the notion that definitions, axioms, and postulates are self-evidently existing agencies of cause and effect. Thus, Riemann's bold return to the standpoint of *Sphaerics,* in his 1854 habilitation dissertation and beyond, is the necessary modern correction for the pathetic influences of reductionism in general and the standpoints of Descartes and Newton in particular.

The Leibniz calculus, from its initial development, no later than 1676 Paris, to its later precision as a catenary/natural-logarithmic-cued universal principle of physical least-action, meets Kepler's requirement. The reductionist counterfeits, such as that attributed to Isaac Newton, and to the doctrines of the empiricists D'Alembert, de Moivre, Euler, Lagrange, Laplace, and Cauchy, do not meet the requirement.

On the second count, it was clear to Kepler that we must not situate any physical principle, such as gravitation, within an aprioristic, Euclidean or kindred sort of Sophist system. The principle of hypergeometry since Riemann, has been, that the curvature lies within *the dynamic nature* of the action, rather than the action within the curvature. The three most outstanding cases of those who mastered Kepler's challenge on this account, were Carl F. Gauss, Niels Abel, and Bernhard Riemann. Riemann adopted Gauss's treatment of both elliptical physical functions and the rudiments of the higher-order physical-hypergeometric functions, as starting-points for what emerged as the Riemannian physical geometry which underlies any competent modern approach to a science of physical economy.

On this account, it should be emphasized that Kepler's method, which he rightly bases on the influence of Nicholas of Cusa and Leonardo da Vinci, is already, implicitly, a method of physical geometry, not an "ivory tower" mathematics such as that of Euclid. The outcome of the successive discoveries of Leibniz, Gauss, Riemann, et al., is already implicit in the work of Kepler. This was already recognized as a matter of *a threatening principle, contrary to their special interests,* by the empiricist followers of the New Venetian Party of Paolo Sarpi, as the attempt to destroy knowledge of Kepler's work was deployed through hoaxsters such as Fludd, Sarpi's lackey Galileo, Descartes, and the Isaac Newton hoax steered by Abbé Antonio Conti et al. Once again, in this and comparable cases, the voice of the Satanic Olympian Zeus, heard in Aeschylus' ***Prometheus Bound,*** resonates in the misty unwashed nooks of the modern science classroom.

The type of creative conceptions which I have defended here, conceptions situated within the domain of an epistemologically competent modern science, were not original to modern Europe; they are rooted in the earlier scientific practice of *Sphaerics,* which the ancient Classical Greek Pythagoreans and Plato adopted from Egyptian origins. Knowledge of that connection is more than probably indispensable in today's world, to clear up the popularized, false assumptions which were embedded in the wicked tradition of ancient Sophists such as the famous Euclid.

How Sophistry Corrupts Science

My experience with my own original discoveries in the science of physical economy, combined with experience of the achievements and shortcomings within the work of the Fusion Energy Foundation, have taught me that the proper approach to the development of a new adult generation of more fruitfully creative minds is to concentrate on avoiding the replication of those traditional pedagogical hoaxes of the classroom. The experience of a lifetime has shown me, that a young mind which submits to qualifying himself, or herself in a profession by submitting to the canons of a corrupt representation of science, is more likely to damage his, or her mind, than improve it.

By premising the education of bright young adult minds on avoiding the pitfalls called the taught canons of science and modern art, we leave young adult minds of promise free to unleash their true potential. Given the circumstances under which progress has proceeded, the work of the LYM during the recent several years on this account, has been a gratifying success in the specific sense that it shows the pathway to travel in promoting the creative development of the individual mind.

Cardinal Nicholas of Cusa appears thus as the most notable among the great creative intellects who shaped the wonderful work of the great "Golden Renaissance" of the mid-Fifteenth Century. From the vantage-point of the contemporary classroom, ***De Docta Ignorantia*** seems an awkward work, as all great beginnings of a valid intellectual revolution must be. It appears difficult in its own way, because every work of pioneering a new quality of direction in the Classical modes of science and art, must create its own language as it proceeds from the beginnings of a new direction. If later works appear less awkward, it is chiefly because the richer development of the necessary forms of language, and of ideas as such, have enriched the catalogue of our conversations. Such is the way in which real creativity proceeds, especially those creative efforts which launch an entire field of scientific or comparable thought.

The great accomplishments within modern European culture, although they echo, chiefly, the Classical Greek legacy established prior to the Roman, Byzantine, and medieval systems of corruption, were brought forth afresh by the Renaissance and its immediate predecessors, giving newly minted names for ideas almost lost to historical memory, and introducing new ideas not known to predecessors. In the greatest of the art and science which has emerged in the aftermath of the Fifteenth-Century Renaissance of Cusa et al., we have accumulated a new language, not merely of new words, but of new conceptions of principle unknown to our civilization's predecessors. As the participants in the experience of the LYM's self-development turn to Classical science and music, they find available to them a rich vocabulary of selectable, non-linear ideas of science and Classical art which have been created by six centuries of progress—despite the reactionary setbacks along the way. Ideas which had been confined to awkward expression, now have a rich vocabulary on which to improve.

The attempted corruption of ancient Greek science did not begin with Euclid. The intersecting, combined influence of the reductionists, such as the "materialists," Aristotle, and Euclid, have been the principal reservoirs of such types of intellectual corruption in European civilization since, up into modern times. The kernel of that corruption can be fairly summarized, for our purposes here, in the following way.

As I have already stressed this point above: we know that our imagination of what we are experiencing in the world, so to speak, which is "outside our skins," is not necessarily a competent representation of the real world. What our consciousness experiences is our attempt to discover both how the universe in which we live is controlled, and how we might alter the way in which that control is exerted.

Do not ignore sign-posts, but, at the same time, never allow yourselves to be duped into believing in mere signs, such as mere mathematical formulations.