

Reviewing an Original Discovery: Believing Is Not Necessarily Knowing

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The root of the increasingly catastrophic failure of U.S. education policy of practice, over the recent thirty-odd years, may be summed up in five points of a general indictment:¹

1. Sense perception is not necessarily knowing.
2. Learning is not necessarily knowing.
3. Generally accepted opinion, academic or other, is not a standard for the definition of truth.
4. Today's teachers have not necessarily intended to educate or test their students in a manner suited to human beings.
5. The radically reductionist fad known as "Information Theory," as associated with the influence of Bertrand Russell devotees Norbert Wiener and John v. Neumann, was always a hoax. Thus, the educational methods adapted to the "information theory" hoax, such as the related so-called "new math," are also a hoax.

¹ The corrupting influence of McGeorge Bundy's Ford Foundation on U.S. educational practices over the late 1960s and 1970s, should be seen as complementing the disastrous influence of Britain's Dr. Alexander King's 1963 Paris OECD report on education in Western Europe, as the effect of the latter is typified by Germany's disastrous "Brandt reforms." King was a co-founder, with Lord Solly Zuckerman, of the neo-malthusian Club of Rome, and was associated with Zuckerman, the U.S.A.'s McGeorge Bundy, and others in forming the pro-malthusian, Laxenburg (Austria)-based International Institute for Applied Systems Analysis (IIASA). IIASA was the Lord Kaldor-featured Cambridge Systems Analysis group's strategic back-channel to the Moscow malthusians. The corruption is to be recognized as typical of the moral self-destruction carried out simultaneously on both sides of the Atlantic, and also both sides of one-time British Prime Minister Winston Churchill's "Iron Curtain."

That five-fold corruption is largely a product of a moral degeneration of our society which was embedded in those standards of general education and culture which were introduced, in pilot-phases, during the course of the 1945–1964 interval.² During the middle to later 1960s, this already emerging trend was unleashed with great destructive force, in forms such as the “rock-drug-sex youth-counterculture,” and the moral and economic decadence resulting from the intention to transform a formerly productive society into a “post-industrial” form of “consumer society” utopia. As a result of this post-Missiles Crisis cultural paradigm-shift, which descended upon the adolescents of the 1960s, the world is now gripped, not only by the present, potentially terminal, systemic decline of the economies of Europe and the Americas, but by an ominous intellectual decadence among the generation presently occupying many leading positions, both in government and relevant private institutions.

Thus, we, most notably in the Americas and Europe, must recognize our nations as presently in the grip of that culturally induced 1964–2002 paradigm-shift in institutionalized popular opinion. This change has now reached the point of crisis at which the existence of this body of popular opinion *almost* assures us that today’s Europe and the Americas would not avoid an early collapse into what would become a prolonged new dark age for most of humanity. The practical means to avoid such an *almost certain* catastrophe are available, but the currently prevalent popular culture, combined with its corrupting impact on present educational institutions, would stubbornly resist any of those available, beneficial changes by means of which the economies and their nations might survive.

Therefore, the survival of civilization now depends upon the success of those among us who take the lead in rejecting, and seeking to overturn, very soon, that pathetic body of still currently prevalent popular opinion.

The presently developing international youth movement, whose specific qualities are referenced by this report, is a crucial factor in that effort for reeducation.

Relevant lessons from history show that sudden changes in prevalent, practiced culture, for better, or for worse, often occur through aid of the catalytic impact of youth movements. A youth movement gave birth to the transition from medieval, to modern European civilization, through the Italy-centered Fifteenth-Century Renaissance. So, a youth movement centered around Lessing and Mendelssohn, the German Classic, was a crucial, trans-Atlantic factor in the Franklin-led American Revolution. Yet, an anti-Classical youth

² This cultural-paradigm shift was a complement to the “preventive nuclear war” doctrine of avowed nuclear terrorist and pacifist Bertrand Russell, which became the core of the “Dr. Strangelove” (Leo Szilard) style nuclear-utopian strategic military and cultural doctrines of the anti-traditionalist, so-called “utopian” military-policy faction of the 1944–2002 interval.

movement directed from London by the British Foreign Office's Jeremy Bentham, played a crucial role in giving France the horrors of the Jacobin Terror and Napoleonic fascism. So, the introduction of the 1960s "rock-drug-sex youth-counterculture," was an essential contributing factor in transforming the previously successful form of U.S. economy axiomatically, from a successful producer society (albeit with serious flaws), into a decadent, parasitical, and self-doomed form of "consumer society." The included result of the latter turn, is what has since become the self-inflicted terminal phase of material and moral collapse of a systemically failed world economy of today.

Look back, across the expanse of European history since Thales and Pythagoras, but especially since "Golden" Athens' tragic folly in launching the Peloponnesian War. One ominous fact stands out.

We see there, in that history, repeatedly, an appalling fact. The renaissances of the past depended upon an intrinsically vulnerable, relative handful of apostles. In each renaissance, the continuation of that upturn was subsequently aborted, more or less, by its enemies. The enemies of progress were able, repeatedly, to mobilize those ruling forces of ignorant popular opinion, from the top-most ranks of society downwards, which misshaped the popular will, and thus induced the foolish majority of the people themselves to destroy or isolate the few worthwhile intellectual leaders available.

So, the legacies of murdered Presidents Abraham Lincoln and Franklin Roosevelt, and murdered Rev. Martin Luther King, have been virtually abandoned, or even explicitly betrayed by so many among their survivors. Thus, the despicable Democratic Party of Athens rallied popular opinion to murder Socrates judicially, and thus, ultimately, bring Athens' self-inflicted ruin upon itself.

In history, the leaders with the sublime quality of a Socrates or France's Jeanne d'Arc, are too few. This is not to recommend, perversely, the intrinsically evil Norman or Spanish inquisitions as a grim yardstick for measuring their heroic victims' achievements. Let us be grateful for those handfuls of exceptional individuals, who led every renaissance; but, let us also be warned, that the impulse for progress has been repeatedly turned back, as it was by the 1966–1972 Nixon campaign's "Southern Strategy."

Remember, that Nixon's "Southern Strategy" was a triumph of a combination of two passionately, morally illiterate, populist rabbles. This rabble included, on the one side, the neo-Confederate Nashville Agrarians' obvious followers; on the other side, the corrosive role of the leadership of the so-called "rock-drug-sex youth-counterculture" of Ford Foundation-backed and other anti-Classical university campus rebels of the middle 1960s. In effect, those ostensibly mutually opposing forces combined in converging effect, to unleash a process of

moral decay of the campus-centered youth, which continued through the *sans-culottes*-like “Rainbow Coalition” of 1972 and beyond. It was those combined varieties of existentialists, including the “speech code” Jacobin Terror of the nation’s campuses and public school-rooms, which have played a crucial part in transforming public and higher education of the U.S.A. and the Americas, especially the U.S.A., into the putrid mess it has become today.

In the history of European civilization since the period of Rome’s Second Punic War, the continuing cultural conflict within globally extended European civilization, has been, chiefly, the struggle of that decadent Roman legacy known *genetically* as Romanticism, in its recurring efforts to exterminate that Classical movement for truth which is associated, chiefly, with the Christian tradition of Plato.³

Among the numerous exemplary cases of this history, is the destruction of the Classical movement associated with Germany’s Abraham Kästner, Gotthold Lessing, Moses Mendelssohn, and Friedrich Schiller, by the succession of those waves of reactionary Romanticism expressed in such assorted forms as France’s Jacobin Terror, the rise of fascism under Napoleon Bonaparte, the waves of Romanticism spread in Germany following Napoleon’s victory at Jena-Auerstedt, and the increasing influence and depravity of Europe during the decades immediately following the Metternich-Castlereagh Vienna Congress and the Metternichean Carlsbad decrees. The fascist doctrine of the Napoleonic model of the state, as elaborated for Germany by G.W.F. Hegel, and the rise of Romanticism in poetry and the musical school of Czerny, Liszt, Berlioz, and Richard Wagner, are typical of the cases under which a great upward movement of the Greek Classical tradition has been, once again, aborted for a time by the mobbish thuggery of a Romantic resurgence.⁴

So, in the history of modern science, when Johannes Kepler, the Classical voice of the Golden Renaissance, had liberated astronomy from the Romantic folly shared among Claudius Ptolemy, Copernicus, and Tycho Brahe,⁵ Venice’s Paolo Sarpi unleashed the Romantic follies of his servant Galileo, and his agents Sir Francis Bacon and Thomas Hobbes, to launch that orgy of Romanticist empiricism associated with Descartes, Locke, Mandeville; this empiricist romp was continued by that Voltaire-led pack of salons known as

³ The Gospel of John and the Epistles of Paul typify this most clearly. However, the Platonic tradition is also an ecumenical one, as typified by Philo of Alexandria and Moses Mendelssohn for Judaism, and also Islam.

⁴ Cf. two works by the anti-Kantian Heinrich Heine: *The Romantic School*, in *The Romantic School and Other Essays*, Jost Hermand and Robert C. Holub, eds. (New York: Continuum, 1985); and *Religion and Philosophy in Germany: A Fragment*, John Snodgrass, trans. (Albany, N.Y.: State University Press of New York, 1986). Emphasis should be placed on Heine’s own first edition of the latter work.

⁵ Cf. Jonathan Tennenbaum and Bruce Director, “How Gauss Determined the Orbit of Ceres,” *Fidelio*, Summer 1998.

the Eighteenth-Century “Enlightenment” of Venetian Abbot Antonio Conti and his followers.

So, a see-saw battle between the opposing forces of Classical science and philosophical reductionism, has reigned throughout globally extended ancient, medieval, and modern European civilization, up through the present day.

Now, once again, a new youth movement has appeared an indispensable ingredient for the effort to rescue civilization; but, this time, let us build it more wisely, on the basis of lessons which should have been learned from the outcomes of the campaigns of the past. We must aim at producing what might be described loosely as a factor of mass-leadership. We must rapidly develop many veritable “platoons” of truly qualified, young intellectual leaders steeped in a distillation of the most crucial products of the Classical tradition to date. For this, we require not only a movement *for* education, but *a political movement which is education in and of itself*. That must be a mass-oriented movement of future world leaders, which seeks to inspire the kind of leadership in institutions today, which those present youth will represent when they become the nations’ leaders of a decade or more ahead. It must be based on an inner core of educational programs, around which other elements of education are organized. That approach to education is implicitly represented in the unfolding of this report.

The Needed Principles of Education

In service of that strategic purpose, the alternative to the ugly actuality of today’s prevalent educational policy, may be summed up in the following headlined points. These points, and the following exposition of their basis, include a relevant, featured summary of that core of my discoveries in a science of physical economy, which is otherwise distributed among my published accounts from over more than three decades to date. The relevance of those discoveries of mine, to the issues of educational policy, will become clear in the course of the following pages.

On this account, it is not merely relevant, but, functionally speaking, of crucial importance, to point once more to my published record of more than three decades, as consistently the world’s most successful long-range economic forecaster. The extraordinary quality of this comparative success, reflects the characteristic intellectual backwardness, the lack of consideration for scientific principle, among those putative rivals of mine, who practice the statistical methods prevalent among both university economics departments and U.S. government forecasting agencies, still today.⁶ Although my knowledge of many of the

⁶ Out of compassion for the incompetents teaching in those economics departments, we should emphasize the virtually criminal kind of intentional statistical fraud practiced over the recent two decades by the Federal

following matters here has been improved considerably, again and again, during the course of work done over the recent half-century, all of my unique accomplishments as an economist, has been the fruit of principled conceptions already crystallized during 1953.⁷ Thus, the evidence of my exemplary successes over some decades to date, will serve now to enrich today's student's sources of insight into the broader implications, for education and other missions, of the Classical physical principles on which my exemplary successes as a long-range forecaster have depended.⁸

As I shall show, economic science, when defined in the way in which the exemplary success of my forecasting demonstrates, should be recognized as implicitly "the science of humanity." Strong language? Admittedly. Exaggerated? Not in the slightest degree! As I shall show, and prove, at least implicitly, in the following pages, that claim is more than justified, especially in the setting of today's awful, global and systemic economic debacle.

The principled issues introduced in the list of summaries given below, reflect the starting-point of my definition of physical economy. That definition is summed up in two arguments. First, that: Physical economy, and its reflection as political economy, is premised upon the specific quality of principled difference which sets the member of the human species absolutely apart from, and above all lower forms of life. Second, that: Political-economy did not exist in practice, until the birth of the modern sovereign nation-state during Europe's Fifteenth-Century Renaissance's introduction of the notion of the supreme political authority of that general welfare principle of natural law which Leibniz

Reserve and other malefactors under such rubrics as the so-called "Quality Adjustment" factor.

⁷ It is notable, respecting lessons for educational policy generally, that an approximately year-long recovery and rehabilitation from a severe case of hepatitis, imprisoned me in circumstances under which recreation often took the form of extended, increasingly intense concentration on the relevant implications of the work of Georg Cantor and Bernhard Riemann for physical economy. This occupied most of the waking hours during the several initial months of recuperation, and reenforced greatly the habits of study and work which have dominated my life since.

⁸ The reader should understand "long-range" forecasts to be based on the effect of current, implicitly axiomatic assumptions of a society's economic behavior over a span of one to three generations. Approximate forecasts for periods as short as three to seven years are feasible. For example, in February 1982, I first warned the Soviet government, during my part in a 1982–1983 back-channel discussion which I conducted on behalf of the Reagan Presidency, that if the Soviet Andropov government continued the policy its representative had reported to me, that the Soviet-bloc economy would collapse in "about five years." I subsequently made the same forecast publicly. On the basis of that forecast, I warned, in an October 12, 1988, Berlin press conference, later broadcast on U.S. network TV, that the policy of the next U.S. Administration must base its policy-shaping on the expectation of an imminent collapse of the Soviet bloc economy, with Berlin to become the expected future capital of a reunited Germany. This case illustrates the point, that competent short- to medium-term economic forecasts are possible only as they are subsumed by study of long-term capital/generational factors. In the short-to-medium term, the factor of human "free will" may produce immediate effects contrary to nonetheless persisting long-term "orbital trajectories."

later identified as “life, liberty, and the pursuit of happiness.”⁹ The existence of any acceptable practice of political-economy depends upon the submission of government to the supreme authority of that scientifically defined universal principle of natural law.

That said, the indicated principles of educational reform addressed here, are, in summary, as follows.

1. The “axiomatically” absolute difference between members of the human species and higher apes, is typified by that paradox of “The Cave” presented by Plato. The generation of what prove to be experimentally validated solutions for that type of paradox, called “hypotheses,” is the gateway to the discovery of what are called, interchangeably, “universal physical principles,” or, principles otherwise recognized as in the form of Platonic “ideas.” The body of this quality of “ideas” uniquely constitutes the core of actually knowable truth.
2. For today’s secondary or university science classroom, or comparable setting, the most convenient choice of benchmark for introducing a proof of that notion of “truth” to students today, is Carl Gauss’s conclusive exposure of the axiomatically fatal, systemic error, respecting physical science, perpetrated by such leading Eighteenth-Century “Enlightenment” figures Euler and Lagrange. That error was identified explicitly by Gauss, in Gauss’s original, 1799 (Latin) presentation of the fundamental theorem of algebra.¹⁰ This proof of that theorem, by Gauss, supplied a rigorous definition of the notion of “the complex domain.” It also supported and clarified Leibniz’s earlier, original discovery of both the catenary-keyed notion of a universal physical principle of least action, and Leibniz’s related, transcendental conception of natural logarithms.
3. These proofs by Leibniz, Gauss, *et al.*, although initially situated within the domain of *the functional (“phase-spatial”) relationship of the human individual to man-altered nature*, are also the key to defining a related, but distinct, second category of universal principles. *This second category provides an historical conception of the efficient*

⁹ While this report was being written, I received several draft papers, of David M. Shavin and other collaborators, on the subject of my own and my associates’ continuing fascination with the influence of Leibniz, from Europe, expressed in both the U.S. Declaration of Independence and U.S. Constitution, and in the principles of what Alexander Hamilton defined officially as the American System of political economy. My associates’ continuing attention to these connections, which had been spearheaded by historian H. Graham Lowry during the early 1980s, will be featured in an edition of the *Fidelio* quarterly to be released from the printer during February 2003.

¹⁰ Although the reductionists, such as Lagrange himself, Laplace, Cauchy, Lindemann, Felix Klein, *et al.*, have rejected the crucial kernel of Gauss’s 1799 argument, no competent objection to Gauss’s proof is known, to the present day.

principle of human social relations, such as the principles of what is known as Classical artistic composition, as these modes of intellectual organization of cooperation in society, bear on the increase of our species' power to exist and prosper in the universe.

4. The latter, *properly adduced social principles of strictly Classical artistic composition*, are also universal physical principles, so defined by their *physical effects* on the potential relative population-density of societies (“cultures”). Both these classes (sub-phase-spaces) of universal physical principles, are to be located within the anti-Euclidean physical geometry defined by Bernard Riemann.¹¹
5. The physical effects of the combination of those first and second sub-phase-spaces, are measured with reference to the long-term (multi-generational) increases (or decreases) per capita and per square kilometer of the Earth’s surface: what I have defined as *the potential relative population-density of our species*. The discovery of this twofold set of principles as an integral notion of function to that intended effect, has been my original contribution to a science of physical economy.
6. The social transmission of the first class of principles, by means of the second, defines the efficient actuality of the historical existence of our species, and thus defines the uniqueness of the human species. This transmission is the elementary basis in fact for both a history of science and a science of history.

For today’s populations, the two sets of principles just identified, are more easily understood by aid of references to my own, critical appreciation of the work of Vladimir Vernadsky’s respective, successive definitions of the *Biosphere* and *Noösphere*. However, there are three crucial omissions of essential principle in Vernadsky’s known writings, principles which were featured as central to my own original discoveries in the science of physical economy. Nonetheless, Vernadsky’s work, if and when taken in the context of my own, is of crucial importance for inclusion in teaching my own discoveries to university-level studies today. My exposition here follows that pedagogical track, as in earlier locations.¹²

For reasons which I shall summarize here, the appropriate approach to study of the case of Gauss’s 1799 attack on the systemic fallacies of such anti-Leibniz fanatics as the reductionists Leonhard Euler and Euler’s *protégé* Lagrange, serves today’s student of university age, or a relatively exceptional secondary student, as the best point of entry into the foregoing list of categories of knowledge. A clear insight into Gauss’s discovery reported there, requires a direct comparison of the equivalence of Abraham Kästner’s student Gauss’s attack on the

¹¹ My use of “Classical” is a strict one, as I indicate below. As I shall show during my summary of the lessons to be adduced from Vernadsky’s definition of the Noösphere.

¹² Lyndon H. LaRouche, Jr., *The Economics of the Biosphere* (Washington, D.C.: EIR News Service, 2001)

axiomatic errors of d'Alembert, Euler, and Lagrange, to the earlier, Classical arguments to similar effect by such Classical Greeks as Archytas and Plato on the matters of methods of construction for doubling the geometric figures of line, square, and cube. This comparison must include Plato's, Leibniz's, and Gauss's mutually congruent, anti-Aristotelian notion of *powers* for these cases.¹³

The foregoing prefatory remarks mark out the territory to be covered. What now follows is a combination of arguments presented in locations previously published, with some added points needed to bring the totality together in that kind of unified world-outlook which ought to become the common basic knowledge of persons of the 18–25 age-interval of education today.

1. In the Beginning: Plato's Principle of Hypothesis

The sense organs of the human individual are part of the mortal human being's animal-like, biological organism. Sense-perception does not present our mind with direct images of the world "outside our skins," but rather, as Plato and the Christian Apostle Paul's *I Corinthians* 13 warn, our senses show us only "shadows" of that reality which has tickled the human individual's biological mental-sense-perceptual apparatus. So, Plato compares the experience of sense-perception to shadows cast by unseen real objects, as if upon the walls of a dimly firelit cave.

Human beings are nonetheless capable of discovering the real, essentially unseeable, immortal universe whose included, non-substantial effects are those shadows called sense-perceptions. The method by which those discoveries are made, is typified by the Socratic dialectical method of Plato, otherwise known as the method of *hypothesis*. Plato's collection of Socratic dialogues, and his *Laws*, constitute a body of exemplary mind-training

¹³ Abraham Gotthelf Kästner (b. 1719) is a key international figure behind such of his students as Lessing and Gauss, and a central figure in the 18th-Century development of mathematical physics. He was a crucial influence in the 18th-Century rise of the German Classic around Lessing and Moses Mendelssohn, and played a pivotal role in bringing knowledge of the work of Leibniz into the leading circles of the American Revolution. Among Kästner's many important publications, the most notable, which should inspire some noble souls to produce good English language translations, include his 1758 *Anfangsgründe der Arithmetik, Geometrie, ebenen und sphärischen Trigonometrie, und Perspective* and his four-volume *Geschichte der Mathematik, Vols. I-IV, 1796–1800*. Kästner was the founder of an explicitly anti-Euclidean geometry; his influence on his pupil Gauss on this account, is reflected in Gauss's own discovery of elements of an anti-Euclidean geometry, dated to 1792, and reflected in Gauss's 1799 refutation of the reductionist errors of Euler and Lagrange. Riemann's development of an anti-Euclidean, as distinct from merely "non-Euclidean" geometry, is chiefly an outgrowth of this line of development by Kästner, Gauss, and Dirichlet. Kästner was also a crucial collaborator of Benjamin Franklin, as a forthcoming report by my associates will pin-point this crucial connection of the anti-Locke influence of Leibniz in defining the 1776 U.S. Declaration of Independence.

exercises, by which the student is aided in attaining comprehension of scientific method. As I shall show, later in this present report, Vernadsky's definition of the Noösphere implies a strictly physical-scientific definition of the meaning of "spiritual." These same Socratic exercises which are the centrally characteristic feature of the discovery and transmission of experimentally validated universal physical principles, are therefore to be recognized as "spiritual exercises."

Among Plato's dialogues, his *Parmenides* has special relevance for that aspect of our report. In that dialogue, Plato implicitly emphasizes the importance of the development of scientific method by Thales' follower Pythagoras, a connection which has crucial significance for Gauss's referenced, 1799 definition of the complex domain. The most crucial of the known ancient discoveries, are the fruit of a class of paradoxes of geometry, including the Pythagorean experimental demonstration of the paradoxical musical "comma,"¹⁴ and the impossibility of reductionist solutions for such paradoxes as: the doubling of the line, the square, and cube, and the construction of the five Platonic solids. Despite the claims of the followers of Euler, Lagrange, and Cauchy, no competent solution for these paradoxes is found by means of a geometry confined by "ivory tower" definitions inhering in the shadowy, axiomatically erroneous presumptions of the reductionists' sense-perception.

Gauss's discovery of the physical principle of the complex domain, as in the referenced 1799 piece, returns our attention to the Classical Greek form of the elementary paradoxes of doubling of the line, square, and cube. These ancient paradoxes are indispensable keys to defining a form of modern mathematical physics, that of the complex domain, which is capable, axiomatically, of functional representation of the real universe, as can not be done competently by the ivory-tower imageries of errant mathematical reductionists such as Euler and Lagrange, and their present-day followers.

Consider the relationship between Plato's method and that of such of his modern followers as Brunelleschi, Cusa, Pacioli, Leonardo da Vinci, Kepler, Gilbert, Fermat, Huygens, Leibniz, Jean Bernoulli, Abraham Kästner, Gauss, Lazare Carnot, Dirichlet, and Riemann. Contrast this to that fanatical sort of axiomatic error of "ivory tower" reductionism, which is common to ideologues such as Aristotelians, and such empiricists as Descartes, Newton, Boyle, Euler, Lagrange, Laplace, Cauchy, Clausius, Grassmann, Helmholtz, Maxwell,

¹⁴ The relevant experiment is Pythagoras' comparison of various orderings of what must have been the equivalent of Florentine *bel canto*-trained singing voices, in various modes, against a monochord. The naturally determined differences in intervals of the singing voice, compared with the relevant lengths marked off on the monochord, would define a "comma," not as a mathematically predetermined, but physically lawful characteristic of the properly developed human singing voice. The related case for J.S. Bach's well-tempered system, as opposed to the reductionist system of equal-tempering, an example of the same principle. Hence, the "comma" is an example of the difference between a physical geometry, and an "ivory tower" geometry.

Lindemann, Felix Klein, and the devotees of Bertrand Russell. Focus upon the most essential point of irreconcilable conflict in method between the two sets. Then examine those implications of that contrast which are illuminated by the methods employed by Vernadsky to define the Biosphere and Noösphere.

What Is Hypothesis?

The discoveries of Johannes Kepler, effected by the methods he details in his 1609 *The New Astronomy*, were the beginning of a comprehensive form of mathematical physics. As in all science, so in contrasting the success by Kepler to the failed method of Claudius Ptolemy, Copernicus, and Brahe, we must take into account the relevant ancient precedents for the follies of such followers of the ancient Eleatics as the modern empiricists Galileo, Descartes, Euler, and Lagrange. We must give our attention to what many famous names in history have easily overlooked among the ostensibly fine details of scientific rigor. Those paradoxical details in methods of observation and judgment, are usually the key to truly important discoveries, even validatable discoveries made by confessing religious empiricists. Even reductionists such as Aristotle and the empiricists, sometimes admit the paradoxical existence of efficient principles which can not be observed by the senses, if not those principles themselves. Like the Romanticist Immanuel Kant, they either concede, or claim to know of, the existence of such considerations, which they define wrongly, while insisting that such agencies, if they exist, can not be known rationally by the individual human mind.

Apart from the specific wickedness of Aristotle's *Politics* and *Ethics*, the general folly of Aristotle's method for physical science itself, is typified by Claudius Ptolemy's hoax. Although Aristotle assumes a higher reality than sense-certainty to exist, Ptolemy follows Aristotle in limiting attempted knowledge of actual physical principles to a kind of apparent statistical regularity presumed to be consistent with the introductory books of *Euclid's Elements*. Although Copernicus echoes the heliocentric view of Aristarchus, the astronomy of Copernicus and Brahe accepts the same anti-scientific quality of "medieval" method of Aristotle, adopted by Ptolemy.

Within his *The New Astronomy* and other published locations, Kepler presents an elaborate report on the anti-scientific character of Aristotle's doctrines; Gauss, in developing a crucial proof of the entirety of Kepler's argument respecting the functional composition of the Solar system, applies the case of the principal asteroids as the empirical proof underlying Kepler's definition of the principles of a comprehensive approach to mathematical physics.¹⁵

¹⁵ Cf. Johannes Kepler, *The New Astronomy*; see also Tennenbaum and Director, *op. cit.* Implicitly, Gauss's confirmation of Kepler's case for "the missing planet," in the orbits between Mars and Jupiter, is an application of the notion of the complex domain which Gauss had presented, in refutation of Euler and Lagrange, in the 1799 piece.

The errors of Aristotle's method are always found in the details which that method either presumes to deny, or relegates to the domain of the humanly unknowable.

The followers of that Ockhamite perversion of Aristotle called empiricism, as typified by Paolo Sarpi, by Sarpi's personal lackey Galileo Galilei, Galileo's pupil Thomas Hobbes, and Locke, turn Aristotle's details into what often prove to be explicitly an actively nasty sort of what is literally a "devil in the detail." For example, Anglo-Dutch Liberal John Locke, makes implicitly a neo-Cathar argument which is featured explicitly as the central claim of Physiocrat François Quesnay. The same neo-Cathar claim is featured shamelessly in the central arguments for "free trade" by such of Locke's fellow-Gnostic followers as the more frankly pro-Satanic Bernard Mandeville, and Mandeville's follower Adam Smith.¹⁶

Quesnay is a shameless devotee of the ultramontane medieval feudal system of serfdom. His *Physiocratic* scheme explicitly classes the serf, axiomatically, as a form of human cattle. To support that argument, his absolutely irrational, *laissez-faire* defense of feudal parasitism, resorts to copying the dogma of the neo-manichean cult of the Cathars.¹⁷ He, like a Cathar, defines a capriciously corrupt deity, a nasty sort of gnome operating from under the floorboards of reality, who "fixes" the throw of his crooked dice, such that some people are made, magically, rich and powerful, while others are left destitute and poor. Modern Liberal economists describe that swindle as "statistics."

The "Venetian Party's" John Locke, Mandeville, and Adam Smith, are not customarily regarded as traditional feudalists like Quesnay; but, they share with Quesnay a common interest in their hatred of the Fifteenth-Century Renaissance and of, more immediately, the existence of France's Cardinal Mazarin and Jean-Baptiste Colbert. These "Enlightenment"

¹⁶ As I have elaborated this in locations published earlier, the use of the term "capitalism," as Karl Marx does, to describe, implicitly, both the Constitutional economic system of the U.S.A. and the present systems of western Europe, shows the speaker to be either illiterate in the most elementary features of modern economy, or a shameless liar. The crucial, continuing issue of U.S. wars against the British monarchy is rooted in the axiomatic incompatibility of the British system to that U.S. Constitutional system, rightly known to scholars by the names of "The American System of political-economy" or "the national system of economy." The principal objectionable feature of the British system was, and remains, its foundations in that neo-Venetian system of Anglo-Dutch Liberalism, in which a financier slime-mold form of oligarchy controls the fate of the nation and its other victims through the agency of an "independent central banking system." The latter system represents the special interest of a Venice-style financier oligarchy, which places itself above government in the foreign and internal affairs of both the nation and foreign targets, alike. This oligarchical feature is the notorious "Invisible Hand" (the one presently in your pocket). Under the U.S. Constitution's Preamble, the U.S. government is the sole sovereign, which is accountable to the interest of the general welfare of present and future generations. Admittedly, the U.S. Federal System, introduced by U.S. agents of Britain's Edward VII, is an abomination, but, since its constituent private shareholders are presently hopelessly bankrupt, the sovereign's authority expressed by the U.S. Treasury should be putting the embarrassed Fed under bankruptcy-reorganization, soon.

¹⁷ In English slang, "the buggers."

Liberals are all, like John Locke himself, typical of the philosophical expressions of that neo-Venetian form of Anglo-Dutch Liberalism which raged, like a pandemic, across the maritime regions of late Seventeenth and Eighteenth-Century northern Europe, and spread into the endemically treasonous Essex Junto and slave-owner circles in English-speaking North America. The neo-manichean doctrine of Quesnay appears in a Liberal guise as the explicit advocacy of moral depravity in Mandeville's *The Fable of the Bees*, as the same pro-serfdom dogma of the Physiocrats is echoed in Liberal John Locke's defense of slavery as "Property."¹⁸ Quesnay's and Mandeville doctrine of "let the Satan whom Smith esteems as the knowing Director of nature, fix the dice," is echoed by Adam Smith's 1759 *The Theory of Moral Sentiments*, as in his anti-American tract of 1776, *The Wealth of Nations*.¹⁹

To situate the subject-matters thus introduced, we must recognize that any attempted attack on the problems of physical science, such as physical economy, requires that so-called physical science and so-called social theory not be kept in separate, virtually water-tight, academic compartments. On this account, a competent understanding of both so-called "physical science" and "social theory," depends upon viewing both, simultaneously, as I have done, from a common axiomatic basis in the standpoint of the pre-Euclid geometry of Plato's Academy.²⁰

¹⁸ E.g., "shareholder value."

¹⁹ Cf. Friedrich August Freiherr von der Heydte *Die Geburtsstunde des souveränen Staates* (Regensburg: Druck und Verlag Josef Habbel, 1952). My wife, Helga Zepp-LaRouche and I have compared leading international law specialist von der Heydte's thesis to our own emphasis on the Fifteenth-Century Renaissance. The two views, his and ours, are more complementary than contrasted. He emphasizes the struggle to free Europe from continued enslavement by the imperial law which ultramontane feudalism continued under the tyranny of (in our emphasis) Venice and the Norman military forces. The *Fronde* adversaries of a modern form of French nation-state, and of Cardinal Mazarin and Jean-Baptiste Colbert, who later allied against Colbert with the Gnostic "Sun King" Louis XIV, were a typical expression of the ultramontane tradition. Notably, the explicit coincidences of the Physiocratic tradition of Quesnay and Turgot, with the explicit "buggery" of Mandeville and Adam Smith, reflects the Venetian oligarchical roots common to both the ultramontane feudal and Anglo-Dutch Liberal systems.

²⁰ Benjamin Franklin collaborator, and Leibniz follower Abraham Kästner's crucial, leading role in the middle through late Eighteenth-Century development of both Europe's Classical science and art is strongly implied here. It was Kästner who insisted that mathematics should abandon the post-Plato, "ivory tower" system of definitions, axioms, and postulates introduced as Euclid's *Elements*, and return to a strictly Platonic, anti-Euclidean conception of the experimentally based discovery of universal physical principles (powers). Hence, the development of an actually anti-Euclidean physical geometry is traced from Kästner, through his student Gauss, through the generalization of anti-Euclidean geometry by Riemann. This is not to be confused with the interesting, but relatively superficial "non-Euclidean" geometry of a Lobachevsky and János Bolyai. Kästner, the leading German defender of the legacies of both Leibniz and Johann Sebastian Bach against the Eighteenth-Century "Enlightenment" reductionists, was also the founder of the German Classic of Lessing, Mendelssohn, and such of their followers as Goethe, Friedrich Schiller, and the Humboldt brothers, in addition to causing the rescue of the works of William Shakespeare from their savage mutilation in the England of Walpole *et al.*

The modern reductionist standpoint, typified by Galileo and Descartes, assumes, as Ptolemy's, Copernicus', and Brahe's schemes did, that individual sense-experience can be represented by a set of putatively "self-evident" definitions, axioms, and postulates, and, therefore, that a sufficiently well-developed mathematics, derived from such a set of "ivory tower" presumptions, such as that of the reductionists Euler, Lagrange, and Cauchy, must, as Lagrange taught, be potentially capable of explaining comprehensively anything and everything which occurs within the bounds of sense-experience. No hypothesis allowed!

In contrast to Lagrange *et al.*, the standpoint of the school of Thales' follower Pythagoras, accepts no "ivory tower" assumptions. Typical of the anti-Euclidean physical geometry of the Pythagoras-Plato tradition, are the same three elementary challenges by means of which Gauss, in 1799, defines the complex domain: the doubling of the line, the doubling of the square, and the doubling of the cube, as defined by Plato's collaborator Archytas, the Pythagorean of Tarentum. Add to this the uniqueness of the five regular (Platonic) solids. For Plato's view on these, consider three of Plato's dialogues, where the anti-Euclidean principles of physical geometry are referenced: the *Meno*, *Theaetetus*, and *Timaeus*. Read Gauss's fundamental theorem of algebra against that background; read the *powers* of the square and cube as they are expressed in an algebra so considered, or, as Gauss's famous, and crucial two documents on bi-quadratic residues, presents this view. The solution for *the physical act of construction* of the doubling of the cube, which resolves the so-called "Cardan problem," presents the student with a sense of the efficient "physical presence" of the same complex domain in which Leibniz had located the catenary-keyed expression of a universal physical principle of least action.

The mastery of those elementary challenges of a purely constructive geometry, is to be taken against the experimental background of Fermat's, Huygens', Leibniz's, and Jean Bernoulli's demonstrations, that physical effects in the universe do not follow a pathway of "Euclidean" (e.g., "Cartesian") pathway of "shortest distance," but of "quickest action," a pathway of action which scientific progress typified by the characteristic figure of physical geometry, the catenary. What needs to be purged from education, is the moral degradation of the teaching and application of mathematics to a mere describing of nature, as the Newtonian tradition of Lagrange's dogma does. In other words, as I shall stress at appropriate places in my argument here; the sterile mathematics of mere "energy," must be superseded by the physical geometry of "power."

The implication of such lessons, is that the principles of space-time organization lie in physical space-time, not a space and time of "purely mathematical," "ivory tower" definitions, axioms, and postulates, on which latter, false presumptions, the relevant failures of d'Alembert, Euler, and Lagrange were premised, as were the failures of such followers of

Lagrange as Laplace, Cauchy, *et al.* Contrary to Aristotle, Euclid, and the “non-Euclidean,” competent mathematical knowledge can be obtained only by those experimentally verified methods of constructed proof of principle which are reflected in the Platonic argument of Gauss’s 1799 paper. The outcome of Gauss’s work to this effect, becomes the opening paragraphs of Bernard Riemann’s 1854 habilitation dissertation, which presents a general definition for a purely *anti*-Euclidean, rather than “non-Euclidean,” physical geometry.

A physical geometry limits the notion of “dimensions” to those *hypotheses*, as Plato defines a notion of *hypothesis*, which occur as the acts of discovery and experimental proof of universal physical principle. These acts must have been validated, as Riemann emphasized, by methods of experiment uniquely appropriate for general claims to a proposed principle’s universality. The discovery of the method of construction which enables a human mind to double a line, square, or cube, by no means but construction, defines “properties” of each, which are expressions of the *powers* of physical action by means of which relevant construction is accomplished. For example, the sublime “power” which distinguishes rotation from a mere line, and a solid from a mere surface. Gauss’s treatment of the cubic function, and also his construction of the *Pentagramma Miraficum*, are typical illustrations of the use of the principle of construction as a reflection of physically efficient effects of “powers.”

Successful hypotheses begin with a paradox. For example, *does a cube exactly double the volume of a given cube, actually exist?* Think about that; it is not an idle question. *Prove it by construction!* Look at Archytas’ solution for this! The method of construction which solves that specific paradox expresses an experimentally demonstrated hypothesis which guided Archytas to that solution (**Figure 1**).

That which is presented to the senses of the purblind newborn child is a realm of paradox-ridden sense-impressions, not a faithful image of the world outside his skin. The child must not only discover the functional relations within sensed physical space-time; he, or she must repeatedly rediscover those relations, correcting earlier errors of presumption in a succession which suggests the peeling of the onion. From the beginning, the child’s mind must hypothesize the existence of that which corresponds to the always paradoxical sense-experience of that real, unseen physical space-time which tickles the human sense-apparatus. Nothing real is simply self-evident.²¹

²¹ Truth is expressed as action cohering with the essentially infinitesimal quality of the catenary. Scientific progress seeks to approximate that truth. As Leibniz taught, but an enraged Euler denied, it is truth, not mathematical approximations, which runs the universe, e.g. Leonhard Euler, *Letters to a German Princess*, 1761. Hence Euler’s denial of the infinitesimal for calculus, and Euler’s and Lagrange’s obsession with their protests against the reality of the complex domain. Hence, Euler’s accomplice Maupertuis’ fraudulent claim to have discovered a principle of least action.

New dimensions of physical space-time exist for us only as we acquire those new willful powers over nature which we define as the successive work of Gauss, Dirichlet, and Riemann defines a physical universe of that expanding array of paradoxes. These are paradoxes which the human will has either mastered as human physical powers for hypothesizing in the universe, or are, at the least, recognized challenges, as those paradoxes which we are seeking to bring under the willful control made available to us by experimental proof of physical principle.

That, in short, is the issue of hypothesis which almost invariably prompts the wildest eruptions of distemper among the reductionists of the “pure mathematics” and “physics” departments. What enrages those “ivory tower” fanatics, is their confrontation with the details which threaten to topple the edifice of their “self-evident,” mathematical “ivory tower” conceits.

That much said, what then is the way we must define the relations between what is usually assigned to the department of mathematical physics, as distinct from what is assigned to the departments of taught social dogma? A glance at Kepler’s method will point the way.

Kepler & Prometheus: A Matter of Detail

Kepler’s attention to detail showed him the existence of some crucial oversights in the work of astronomer Tycho Brahe. The orbit of Mars was not circular, but approximately elliptical. Moreover, the motion of the planets in their elliptic-like orbits was not uniform, but constantly not uniform. Nonetheless, the succession of the recurring orbits was predominantly regular. These elementary details showed that the real universe did not function as Aristotelians such as Ptolemy, Copernicus, and Brahe had imagined. The real universe was not the universe as a naive Aristotelian or empiricist blind faith in sense-certainty misdefines the notion of what are called “universal principles.”

In brief, Kepler recognized the paradox of observed, approximately elliptical orbits, that, not only, can the notion of Aristotelian regularity never be reduced to a simple form of action, but that, more to the point, the characteristic principle of action in the more scrupulously observed Solar system, is expressed by constantly non-uniform motion. The shadows on the screen of a merely perceived Solar system’s motions, are therefore controlled by some universally efficient power, in Plato’s sense of “power” (as contrasted with the reductionist notion of mere “energy”). Kepler recognized the object which cast the shadows of astronomical sense perception as a controlling intention of the Creator of the universe: *a universal physical principle, a power acting efficiently from outside perception, to produce the shadowy effects presented to the astronomer’s perception.*²²

²² Kepler, *op. cit.*

The intention, which must be discovered, and then proven to be universally efficient in controlling the behavior of the shadows, appears first as a paradox, and then as an hypothesis which needs experimental proof of its efficient universality.

That much, for the moment for that example from Kepler; now, for LaRouche on the Riemannian geometry of long-range capital cycles.

What is an experimental proof of a Platonic quality of hypothesis? Really? Here, on this crucial point respecting the implications of experimental proof of principle, the Aristotelians and empiricists figuratively hang themselves. The validity of the claim to have discovered any universal physical principle, is not satisfied by the mere repetition of the specified, observed effect. *It must be demonstrated that the application of what is believed to be an individual's discovery of a proven universal physical effect, enables mankind to increase its power to exist in the universe.* It must be demonstrated that the claimed hypothetical knowledge represents a principled increase of mankind's *power* to exist in the universe, as Plato defines "power" where the erring Aristotle claims to see "energy."

In the relatively simplest case, the notion of *power*, as employed by Plato's dialogues in respect to doubling the square, or the Pythagorean Archytas' construction of the solution for doubling of the cube, represent pre-existing principles of the universe, but preexisting universal principles whose discovery enables man to produce effects which are changes in that otherwise preexisting universe. The elementary cases of doubling the line, square, and cube, by construction, are typical of such Platonic connotations of *power*.

To illustrate the point of contention, consider the implications of what I have just said. Consider the legendary image of Prometheus, a subject to which I shall return at a later point here. The mention of that name now cracks the egg-shell, releasing our thoughts into a larger universe. This takes us directly to the most essential implication of Riemann's 1854 habilitation dissertation.

Economist LaRouche's View of Our Universe

Now, we come to the point of this report at which we shall focus upon the idea of measurement of performance of economies in physical, rather than fictitious, financial-accounting terms (**Figures 2–5**).

This clarification of the principles of real, as opposed to financial-accounting economics, requires a careful, preliminary reconsideration of some of the most important of the underlying considerations of physical-scientific practice. The indispensable role of the discussion of these considerations for any science of economy, will be made clear in the

course of both the immediately following, concluding topics of present chapter, and subsequent, concluding chapter of this report.

We proceed, at this point, by turning first to an indispensable set of remarks on the nature of science in general. This applies to both matters of the phase-space of the individual's action on the universe, and the physical effects determined by the principles of the social processes within which individual action is situated.

In any competent aspect of physical science, even formal mathematics, nothing exists before, after, or outside our universe. Einstein's notion of the universe (taken as a totality) as "finite, but unbounded," reflects such an awareness of the framework within which we might conduct any rational discussion of the universe. Similarly, if we must suppose that that universe always existed entirely within itself, that is not to suggest that it did not continue to develop, but that it is a Riemannian universe, producing not only new forms, but changes in characteristics of action within itself.

Suddenly, with that latter thought, of development, the universe becomes a fascinating place of residence; physical science suddenly comes to life. Our notions of matter, space, and time, are changed profoundly, both individually, and in respect to their functional interconnections. Those childish notions of space and time which occupy popular and other scientifically illiterate opinion today, vanish, replaced by something which Riemann's notions of physical geometry suggest.²³

For us, as mortal human beings, all that science has discovered so far to be universal physical principles, points to principles which must be presumed to be, and should be tested for the quality of being universal, in their efficient extent of relevant application. Therefore, for a qualified physical economist, any Platonic form of hypothesis which is proven to be a universal physical principle by Riemann's implied standards of unique experiment, always existed within "the simultaneity of eternity," with those qualifications, and always will. This is to be understood in the sense that Gauss's 1799 report of the discovery of the fundamental theorem of algebra signifies "universal physical principle" in a Platonic way which reflects the Classical Greek constructions of Archytas, Plato, *et al.* That presumption of universality will remain true, to the extent some qualifying error in the interpretation of that notion were not uncovered and corrected.

Therefore, in the subject-area within which this report is situated, the practice of economic science, *we must proceed from the conditional, pragmatic assumption, that man probably does not*

²³ The principle of least action (as opposed to, for example, shortest distance) points in that direction. With Riemann's habilitation dissertation, the notion of changes in characteristic values of action becomes a distinct idea.

create new general types of universal physical principles for the universe, but, rather, is able to create new physical states in the universe, through Platonic modes of discovery and application of pre-existing natural principles. Man extends the actual application of those discovered, universal principles which have the character of Platonic *powers*. This is the central principle of practice for both economic science today, and the principle governing the determination of relevant forms of competent law and policy-shaping practices of governments. Pending new discoveries which extend knowledge of our universe beyond that available today, this view expresses the principle on which the competent measurement of performance of an economy must be measured currently.

Therefore, the conditional notion of science today, must limit its claimed ambitions, to the bounds of those universal new states in the universe, which our discovery of pre-existing principles enables us to introduce as qualitative changes in our practice upon the universe. All competent notions of economic processes depend directly and absolutely on that view of man in the universe as a whole.²⁴

The essential argument to be made here respecting elementary principles of a science of physical economy, is summed up as follows.

When a person discovers an experimentally validated universal physical principle, a Platonic quality of *power* already existing in the universe, it is placed implicitly at the disposal of mankind. The best evidence of history to date, is that this action adds no new principle to the total of those existing in the universe, but increases the powers of the universe now placed within the domain (Riemannian phase-space) of powers now at mankind's willful disposal.²⁵ The realization of that new potency of mankind produces qualitatively new states within the universe, states which would not be generated without man's practice of those

²⁴ The notion of development within the universe as a universe suggests four possibilities:

1. The development within the universe which occurs through mankind's application of discovered universal principles which have the quality of Platonic powers. This is a scientific certainty.
2. The self-development of the universe implicit in the notion of a fixed set of active, "original" physical principles considered as Platonic powers. This is also a certainty, as the presently considered development of a Solar system from a "young," fast-spinning Sun implies such development.
3. That man, by discovering and adopting the power inhering in such knowledge of a self-developing universe, qualitatively expands and accelerates the self-development of the universe in man's practiced role as a conscious agent of the Creator.
4. The great ontological paradox, that the Creator, as a self-subsisting personality, creates new primary universal principles (powers) within an otherwise self-developing universe. For our purposes here, we limit most of our discussion to the first three of these notions of development of what Vernadsky identified as the Noösphere.

²⁵ For example: Note for later reference, that man's efficient discovery of a principle associated with abiotic phase-space increases the anti-entropy of the universe by this copying action from the ostensibly abiotic to anti-entropic to the cognitive domain.

principles. This changes the behavioral characteristics of that universe in a principled way, without yet increasing the totality of principles existing in the universe.²⁶

A related, if more limited conception of the universe, is presented by Vernadsky's successive development of the conceptions of *Biosphere* and *Noösphere*.²⁷ Vernadsky, a trained geologist, proceeding from the included benefit of the accomplishments in geology and physical chemistry of his former teacher Dmitri I. Mendeleev, took up the work of Louis Pasteur *et al.*, in defining the existence of *life* as a distinct universal principle, not derived from an abiotic universe. To this end, as a physical chemist of that intellectual pedigree, he introduced the case for the existence of what he identified as the *Biosphere*, whose geological "history" shows the abiotic processes of Earth as under increasing relative domination by the combination of the totality of living processes and their fossils, the latter including our planet's atmosphere, bodies of water, and soils.

As this fact became relatively well known among scientifically literate university graduates of the last half-century, the kernel of this notion of *life* as an expression of a primary form of universal physical power,²⁸ is that what are known to be living processes, produce what are otherwise impossible states of organization among non-living processes. This conception, whose development relevant classrooms and textbooks have traced to outgrowths of the initiatives of Pasteur, was pursued by his associates and followers such as Curie, to the effect of defining *life* as a specific quality of universal principle (*power*).²⁹

Following the introduction of the reductionist notion of thermodynamics, by Clausius, Kelvin, *et al.*, the experimentally based mathematical-physics distinction of life from abiotic processes generally, was early associated, by friends of life, with a mathematical notion

²⁶ There is one qualification to be added to that at later point in this report. The efficient addition of the practiced discovery of any universal principle to mankind's knowledgeable practice, changes the principled character of that phase-space, but, despite that, the fact that a pre-existing principle of the universe is added to human knowledge does not add to the roster of physical principles in the universe as a whole, even though the resulting human activity may change the characteristic anti-entropic efficiency of the universe as a whole.

²⁷ LaRouche, *op. cit.*

²⁸ Again, the term "power" is used here in the sense of Plato, Leibniz, Gauss, *et al.*, in contrast to the reductionists such as Euler, Lagrange, Cauchy, *et al.*

²⁹ In follow-up on my initial wrestling against the quackery of Professor Norbert Wiener (most notably, *Cybernetics, Human Use of Human Beings*) and John von Neumann (most notably, *Theory of Games and Economic Behavior, The Computer and the Brain*), I was confronted by Erwin Schrödinger's *What Is Life?* What Schrödinger failed to grasp, is that the physical evidence for a specific principle of life, as distinct from the abiotic domain, precludes any reductionist inference. Schrödinger, to his credit, was a physicist at heart, despite the Machian influence represented by Boltzmann's work; but, his influence is all the more dangerous to science, simply because he is less implausible than the obviously epistemologically childish Bertrand Russell clones Wiener and von Neumann. See the later discussion here of Vernadsky's concept of life, for more on this ticklish issue of defining a principle of life as such.

originally named “negative entropy.” This distinction presumed that life is a self-subsisting universal principle, not dependent upon specifically abiotic assumptions, which is imparted by life to the universe as a whole. Later, from the late 1940s onward, as the crankish, radically positivist, anti-humanist notions of such followers of the fanatical Ernst Mach as Ludwig Boltzmann, and Bertrand Russell’s devotees such as Professor Norbert Wiener, and John von Neumann, gradually gained broad, even popular currency, the original experimental connotations of “negative entropy” have almost disappeared from general use. That term has been taken over by the popularization of the pathetic science-fiction cults of the positivists, not only among science-illiterate politicians and mass-media editors, but even among many persons who are putatively actual scientists.

To eliminate that growing confusion caused by the spread of the “information theory” fads, as through the irrational fantasies of “science fiction” writers and their readers, I found myself compelled to introduce a new, mathematically more precise term, “anti-entropy,” for what had been the biologists’ original, pre-“information theory” intent of “negative entropy.” I premised this notion of “anti-entropy” on the characteristic functional distinction between an anti-Euclidean physical geometry, notably that of Gauss-Riemann, from a merely “non-Euclidean” geometry, such as those of Lobachevsky, János Bolyai, and Hermann Minkowski’s famous lecture on relativity. This notion of “anti-entropy,” as it must be identified today,³⁰ reveals its essential role in defining universal physical principles when we recognize two inseparable notions, as Vernadsky did, in his defining a Biosphere.

The fact, that processes characteristic of life generate ordered states of nature not existing in abiotic processes, not only defines living processes, but also provides a rigorous line of experimental division between abiotic and living processes. This line of division has the quality of a universal physical principle of the type associated with the notion of a *power* in the physical geometry of Plato, Kepler, Leibniz, Gauss, Dirichlet, and Riemann, among others. *First:* It identifies an expressed power which is always functionally characteristic of the living process, but never the abiotic as such. *Second:* As Vernadsky showed the proofs of this fact, the biological evolution of our planet, when the fossils specific to living processes are counted in, increases the accumulation of biomass, including such fossils as atmosphere and oceans, the living process dominates the abiotic in long-term effects of this transforming of the planet.

This division between the abiotic and living separates the phenomena of Vernadsky’s Biosphere into two distinct but universally interconnected, Riemannian phase-spaces.

³⁰ This is “anti-Euclidean” in the sense of the use of the term by Gauss’s teacher Abraham Kästner. It has the geometry implied by such early Gauss writings as his 1799 report of the fundamental theorem of algebra, a meaning more amply expressed by Riemann’s 1854 habilitation dissertation.

Vernadsky's work shows no actual comprehension of Riemannian physical geometry and its implications, but his work begs rereading from the anti-Euclidean standpoints of Kepler, Leibniz, Gauss, Riemann, *et al.*

Vernadsky's approach to the Biosphere leads him toward defining the Noösphere.

Just as the physical effects of action of living processes, produce the combination of living processes and their fossils, so what Vernadsky identifies as the distinctive creative (*noëtic*)³¹ powers of the human mind, produce qualitative changes in the combined processes of the Biosphere, changes representing physical effects which can not be the spontaneous outcome of living processes alone. The combined effect of these *noëtic* and Biosphere processes, produces what Vernadsky defines as the Noösphere. The result is the image of a three-phase universe, the Noösphere, composed of the interconnected action of three distinct phase-spaces: abiotic, living, and *noëtic*.

Where Vernadsky writes *noëtic*, I point to the quality of mental action typified by Gauss's 1799 exposure of the anti-creative physical-scientific impotence of Euler, Lagrange, *et al.* in the matter of those universal physical powers which are reflected in the reality of the complex domain. Gauss, like Leibniz before him, and such successors as Riemann, moved science toward eradicating all "ivory-tower" definitions, axioms, and postulates from science, and replacing these with nothing but those discovered universal physical principles defined by experimentally validated Platonic forms of hypothesizing: *noësis*.³²

It is that specific quality of creative reason which places Euler and Lagrange in stubborn defiance of the existence of human creative reason, as Gauss's cited 1799 argument typifies the product of creative reason, which otherwise is key to locating the functional difference between man and beast. This takes us beyond the accomplishments of Vernadsky, into the domain of Riemannian physical geometry. This is also the key to a competent economic science.

The Measure of Economic Value

The assortment of the universe's known principal phase-spaces, among the abiotic, the living, and *noëtic* processes, should be viewed from the vantage-point of the Plato's Cave allegory,

³¹ I would define what Vernadsky appropriately terms "noëtic" processes as cognitive in the sense of Plato's principle of hypothesis. Here, I continue to reference Vernadsky's use of the term up to the point of this report I have made my own preferences clear. I mean cognition (*noësis*) in the sense of a Riemannian, anti-Euclidean physical geometry, as Riemann employs "hypothesis."

³² In Christian theology, for example, there is no knowledge except through the Platonic principle of contradiction. In mathematics, this takes the form of saying that nothing real exists outside the complex domain identified by Gauss, Riemann, *et al.*

contrasting the shadow-world of sense-perception to the unseeable reality, the principled powers which generate the shadowy perceptions of sense-certainty. The relations among those three principal phase-spaces identified as representing the unseen reality, are to be considered in that light. In short, just as the principles of the abiotic domain do not “see,” but are affected by the principle of life, so the biologist qua biologist does not “see” the *noëtic* principle which produces cognitive behavior in a certain species of living organism, man.

I now introduce the matter of the underlying principles of economics to this review, with relevant comments on those distinctions in physical science which are the foundation for any competent economic, or national-income-accounting doctrine of practice.

As I have reported this fact earlier, the notable difference between my own and Vernadsky’s definition of a Noösphere, is threefold. This difference defines my concept governing the measurement of the relative value expressed by physical-economic processes. I now summarize that distinction, as follows.

First, we have phenomena which are produced without the attribution of either a principle of life, or of what Vernadsky terms a *noëtic* principle. The first set of phenomena are those we attribute to the abiotic domain.

It became customary, until now, to define the characteristic feature of the abiotic domain as what the Clausius, Grassmann, Kelvin, *et al.* tradition named *entropy*. The flaw of that assumption should be obvious; the associated notions of thermodynamic principles introduced by Clausius *et al.*, incorporate an array of largely unstated, *a priori* assumptions. These assumptions include the error of empiricist mathematical dogma associated with the referenced common blunders-in-common of Euler, Lagrange, Laplace, Cauchy, *et al.* These include the fallacy of “energy,” derived from the precedent of Plato’s famous philosophical adversary, Aristotle: as opposed to the notion of “power” associated with Plato’s notions of physical science.³³ Clausius *et al.* also include a general fallacy of composition to which I shall turn attention a short space ahead.

It were better to leave out the issue of the empiricist notion of entropy altogether, and to define the abiotic domain as the domain of actions (i.e., a Riemannian phase-space) from which the principled qualities of life and *noësis* are manifestly absent. I shall clarify the importance of, and basis for that negative definition a relevant short space ahead.

Second, and third, we have the sets of phenomena which are characteristic, respectively, of life and *noësis*. This points to the principles of life as a universal physical principle, and *noësis* is also a universal physical principle. By principles, we should understand *power* in the

³³ *Power* equals *work* on that real universe which exists beyond the shadow domain of mere sense-perception.

Platonic sense of Kepler's discovery of gravitation as a representative of the existence of a specific quality of *power*. Life as a principle (*power*), is recognized as both an agency specific to living processes and their specific effects, and as also *anti-entropic*: as I have used the term anti-entropy.

The distinction among the notions of power respectively specific to the abiotic, life, and *noësis*, defined three distinct but multiply-connected Riemannian phase-spaces. *All three phase-spaces are in operation throughout the universe at all times, as well-ordered Riemannian phase-spaces tend to be.* Hence, the anti-entropic influences of life and *noësis* have *always* been present and operating in the universe. Thus, for example, the universe as a whole, the universe in which these three phase-spaces are multiply-connected, is anti-entropic, although most encountered textbook-style physics implicitly assumes the abiotic phase-space to be entropic in the sense of the argument by Clausius, Grassmann, Kelvin, Mach, and Boltzmann.³⁴

That negative definition of abiotic, may appear less shocking, if I now emphasize the following qualifications. Rather than saying that life as we usually agree to recognize the term "life," as an act of pointing to certain experimental evidence, life, as expressing a universal physical principle, we must, as Vernadsky emphasizes, recognize it as *a physical principle* by its specific production of uniquely relevant physical effects. So, as Vernadsky also argues, the term *noësis* is also a way of pointing toward the existence of a universal physical principle. In neither case are we inferring that the principle appears only in the form of expression we associate with our first-impression notions of the terms "life" or *noësis*; we are inferring

³⁴ The misreading, by Clausius *et al.*, of the celebrated work of the Ecole Polytechnique's Sadi Carnot, is the result of that practice of fallacy of composition of the evidence specific to the reductionist methods of the empiricists, including the positivists generally. After Fermat's introduction of the concept of quickest pathway of action, rather than Euclidean shortest distance, that further work by Huygens, Leibniz, Bernoulli, *et al.*, leading to both Leibniz's universal physical-geometric principle of least action, and the anti-Euclidean physical geometries of Gauss, Weber (for electromagnetism), Riemann, *et al.*, we must regard the continued effort of any relevant professional to locate the elementary principles of action within implicitly Cartesian spaces, as tantamount to fraudulent recklessness. Thus, energetic effects are to be mapped as results of actions within that specific, anti-Euclidean physical-space-time geometry within which the supposedly elementary action occurs. Since this requirement was well known since the relevant work of Gauss, Weber, Dirichlet, and Riemann, there was no excuse for that purely arbitrary, ideological error of the reductionist which was typified by such collaborators of Kelvin as Clausius and Grassmann. As J. Clerk Maxwell conceded his own stubbornly intentional subscription to that "Cartesian" fallacy of composition, when challenged for his omission of his work's debt to the preceding discoveries of Gauss, Weber, and Riemann, he replied that "we" have refused to acknowledge the existence of "any geometries but our own" Cartesian tradition. The false claims for Hermite and Lindemann of the discovery of the transcendental and the inclusion of "*pi*," as by Felix Klein, typify the same ideologically motivated form of elementary disregard for truth. Notably those false claims by such reductionists were premised on the fraud of Euler's ideological fanaticism, as expressed in Euler's 1761 *Letters to a German Princess*. The lunatic Ernst Mach and such followers of Bertrand Russell as Wiener and von Neumann exhibit frauds born of those reductionists' ideological fanaticism, but carried to an extreme.

principles whose expression is usually recognized by us when expressed to us as a principle of life as Pasteur, Curie, *et al.* defined it, or, for *noësis*, as Socratic hypothesizing. The principle itself, in both cases, must have a broader and deeper quality of significance than we associate with conventional reference to such terms. From the standpoint of a science of physical economy, these principles, in their more general, underlying quality, permeate the universe, its astrophysics and microphysics included.³⁵

Ironically, our best knowledge of such a three-phase-space Riemannian manifold, comes from appropriate forms of study of the human mind, rather than abiotic physics or biology. This is, admittedly, contrary to the reductionist method; but, that is a virtue, not a fault. We must proceed from the top down, what we actually know about our own ability to make experimentally valid discoveries of principles, rather than the “ivory tower” methods of *Euclid's Elements* and empiricism.

Plato's Socratic method of experimentally oriented hypothesizing, is itself a great experiment by mankind. We have wonderful access to that experimental domain, because all of mankind's progress in knowledge and power as a species, has depended absolutely on the efficient practice of those specifically human powers of hypothesizing. We are enabled to experience the interior of the *noëtic* processes directly, to observe them consciously, and to confirm those hypotheses experimentally. Our best knowledge of the universe as a whole, is experimental knowledge which we conquer through our consciousness of our sovereignly individual powers of hypothesizing what appropriate experiments show us to be, and to have been, universal physical principles.

Hence, all that we really know about man and the universe is knowledge produced by an understanding of a universal principle of hypothesizing, a higher order of hypothesizing: Plato's concept of an higher hypothesis. What we know, is what we are enabled to know efficiently by aid of the cognitive processes of Platonic hypothesizing of the experimental domain. It is through those cognitive processes of the mind which set us, uniquely, apart from and above the beasts, that we are capable of actually knowing anything, including biology and abiotic physics. Thus, we can not claim to know anything, except through those

³⁵ It is unfortunate, that many teachers, and also students, fall victim to the purely neurotic reflex of insisting that the term they have just adopted is also the “last word” in scientific knowledge. So, the neurotic Lord Kaldor allowed himself to be so deluded by John von Neumann's clever, but fraudulent claim to explain almost everything about economics, and legions of neurotic fools have been duped by the ostensible cleverness of Professor Norbert Wiener's sophistry in arguing for “information theory.” “Oh, I know all about that,” is a typical symptom that we are dealing with neurotic fool, one who, perhaps, “just looked it up on the internet.” Knowledge is never a “final event” in a chain, but an ongoing process, a process which increases, rather than diminishes the number of questions yet to be answered.

processes of *noësis* as I have defined them, yet once again, in this present report.³⁶ It is by validating the functions attributable to those cognitive processes of hypothesizing, that we are authorized to claim any principled knowledge of anything, abiotics and biology included.

To restate the same point in slightly different way, we have the following.

All that we actually know of the universe with the equivalent of scientific certainty, is a product of the hypothesizing activity of the human mind, with its specific power of hypothesizing experimental truths. Where the empiricist attempts to explain the existence of the universe from the starting-point of reductionist notions of sense-perception *per se*, science knows the universe only through its power to change the shadow-world of sense-perception in ways contrary to reductionist presumptions, as Kepler did in discovering the principle of gravitation. The increase of the human species' potential relative population-density, from the level of potential of millions, to billions of living specimens, should warn us that all we really know is nothing except that which is known experimentally from the standard of the practice of Plato's method of Socratic hypothesizing.

Now, focussing that line of discussion of Vernadsky's argument upon physical economy as such: *How, by what universal principles, should we then measure the relative performance of societies as physical economies?* Put that pencil and computer away! Before measuring, ask: *What is your conception of that which you should desire to measure?*

From what is written in the preceding pages of this report, *the conception we must choose for measurement must be, in first approximation, the relative physical-economic power of society, as Plato, Leibniz, and Gauss define power in ways consistent with Gauss's referenced 1799 report.* We must then refine our definition, to think of measuring the changes in physical effects accomplished by application of the power presently being made available to society's practice. We must then express those *Kepler-like trajectories* of projectable or ongoing changes in effect, in terms of increases (or, decreases) of potential relative population-densities per capita and per square kilometer of surface-area.

That said, now shift attention to focus on the content of the action by means of which these changes in trajectories are generated: *the adoption of discovered universal physical principles for practice.* This has the connotation of the idea of science-driven technological progress; but it also implies what is usually overlooked in the discussion of such scientific practice, the determining role of a special class of physically efficient social principles, principles typified by valid methods of composition and performance of Classical forms of plastic and

³⁶ This was the principle, of *De Docta Ignorantia*, on which modern experimental science was founded by Nicholas of Cusa.

non-plastic art, as opposed to the axiomatic irrationalism of Archaic, Romantic, and modern modes of art.

The point may be conveniently illustrated by focussing upon the dividing-line which separates the first establishment of modern European civilization, the modern sovereign nation-state, in opposition to the preceding feudal system. This qualitative change was the fruit of earlier work under feudalism, including the Augustinian harmonics, derived from Plato *et al.*, expressed by the Chartres school of cathedral-building, and the impact of the work of, especially, Dante Alighieri and Petrarch. However, the shift itself was sharply defined in the Europe-wide impact of the internal history of the Fifteenth-Century Italy-centered Renaissance.

To discover how measurement of these trajectories is to be made, we must now define the relevant features of that modern sovereign nation-state which first came into existence during Europe's Fifteenth-Century, Italy-centered Renaissance.

The Modern Nation-State

No political-economy existed prior to the pioneer models of France under Louis XI and England under Henry VII. Four principles point to the premises for that distinction.³⁷

First, the introduction of the Classical method, in place of the Romantic, as typified by Brunelleschi's successful design of the cupola for the Santa Maria del Fiore Cathedral of Florence.

Second, the birth of modern experimental science, with Nicholas of Cusa's *De Docta Ignorantia*, as a revival of the Classical method of Plato.

Third, the birth of the modern nation-state, set into motion by Cusa's *Concordantia Catholica*, the successor to, and supersessor of Dante's *De Monarchia*.

Fourth, the crucial, commonly underlying feature of these revolutionary reforms, was the adoption of the principle of the anti-Roman, anti-feudalistic modern nation-state republic. In the modern republic, the political-moral authority of the sovereign depends absolutely upon efficient submission to the so-called *commonwealth* principle of the *general welfare* (*agapē, common good*) for both the entirety of the living population and, even more emphatically, its posterity. The supreme principle of the U.S. Federal Constitution's

³⁷ This distinction, as a broad distinction between the imperial tradition of, for example, Venice's alliance with its Norman partners, and the sovereign nation-state, is implied by the referenced work of von der Heydte, and, to a lesser degree by others, but the scientific economic definition of the crucial historic change to actually sovereign nations, has been, chiefly, my own work.

Preamble, the sovereign authority and responsibility of the sovereign nation-state to promote not only the defense of that institution, but the general welfare of the living and their posterity.³⁸

For these reasons, despite many corrupted models of elected government under which the U.S. has suffered, from time to time, the Federal Constitution of the U.S.A., especially when read as under the controlling principle stated in its Preamble, is the primary, historically existing example of a true sovereign nation-state today. The related problem which accounts for the defects of the systems of Europe and with other parts of Americas, has been, that even after the dissolution of the Habsburg tyrannies, the prevalent form of government and political-economy in Europe and the Americas today, is the form of parliamentary system, the Anglo-Dutch Liberal model, under which a Venice-like financier oligarchy, represented, typically by an “independent” central banking system, enjoys relative hegemony over the nation’s economic affairs and veto powers over its elected institutions of government. To that degree, whether under the Habsburgs/Hapsburgs or the Anglo-Dutch Liberal system, the state does not exist for the benefit of mankind, but treats the majority of the subject populations as relatively human cattle, as Aeschylus’s Prometheus (and Goethe’s) denounces Zeus and the self-doomed Olympus on this account.

Thus, as I have emphasized above, and in many earlier published locations, the prevalent European economic model today, is that Anglo-Dutch Liberal model whose typical

³⁸ Admittedly, both the Hapsburg systems of Spain and Austro-Hungary, and the parliamentary systems built according to the Anglo-Dutch Liberal paradigm, are in violation of, and hostile to these republican constitutional principles. Two central points are to be emphasized on this account. First, the post-Fifteenth-Century Hapsburg institutions, and their like, existed within the historical setting of the modern European civilization they struggled to destroy, as through the religious and related warfare of the 1511–1648 interval, and, later, through the decline and fall of Prince Metternich’s Austro-Hungary. The role of the Habsburg’s chief rivals, France and the Anglo-Dutch Liberal model, was similarly situated. Second, the character of the globally extended influence of the modern European civilization set into motion by the Renaissance, is defined by the failure of the Habsburgs, and then the Anglo-Dutch Liberals so far, to crush the institutions of sovereignty and scientific-technological progress. The challenge of sovereign states’ resistance to the London-led form of utopian, heathen form of new Roman world empire according to the Venice financier-oligarchical model, still entraps the opponents of the modern state in a world defined by that which the heathen oligarchical followers of H.G. Wells and Bertrand Russell are attempting to destroy, still today. Europe’s long toleration of obscenities such as the Habsburg/Hapsburg systems, and also the Venice-modelled Anglo-Dutch Liberal system, are illustrations of the principle of Classical tragedy. E.g., Shakespeare’s Hamlet “failed” for two reasons. Primarily the “rotten Denmark” depicted by Shakespeare, and, only secondly, the failure of Hamlet to reject the folly of that national culture. Hamlet’s specific folly, as expressed by the famous Third Act soliloquy, was his fear, not of death, but of what might come to him after he had “shuffled off the mortal coil,” his fear of immortality. So, Jeanne d’Arc was a sublime, rather than tragic figure, because she was capable of doing what was necessary to change her corrupt society without fear of immortality. Thus, overriding devotion to the effects one contributes to the future, as if in the image of Christ, is the mark of the sublime, the mark of the figure qualified to lead society, and to govern it. Solon would have agreed with that.

expression is the pro-slavery dogma of John Locke, in opposition to the anti-Locke principles of Gottfried Leibniz, whose influence was dominant in shaping the U.S. 1776 Declaration of Independence and the 1787–89 Preamble of the Federal Constitution. For example, in U.S. history to date, the Essex Junto, Jonathan Edwards and his grandson Aaron Burr, the pro-racist Nineteenth Century Democratic Party of Martin van Buren, Jackson, Polk, Pierce, Buchanan, Cleveland, and Wilson, and the Republican Party of Theodore Roosevelt, Calvin Coolidge, and Richard Nixon, and Associate Supreme Court Justice Antonin Scalia, represent the U.S.'s sometimes nearly fatal infection with the Anglo-Dutch Liberal virus of John Locke.

The domination of many nations, and other powerful institutions by the global power of that Venice style in financier oligarchies, which is typified by the so-called “independent” central banking system, distorts economic reality, by making that monetary and financial power peculiar to central banking systems the determinant of the corrupted political and legal meaning of the term “economics.” The control over “money” by an “independent” central banking system, is the most immediate source of all corruption of nation-state economies around the world today. This corruption, the substitution of largely fictitious money-systems, for physically efficient economic relations, is the chief factor generating the disasters of the world's political-economic systems today.

Under what is known alternately as either the American System of political-economy (e.g., Hamilton) or the American System of National Economy (i.e., List), the republic is perfectly sovereign, including its authority over the monetary and financial systems of the nation. Under the sovereign republic, unlike states corrupted by the Anglo-Dutch Liberal model, the role of the Federal government as the only lawful creator of national debt and credit, demands a system of national banking, through which all banks either work, or by which their practices are regulated. In such a national-banking role, or, as under a President Abraham Lincoln or President Franklin Roosevelt, the true public interest, the general welfare of the present population and its posterity, enjoys absolute preeminence over the influence of finance.

Consider, briefly, the absurdity inhering axiomatically, and also practically, in all monetarist doctrine and comparable practice. Then, consider the scientific alternative. Today, that contrast is being demonstrated by the currently accelerating economic collapse of the world monetary-financial system, a system which has failed, catastrophically, in precisely the way my “Triple Curve” argument presents the relevant evidence.

To restate the working point: All modern economies rely largely on the adopted role of money, as an instrument through which commerce and capital investment are conducted in

the small. The difference is, that in the Venice or Anglo-Dutch Liberal model, the essentially fictitious value assigned to money *per se* is more or less absolute power, a power placed implicitly above the human right to life. Therefore, in the morally degenerate Liberal, financier dictatorships according to the neo-Venetian model of Locke *et al.*, physical values in economy are judged by monetary processes. In the contrary case, the sovereign nation-state republic, money and its traffic are regulated, as President Franklin Roosevelt understood a gold-reserve system (as opposed to the wicked gold-standard system). The latter regulation is to be through aid of government, to the end of holding relative monetary values within the bounds of relative physical values.

The illustrations used above, and in other published locations, to describe the general lines of economic and moral degeneration of the Americas and Europe over the 1966–2002 interval, show the actual shifts in relative valuations of money, finance, and physical reality over this period, especially since the massive destruction of economy effected during the 1971–1981 interval. It is the fact, that these diverging trends among money, finance, and physical output, are characteristic of the policy-making trends under a radically monetarist form of rule by the Anglo-Dutch Liberal model, which has caused the present global economic collapse of the present world monetary-financial system, to be a systemic (e.g., terminal) process, rather than merely a cyclical one.

The world is presently gripped by an incurable bankruptcy of the existing central banking systems of the Americas, Europe, and many other locations. The effort to maintain these doomed systems would produce effects comparable to Europe's mid-Fourteenth-Century New Dark Age, dooming both the financier interest and the nations on which they prey. Only a process of state-directed bankruptcy reorganization of the system, could prevent the virtual doom of most, or even all of civilization for more than a generation to come. Under the urgently needed bankruptcy-reorganization of the ruined monetary and financial systems, the reorganization of national economy and world trade must follow, it will be indispensable to place the monetary and financial processes under the control of scientifically validatable forms of physical-economic determinations of relative values. On this account, much can be learned from U.S. economic history as a whole, the pluses and minuses of the 1933–1945 interval most notably.

The most critical political issue posed from the outset of such a now urgent reform, is that neo-manichean superstition associated with the misleading name of “free trade” which the modern European Physiocrats and Liberals adopted from wild-eyed gnostic cults of “the elect,” such as the Cathars. The superstitious cultist, such as Quesnay, Mandeville, Adam Smith, or marginal utilitarians, attributes the “secretion” of economic profit to some mystical agency, such as a magical power invoked by a title of nobility, or other form of property-title,

or the bounty given to the undeserving louts of a Jonathan “Elmer Gantry” Edwards “revival meeting.”

In physical economy since Leibniz, the generation of gain of wealth produced over that consumed as a prerequisite, is attributable to the generation and application of improvements in human knowledge. The objective is to reverse the relationship among the trajectories of monetary, financial, and real growth, in directions exactly contrary to that illustrated by the set of “Triple Curves” shown above.

Without taking up, yet, those matters of principles of social relations addressed in the coming chapter, the principles of physical-economic profit, are defined in the following, Riemannian mode.

Relative physical-economic profit, as distinct from financial-accounting profit, is defined as the product of the accumulation of applied universal physical principles per capita and per square kilometer of relevant surface-area. This is relative to the improved or depleted condition of the environment in which the relevant activity occurs. To set the stage for the following summary argument, focus again on the most crucial evidence: That were man a higher ape, the living human population of the planet would not have exceeded some millions of individuals, whereas scientific-technological progress has made possible a population in the order of billions.

The discovery of universal physical principles by individual “free will,” as the legacy of Plato’s method best defines the notion of such principles, and the transmission of those discoveries into socialized practice of societies, is the category of events which accounts for mankind’s increasing power to exist, individually and as society, per capita and per square kilometer. The combined benefit is expressed in the form of an increase of the potential relative population-density of society, and also of the human species as a whole.

This process is expressible in the language of a Riemannian physical geometry. The accumulation of “revolutionary” discoveries of universal principles, as Gauss’s 1799 attack on the axiomatic fallacies of Euler’s and Lagrange’s method reflects this, is the action by means of which mankind makes possible an implicitly endless accumulation of successive increases in its potential relative population-density. To the degree that society transforms its practice in accord with such scientific progress, the per-capita power of the individual is increased in a way which is reflected as a gain in potential relative population-density.

Mathematically, such a progressive succession of changes has the quality of a change in the Riemannian physical geometry of mankind’s functional relationship to the universe. The change has the form of a transformation of a geometry of n universal physical principles, to

one of $n+1$ principles. The change in the characteristic “curvature” of action within such a succession of changes in numbers of principles being intentionally applied by man, is the location of the increase of the relative physical profit of society per capita and per square kilometer.

The Role of Basic Economic Infrastructure

Consider briefly the most ironical feature of such a process, the effect of capital and related improvements in basic economic infrastructure.

The most relevant, and ironical of the typical cases of development of basic economic infrastructure, is that in which the productive powers of labor in agriculture and manufacturing are increased by improvements in basic economic infrastructure, without any relevant change internal to operations in agriculture and manufacturing itself. Such are the notable classes of benefits to production of, and quality of produced goods, the which are more or less entirely the benefit of improvements in such features of basic economic infrastructure as water management, transportation, production and distribution of power, urban physical infrastructure, education, and public health-care systems. These benefits from development and maintenance of basic economic infrastructure, have the form of improvements in the area and improvements in the general conditions of life of the population.

Making the deserts bloom, fostering the expansion of managed forestation, as well as the expansion of agriculture and adding new, more scientifically advanced forms of urban life, are typical of the essential elements featured in this example of the phase-relationship of public infrastructure to the productivity of private enterprise.

This is to be recognized as a leading example of the reasons why economic processes can not be understood from any standpoint but what I have summarized, above, as the essential role of a Riemannian physical geometry for understanding how economies actually work.

Under the constitutionally traditional American System of political-economy, as distinct from the folly of the recent decades “post-industrial” trends in philosophy of practice in the U.S.A., and among most of the parliamentary systems of Europe, approximately half of the total national economic outputs and inputs should be associated with the development and maintenance of government-regulated basic economic infrastructure. These activities should be a function of either direct investment and operation by Federal, state, county, or municipal government, or assigned to those government-regulated public utilities which are conducted, partially or entirely, as private enterprise. They complement the constitutional function of “Hamiltonian” national banking, as opposed to independent, or

quasi-independent central banking systems, and general regulation of commerce, in defining the functional framework within which the nation functions as an integral national economy.

How, then, should the relationship of such degrees of public control of basic economic infrastructure to its effects on the productivity of labor in agriculture, manufacturing, *et al.*, be conceptualized? The broad answer is: Think of infrastructure's role in determining the "physical geometry" of the whole area and entire population to which particular firms are attached. Consider the following examples of that point.

The quality of public education determines the corresponding element of trends in productive powers of labor in the labor-force as a whole. Recent U.S. trends in public and higher education and popular entertainment culture, have been a monstrosity costly abomination, on long-term economic trends, for such reasons. Public health affects productivity in a related way. Time lost in commuting is a loss of productivity in the economy as a whole, and thus in the enterprises in which persons are employed. Public policies governing real estate will worsen the economy of a region, by increasing physical-economic losses attributable to increased costs and inefficiencies of commuting.

Similarly, for related reasons, high rates of capital-intensive development in production and infrastructure generally, are essential costs of maintaining, as well as increasing productivity. Power-intensive modes are of similar significance. These changes are effected largely through the development of infrastructure, chiefly by government, or government-regulated private ownership of public utilities.

Where does private entrepreneurship fit in? This, among its other uses, answers the question: What went wrong with the Soviet economy, which is attributable to a so-called Marxist form of the pro-"Enlightenment" materialist misconception of man?³⁹ A comparison of the better

³⁹ Typical, in the extreme, are the arguments of Frederick Engels, respecting "the horny hand of labor," his ludicrously incompetent allusions to the "opposable thumb," and his and Social Democrat Franz Mehring's rabidly philistine hatred against the German Classical renaissance of Lessing, Moses Mendelssohn, *et al.* Also typical of sources of incompetence similar to the follies of Engels, are the spread of anti-intellectual "workerist" cults within the Communist Party U.S.A. and the effect of Leon Trotsky's pro-anarcho-syndicalist and pro-Benthamite leanings on the self-inflicted intellectual and moral decay of the Trotskyist movement internationally. The shallow superficiality and related intellectual dilettantism of these movements' pompous leaders, led, more or less inevitably, to their political, as well as moral bankruptcy, and the subsequent easier takeover of such pathetic organizations by political-police agents, such as the U.S. FBI. In the case of the Soviet Union, Yuri Andropov's passage from Hungary, via the connections to Cambridge's Lord Kaldor, to head of the KGB and Soviet General Secretary, smug cleverness by philosophically shallow-minded, "what's my line?" careerists, created the situation in which the Soviet system was incapable of saving itself from its own follies. When dogma becomes a substitute for science, the frequent result is an increasing labile flight from dogma to doom.

quality of scientist with the entrepreneur who functions successfully as virtually sole controller of the internal policies of practice of his or her closely held enterprise, is the clinical case which points most efficiently to the roots of the characteristic intellectual, moral, and related failures of socialist organizations. Why does the all-too-typical management of the successor to such an entrepreneur lead the inherited enterprise to a relative disaster?

The general form of the answer to such crucial questions, appears as approximate answers to such other questions as the following: Why did U.S. corporations tend to degenerate, as they are falling like proverbial “ten pins” now, more or less as the civilian sector of the Soviet economy did, and for the same underlying causes? Why is the closely held private entrepreneurship, a relatively superior form of enterprise than the giant corporation? Indeed, why do typical examples of effective corporate manufacturing enterprises have a crucial dependency on their high-technology vendors from among relatively small, closely-held enterprises? Why is new management, as in the takeover of a private enterprise by the founder’s heirs, or by some hired agents of an absentee owner, so frequently a failure?

The general answer to such questions is the following.

The essential quality of the successful closely held, smaller entrepreneurship, typically of between several to a hundred or so employees, lies in the cognitive qualities of the mind of the individual entrepreneur, or the relative handful of entrepreneurs and some among their key associates. These qualities of mind are of the same broad class as those of leading physical scientists. Often, the crucial entrepreneur is either a scientist himself, or relies on one or more key associates who are.

The preferred such entrepreneur would heed warnings from his accountant, if only in matters where the accountant’s non-productive role should be heeded, but would not be such a fool as to allow his accountant, or a Harvard Business School product, to run his business operations.

The effective entrepreneur operates on the basis of an evolving sense of some special function his enterprise could, or does perform within the society. He asks himself repeatedly, “What is it that my firm does which makes a contribution to the vitality of the national and world economy?” That contribution is some action which expresses power, as Plato, Leibniz, and Gauss define power, contrary to the opinion of Euler, Lagrange, Cauchy, and accountants alike. That is the core of what might be termed his, or her “strategy for management.” His pride in performing not only a useful function for society, but one of relatively unique importance, is the underlying basis for the best entrepreneur’s strategy of management. His successors are, unfortunately, more inclined to focus on “proven” accounting techniques of management, rather than protecting and developing the constantly changing function which

makes the enterprise important to society. Often, as a result of that unfortunate shift, the enterprise fails, either only relatively, or absolutely. The successors are, all too often, would-be imitators of the “big boys,” the large corporations.

In the Soviet case, the contrasted performance of the military-scientific and civil-economic functions shows the same principle in a slightly different way. In earlier decades, when I worked as a management consultant, I was fascinated with the Soviet literature’s documentation of similarities of bureaucratic blunders in Soviet state-owned enterprises to the typical sources of fatal or near-fatal decadence in once-lively U.S. business enterprises. In the typical such case, the decadence of the enterprise reflected a cost-and-profit-conscious management’s desire to maintain profits by curtailing the costs of preventing technological attrition. The attrition took such forms as decadence in production technologies, in failing to adapt to qualitative technological changes in markets, or in failing to recognize that the enterprise must adapt to a new market, or new kind of market. Usually, it was the tragically Hamlet-like successors of the enterprise’s founder, and their accountants, who were more prone to such cost-conscious follies of bookkeeping.

The secret of competent entrepreneurship, is that what the entrepreneur risks is not his profits, but, rather, like the scientist in the frontier programs of the former Soviet scientific-military programs, puts himself on the line, staking his life on his ability to develop a technology, and to make it work.

From the beginnings of the U.S.A., the foundations of the U.S.’s economic and related resilience and its post-1861 development as the world’s leading model of economic power, focussed upon what I have just pointed out as the type of the true entrepreneur, especially the farmer and manufacturer. The development of basic economic infrastructure proceeded as Treasury Secretary Hamilton’s 1791 Report to the U.S. Congress *On the Subject of Manufactures* argued. The decline of the role of the science-oriented entrepreneur, focussed upon some function for the economy at large, and the replacement of that entrepreneur by the increasingly decadent large corporation and foreign “out-source” has been a crucial factor in transforming the world’s leading producer, into the presently ruined economy.

It has been the specific advantage of the U.S. Constitutional system of political economy, that we did four things which are of immediate bearing on this discussion of entrepreneurship. 1. We provided large-scale basic economic infrastructure, for the population, for the land-area’s development, and to create the preconditions of opportunity for private entrepreneurship. 2. We fostered useful inventions, and protected the inventor more than the invention itself. 3. We defended entrepreneurship against the inhering, predatory impulses of both financier interest and the giant corporation. 4. Under our

Constitution, we banned the subversion of our nation's sovereignty by the existence of so-called "independent" central banking systems, especially those of the Neo-Venetian Anglo-Dutch Liberal model.

We have too rarely lived up to those principles, but when we did, they served us well.

The structural features discussed in the preceding paragraphs, are all focussed upon an essential division between the role of the individual mind in discovering and deploying universal physical principles, and the development of both the general land-area and population in accord with the requirements of those expressions of scientific-technological progress which foster increases of the potential relative population-density of the combined land-area and population as a whole.

This set of relationships within policy-shaping, must be aimed to effect a Riemannian development of the creative mental powers of present and future generations. It is through the Riemannian anti-entropy represented by the accumulation of discovered and deployed universal physical principles, that true economic growth is made sustainable. That margin of physically defined growth is the only true measure of gains in national income, and, therefore, also in the profits expressed by the work of individual enterprises.

In this configuration for physical-economic growth, the general changes, as in public infrastructure, have the relatively greatest effect in increasing the productive powers of labor. The development of basic economic infrastructure to this intended effect, changes the physical geometry of the domain in which the private enterprise, and the individual person operates. That change in the physical geometry of that environment, effected largely through public maintenance of and improvements of infrastructures, is the principal source of increase of productivity within the society/economy as a whole. However, the continued success of that process relies upon the continuing contributions of individual minds of discoverers and upon private entrepreneurs who meet the standard implied by summary of the case here.

However, a word of warning must be added. We can not predict precisely how much benefit will be derived from the application of a newly discovered, or newly adopted universal physical principle. The gain in anti-entropy assumes what Riemannian physical geometry identifies as a *characteristic curvature* of the entire system which includes this added feature. That value can not be simply calculated *a priori*; as Riemann warned, it must be determined in practice, as is the case for all matters of real-life physical science. We know only, that things will go better. If the gain were less than we have hoped, then add a new discovery, and continue to add new such discoveries until the desired gain is realized experimentally.

2. Social Systems: Prometheus vs. Apollo and Dionysus

In the preceding chapter, we have focussed upon the situation defined by the role of the relationship between, on the one side, science and the individual thinker, and, on the other side, the changes needed for the development of society. Now, we shift the emphasis in our report, to the reciprocal functions associated with the social process of development of the thinking individual, to the subject of “Promethean man.” By “Promethean man,” we should signify winning the cause of man’s freedom from the inhuman tyranny characteristic of pantheistic oligarchies, such as that of the pagan gods of Olympus and the Pythian Apollo cult of Delphi; we defend, for example, the Mosaic, and also Christian principle of man in that image of the Creator of the universe.⁴⁰

Therefore, we also signify the topic of those self-inflicted follies by which corrupt societies degrade man to a condition which is less than himself, as, for example, in most contemporary U.S. education, and the recent several decades’ so-called “popular culture” generally.

In this report thus far, we have considered the nature of individual man as located, essentially, within what Gauss pointed out as that complex domain for which sense-perception is a world of shadows. In that portrait, we have considered each person as an individual possessed, potentially, with those cognitive powers of individual discovery, by means of which man’s power to exist within the universe are increased. That left more or less unstated the way in which a society might be enabled to govern itself according to that conscious awareness of the conception of cognitive man implicit in the physical geometry of Plato, Cusa, Leonardo, Kepler, Leibniz, Gauss, and Riemann.

⁴⁰ According to the legend, Apollo came upon an ancient pagan grotto site, Delphi, which was then devoted to the worship of the Earth Mother and her son-lover, the snake-god Python. Apollo slew Python, chopped him into segments, and buried the remains; but, then, fell into a fit of remorse. Apollo apologized, presumably tearfully, to the Earth Mother, and established the grave-site of Python as the Temple of Apollo, in that international center of usury known as Delphi. On one side of the grave-site, sat a priestess, known by the title of Pythia, who, relative to the fee paid, would reply to questions put, by either plucking stones from an urn, or, for a higher price, babbled nonsensical riddles which were then interpreted, for a price, by the priests of Apollo seated in the first row of places for visitors, on the opposite side of the grave-site. Plutarch, dating from the time of the Roman Empire, is today the most famous of those priests of Apollo. (According to some certified accounts, the rape of the young priestess filling the role of Pythia, led to the prudent substitution of old crones for the role. A charming sort of religious worship was, obviously, being practiced there.) The British, in the footsteps of Lord Shelburne’s Gibbon, and kindred worshippers of the pantheon of the heathen Roman Empire, uphold the Apollo cult as their preference over Christianity, Judaism, and Islam today. Dionysus is a synonym for the cult of Python today. Hence, the efforts of decadent Romantic cultural currents of modern Europe to insist, as Walter did, upon the duality of Apollo-Dionysus today. The Christian complement to the Mosaic principle, is essentially that emphasized in the Gospel of John.

Now, we ask: How might society, as society, be enabled to see itself as a society of a Platonic form of cognitive species, rather than as if a species which includes some individually clever apes among, perhaps a Nashville Agrarian tribe of higher apes, a tribe which reacts, usually, as it were, as Frederick Engels' species of sense-certainty-bound apes, or, as the existentialist Nazi philosopher Martin Heidegger insisted? Or tribes which might have been, as the utopian circles of H.G. Wells, Bertrand Russell, Aldous Huxley, Leo Szilard, John von Neumann, *et al.* proposed, "thrown" into an alien universe as more or less feral creatures of no intrinsic morality, wretches like Heidegger's cronies, Jaspers, Adorno, and Hannah Arendt, feral creatures with neither sense of, nor desire for knowable truth?⁴¹

How were it possible, that entire societies might consider themselves as that superior species Plato's principle of hypothesis implies, and therefore act as such a species, rather than an ape-like clan with the advantage of a few egregiously clever individual intellects among them? In other words, how might social processes be developed, by means of which society, as society, reacts according to a shared conception of man as a cognitive being reigning over nature by means of the cognitive powers expressed by Gauss's 1799 devastating attack on the incompetence shared among Euler, Lagrange, *et al.*?

Do there exist discoverable principles of social relations by means of which society might see itself, as society, as the minds of the greatest discoverers in physical science reveal see the true nature of man's relation to the universe, as in their discovery of universal physical principles? Can society willfully control itself by the recognition that it is a society efficiently unified in its self-conception as the species of Promethean man? Given the great achievements of the Classical tradition of physical science, can society show a quality of insight into the nature of society itself comparable to that which the greatest individual scientific discoverers have shown toward the universe in which our species is situated? What are the faults which tend to lead us into the kinds of relative depravity and ruin which afflict society, most notably the U.S.A. itself, today? What is the cure of such faults?

For example. Few people today realize, that the acquired habits of modes of speaking and punctuation, which have become accepted among post-war generations of secondary-school and university graduates, like the induced fad of "up-talk," cripple the victim's ability to

⁴¹ For a relevant confession of this bitter aversion to truthfulness by the existentialist cronies of Heidegger, Jean-Paul Sartre, Arendt, *et al.*, see Theodor Adorno, Hannah Arendt, *et al.*, ***The Authoritarian Personality*** (New York: Harper, 1950). The collection of persons in today's U.S.A. who have embraced Arendt's dogma, are among the most degenerate found among so-called "intellectual circles" in the U.S.A. today. The Hudson Institute's presently resident "geek act," Laurent Murawiec, linked through Marc Rich's organized-crime circles to Lewis Libby, and thus to Vice-President Cheney's office, is rather typical of persons of fragile, or non-existent moral qualities, all so easily transformed into a moral degenerate of this specific type of Heidegger-associated existentialists Adorno and Arendt.

formulate the prose expression of important types of ideas. The relative suppression of the most essential, cognitive function of the “comma” from written speech, is typical of the virtual inability of the contemporary popular writer to express important classes of ideas in a rational way.⁴²

For this crippling of several post-war U.S. generations, the *New York Times*, like the literati among the Nashville Agrarians generally, must bear much of the blame. Often, in working even with people of the post-World War II generations who have developed reasonably good minds, I have seen that their ability to focus upon important classes of ideas, is crippled by their conditioning by speaking and writing habits which actually prevent them from formulating important classes of ideas which they were otherwise capable of comprehending.

Of this, it might be said: Illiteracy afflicting the intestine of speech backs up, and thus stops the digestive channels needed for expressing what Percy Shelley classed as “profound and impassioned conceptions respecting man and nature.” It is not the choice of rules of punctuation, and so forth, in and of themselves, which renders spoken or written speech literate; it is the submission of style to the requirements of cognitive forms of ideas being expressed, which imposes forms of effective communication of actual ideas upon whatever previously habituated customs had dictated. All communication of significant ideas depends absolutely on those violations of custom known by the names of irony and metaphor. Therefore, a person who thinks clearly, and has worthwhile new ideas to convey, will compose as Shakespeare composed, tending to punctuate effectively, but in apparent violation of sterile rules of style. A person who puts accustomed formal rules of style, such as punctuation, first, will suffer a corresponding loss of ability to think clearly about important ideas. On this account, the *New York Times*’ style book might be justly tried on charges of menticide.

Hence, it is the conventions of oral and written literary style and interpretation adopted by universities and other relevant institutions, which have virtually destroyed the ability of

⁴² The insertion of the comma, by interrupting the run-on mind-flow of babbling of written text, challenges the reader to regard the passage preceding the comma as the integral antecedent of that which follows. For example, Shakespeare’s use of “the which,” following a comma, is often abbreviated by writing “which” after the comma. This should have two effects on the mind of the reader. First, to utter the statement so composed within one’s mind, one must think of the written text as merely the shadow of the relevant prosody to be uttered by the mind of the reader. In the prose of actually literate, thinking writers, one must adduce the intent of the passage by mentally singing the prosody, in an approximation of the Florentine *bel canto* appropriate for uttering (as if singing) a literate form of that language. The principle is the same as for performance of the Florentine *bel canto* of Bach counterpoint, such as the *Well-Tempered Clavier*: the keyboard must sing as a chorus. Habits of speech of university graduates from among U.S. Baby Boomers, for example, tend, therefore to stultify the mind of the speaker, aborting, thus, the capacity for communications of “profound and impassioned conceptions respecting man and nature.”

educated strata to compose, or write important poetry of a Classical quality. Thus, the modes of written and spoken style taught in leading universities, might be usefully classified as either “neo-archaic,” or the “fractured neo-archaic” typified by the advertising writer or rock-concert fan.

True literacy of spoken and written communication, is a right of every child which only a contemptible national culture would deny. As Frederick Douglass would agree, to speak of “democracy” and political “equality,” without providing all of the young mandatory access to true literacy, is a practice of slavery of the mind more valuable to tyrants than shackles on the slave’s hands.

Just as the reductionist methods which Gauss attacked in the follies of Euler and Lagrange, spoil the capacity for scientific insight into physical science, so the lack of insight into cognitively literate use of uttered poetry and prose, impairs the potential of nations and cultures to survive the kind of existential menace now threatening civilization.

The importance of these issues for political-economy today, can be recognized most immediately from recognizing certain broader implications of the way in which the same follies which Gauss exposed in the work of Euler and Lagrange, are at work: follies which cripple the cognitive powers of the mind in the communication of scientific professionals, and also the minds of political leaders today. The case of the addresses of Abraham Lincoln points to the contrast between his mind and the tragic loss of the power of communication of important classes of ideas today.

My recognition of the implications of this problem for a science of physical economy, has been a crucial aspect of all my successful contributions to the science of physical economy. A summary of the way in which I worked through these connections during the 1947–1953 interval, is therefore included as an unavoidable requirement in making the present report.

The Prometheus Theme: Brunelleschi’s Cupola

An extended period of convalescence, during 1953, gave me the enforced leisure which I devoted largely to a tying up and summing up, and also some debriding, of the work done, in scattered clumps, over the 1947–1952 interval. In addition to settling accounts with the relevant essentials of my references to the work of Riemann and Georg Cantor, I composed an argument on the theme of Percy Shelley’s *A Defence of Poetry*, a piece which, together with Keats’ *Ode on a Grecian Urn* and Shakespeare, I had already, since adolescence, regarded as expressing a world-outlook on the proper use of the English language, an outlook most closely akin to my own. Such reflections on the use of language had been brought into focus by a critical study, in 1947, of William Empson’s *Seven Types of Ambiguity*, whose

topics I examined critically against the related role of Classical music's function in a more strict approach to the subtler, but crucial cognitive functions of English prosody. I am not a follower of Empson's doctrine, but I owe him much for what he provoked in me.

During that 1953 concentration on these matters, I virtually completed that notion of the functional integration of the principles of so-called physical science and principles of anti-modernist Classical artistic composition, which has remained the kernel of my intellectual life and work since. That integration defines the systemic features of this present chapter. That integration defines my conception of "Promethean man," as distinct from such explicitly asocial figures as either the legendary Cyclops, or the mis-beknighted "Sir" Alan Greenspan's Ayn Rand.

The notable included result of that focus on the special cognitive functions of prosody in general, and poetry in particular, was a leading feature of my development of the second set of principled features of my discoveries in the science of physical economy.

In 1953, provoked partly by my still resonating anger against objectionable assertions made earlier by conductor Bruno Walter, in a broadcast radio interview, I crafted a case for the *Promethean* world-outlook in Classical artistic composition, against the contending, pro-existentialist view, expressed by Walter in that interview, that Brahms was an *Apollonian* and Beethoven, by contrast, a *Dionysian*.⁴³ What Walter had said in that interview, went against my whole being, so to speak; it rankled. I had correlated my reaction against Walter's remarks with the ringing effects of my first hearing, in early 1946, of a recorded performance of Tchaikovsky, conducted by Wilhelm Furtwängler, and also the experience, later, of a startling recorded performance, by Dietrich Fischer-Dieskau, of Brahms' *Vier ernste Gesänge* hymns. Both of these latter recorded musical performances corresponded to, and greatly improved my insight into the functions of prosody in the communication of a Platonic quality of ideas.

What I have meant, since 1947–1953, by "Promethean," as defined afresh within this chapter, is already elaborated, if not by that name, within the preceding chapter of this report. As have said over these decades, in Christianity, Judaism, and Islam, as in Aeschylus's *Prometheus Bound*, the image of Prometheus, as the enemy of both the Pythian Apollo and Dionysus, signifies the Mosaic doctrine, of man and woman made equally in the image of the Creator, and thus endowed naturally with dominion (and corresponding responsibilities

⁴³ Walter did not make up that egregious blunder. He was following the standard existentialist line on Nietzsche and the "Frankfurt School" which was also popularized in the aggressively decadent, post-Brahms Vienna of Gustav Mahler and Sigmund Freud. Walter's conducting of the second movement of Schubert's *Ninth Symphony*, as to be contrasted with the famous recorded performance under Wilhelm Furtwängler, was also among my grievances against him dated from a half-century ago.

for care) over all else in the universe. It is the denial of man's access to knowledge of and right to practice scientific-technological progress, as the infamous Roman Imperial code of Diocletian does implicitly, which is the satanic-like evil inhering in the tyranny by the Olympian gods. The conception of man as implicitly Promethean, expresses the conception of eternity, God, and man in the *Gospel of John*, and in Brahms' presentation of the Christian Platonic conception of *agapē* from *I Corinthians* 13, in the fourth of his *Vier ernste Gesänge*.⁴⁴ A science of culture could not exist on any different basis than that definition of man's nature and destiny as Promethean.

These and related considerations afforded me an insight into the proper apprehension of a principle of truth underlying all that is justly recognized as Classical principles of artistic composition. By this I mean truth in the same sense I have upheld the truthfulness of Gauss's attacks on the falsehood intrinsic to the reductionist ideological method of Antonio Conti followers Euler and Lagrange. This is to point out, and emphasize, that the issue of truthfulness is even more an issue of method than of isolated particular facts.

One might say, for example: "The method is the man." A man may be regarded as a liar, not merely on the basis of a list of his imitations of those displays of that reckless disregard for truth typical of our leading news and entertainment media. That man's method is a lie, because it is a method which generates false conclusions. So, similarly, the existence of truth in art lies, essentially within the domain of method, in the same sense that the method of Leibniz, Gauss, Riemann, *et al.*, is inherently truthful, whereas the reductionist method of Euler, Lagrange, *et al.*, is inherently false.

This equivalence of the issue of truthful method, is related to factual truthfulness in a specifically crucial way: the issue of historical truth.

More simply seen, as in the contrast of Kepler to Ptolemy, Copernicus, Brahe, and Galileo, a truthful method of mathematical physics, if done from the standpoint of the Socratic method of hypothesis, produces a truthful history of science, whereas a contrary method produces a falsified history of science.

⁴⁴ For me, the most agreeable service to Brahms' intent is found in comparing the somewhat different approach employed by Fischer-Dieskau and my recently departed friend Gertrude Pitzinger. Conductor Furtwängler's sometimes referenced use of "performing between the notes," is of the utmost relevance. One should not perform the score, unless the composition is one not worthy to be performed; one must perform the composer's intention, which lurks in the score of any musical composition in the Classical genre of J.S. Bach's creation of the foundations for all Classical musical composition from Haydn through Brahms, as opposed to the Romantic parodies of Classical composition. One must think of honorable Classical musical composition as expressing, as the Bach defended by Kästner does, an essentially Riemannian (e.g., anti-Euclidean) view of the musical-artistic universe.

The same is true, as I shall emphasize in this chapter, of the role of principles of Classical methods of composition in art. The same is as true of the method with which we speak, as much as what we say in particular. Thus, we may say that the properly identified Classical methods of composition in music, those which Haydn, Mozart, Beethoven, Schubert, Mendelssohn, Schumann, and Brahms derived chiefly from J.S. Bach, are truthful, whereas those Romantics who parodied the Classical more or less skillfully or badly, such as Liszt, Berlioz, and Wagner, produced untruthful art.

Once a self-disciplined, reflective individual mind, has considered the determining role of the individual's progress in scientific progress on the development of the condition of society, the issue becomes that of the character of the available choices among social processes, choices which variously foster, delimit, or frustrate the realization of the benefits implied in scientific progress. The moral and physical decadence of the Americas and Europe, which was largely driven by the post-1964 eruption of Dionysian decadence of such forms as the "rock-drug-sex youth-counterculture," is merely typical of the way in which once relatively healthy cultures plunge into self-inflicted slides toward ultimate, self-inflicted doom. Culturally, the "rock-drug-sex youth-counterculture" was an implicitly satanic orgy of degenerates who had chosen to live a lie.

Thus, the history of science becomes inseparable from its dependence upon the practice of a needed science of history. The only possible form of the required connection between the two, is to be found, as I shall now show once more, in the principles of Classical artistic composition. The question of truth in art, which can be found only in Classical art, and not Romantic or sundry varieties of "modernism," becomes for us, then, the basis for comprehension of the history of science, and the science of social processes of society. It is essential for saving European civilization from today's systemic collapse, that that case be argued, as I do here.

This connection is illustrated with exemplary appropriateness by a case I have often referenced since 1988, the lesson to be adduced from Brunelleschi's successful construction of the famous cupola of the Santa Maria del Fiore Cathedral of Florence. I continue to emphasize that example, not merely because I succeeded, during 1987–88, in rediscovering a principle which Brunelleschi had used, with his foreknowledge of its success, in effecting a process of construction which had been thought physically impossible. The principle he used to secure that success, was the same catenary principle which Leibniz, more than two centuries later, was first to identify as the expression of the universal principle of physical least action. Here, art and science were the same principle. The otherwise impossible process of construction so effected, was a demonstration of the principle of truth expressed equally as

a principle of truth in the triumph of Christian Platonic science and art, over the false, pantheonic tradition and symbols of Latin Romanticism.

Leibniz's principle of least action, which is the basis for Leibniz's discovery of natural logarithms, is expressed by the catenary function, which is the physical curve of "the hanging chain," caused by physical action. This curve was reflected in ancient, pre-Roman Classical Greek sculpture as the principle of continuing motion caught in a midstream moment, as John Keats calls our attention to this equivalence of truth and beauty in his *Ode on a Grecian Urn*.

Once again: *Truth is a matter of method!* In this case, the cupola, truth as a method of art, and truth as uniquely a method of physical principle for successful construction, coincide. To succeed in sculpting a figure caught in mid-motion, the mind of the sculptor must feel the impact of what Leibniz defined as a universal physical principle of least action, just as Brunelleschi settled upon the use of the catenary, in the form of a hanging chain, a form of matter in motion even when it appears stilled, to enable the process of constructing the double wall of the cupola. The point was not that the finished cupola reflected the catenary form, but that the ability to construct those walls depended upon the principle of action expressed during each and every momentary phase of the ongoing process of construction of the still yet-to-be-completed cupola.

The distinction I have just emphasized for the case of Brunelleschi's accomplishment, is the same as that between the unscientific astronomy of Ptolemy, Copernicus, Brahe, and Galileo, and the principle of gravitation which keeps the planet in its non-uniform-motion orbit during each interval of that trajectory. The principle was not a matter of static stability taken statistically from moment to moment, but of an intention rooted not in the sense-perceptual fantasies of empiricists' "ivory tower" fantasies, but rooted in an intention acting efficiently, as a universal physical principle, from the unseen domain from which all universal physical principles exert their tyranny over the shadowy illusions of simple sense-certainty. In Classical art, as in physical science, a principle is *an intention to move, a Platonic power, which governs the movement which it, acting as a universal principle from within the complex domain, effects as the result adumbrated as experienced in the domain of sense-perception.*

Such are the Classical principles of *truthful* architecture, sculpture, and painting, as Leonardo da Vinci's, Raphael Sanzio's, and Rembrandt's masterpieces attest. The same is true of J.S. Bach's discovery of well-tempered counterpoint, which is the basis for all truthfully Classical composition and its performance. Thus, to shallow-minded thinkers, Classical art may appear to be merely a choice of entertainment. It is actually a kind of spiritual exercise, as Plato's Socratic dialogues are, by aid of which the mind is rehearsed in the methods of

effectively truthful communication of important ideas. Brunelleschi's successful approach to constructing the cupola, as interchangeably a work of art and science at the same time, is an appropriate illustration of my point. So is Aeschylus's *Prometheus Bound*.

Prometheus and the Sublime

Friedrich Schiller has shown the difference between the tragic and the sublime, far more clearly than any other modern dramatist or historian. For that reason, during recent years, I have used the comparison of the cases of Schiller's Jeanne d'Arc and Shakespeare's Hamlet repeatedly, to point to the historical principle underlying the typical failures of leading political and other influential figures, most notably leading political figures of today. My repeated use of the case of Hamlet for this purpose, in lectures and writings, dates from Spring 1994. More recent acquisition of several among the documented histories of the Jeanne d'Arc case, gave me the confidence to employ a comparison of the historical Jeanne d'Arc to Shakespeare's character of Hamlet, repeatedly, during recent years, as a better way of showing the nature of today's real-life issue of the tragic principle versus the sublime.

The formulation of the concept I have illustrated by those references, date from my work done during the referenced 1952–1953 interval of convalescence. To indicate then the principle which I came to recognize much later as Schiller's concept of the Sublime, my 1952–53 references were chiefly my critical view of Goethe's *Prometheus*, and a study of Shelley's *Prometheus Unbound* from the vantage-point of Schiller's *A Defence of Poetry*. So, during 1953, I situated "Promethean man" as a type within the kind of universe implied by Riemannian physical geometry.⁴⁵

If on no other grounds than the implications of Hamlet's Third Act soliloquy, Shakespeare's Hamlet should remain forever a foremost figure of reflection by present and future historians. Hamlet's crucial fear, clearly stated there, is fear of immortality: not fear that there is no immortality, but terror of thought that he might be confronted with its actuality. So, all existentialists and similar cowards, such as swashbuckling professional warriors, flee into the passion of the momentarily living present, mortal moment, and present popular opinion, hoping thus to dull the excruciatingly painful sensibility that death will not purge them of accountability for what they either do, or fail to do, in the present mortal moment.

Shakespeare concludes the drama with the corpse of Hamlet being borne off stage, while Fortinbras rallies the survivors to continue the same popular folly. Hamlet's friend speaks his

⁴⁵ To avoid misinterpretations, I shall note the following. It was during that period of 1952–53, that my concept of Shelley as a Promethean figure came together with the notion of a Riemannian universe. The adoption of the theme of Prometheus, and the influence of Shelley and Keats were already fully in progress during 1947–48.

soliloquy to the English theater's audience: let us pause, to learn the lesson of this catastrophe while the events leading to this catastrophe are fresh memory.

The lesson of this case is, you, as a living mortal person, are personally responsible for the future of mankind, something for which the future would justly hold memory of you accountable. You are also at least equally responsible, in the same manner and degree, for what you have failed to do as an act of justice toward the lives of earlier generations, the responsibility to make right now, what should have been made right then.

Take the case of Christ's Crucifixion, but find the same principle expressed by the case of the simple farm girl, Jeanne d'Arc: her mission, which made possible the subsequent existence of the first sovereign nation-state, Louis XI's France, and which was a source of inspiration to the Church and other forces of the Fifteenth-Century Renaissance. Her devotion to immortality realized in that degree, the aspirations of those in France and elsewhere, who had suffered so much at the hands of Venice and its Norman-Plantagenet-Anjou tools, and contributed mightily to the existence of the modern nation-state founded under the leadership of Benjamin Franklin.

Contrast her nobility to the case of poor, contemptible Hamlet, who traded away his soul for the sake of service to the corrupt popular opinion among the ruling circles of legendary Denmark in that time. How many modern "Hamlets" are there among the would-be misleaders of our nation, and others, today?

These are noble notions from political history and Classical art, but they are also notions rooted in the notion of physical science associated with Kepler, Leibniz, Gauss's 1799 paper, and Riemann's physical geometry. Two points are thus implied. These are, in brief, as follows. First, these notions belong to a domain beyond a poor mere animal's naive faith in simple sense-certainty; they lie in Gauss's complex domain as I have addressed that subject, from a Platonic standpoint here. Second, as a consequence of man's power for accumulating experimentally valid universal physical principles, social relations within the realm of humanity as a whole, humanity past, present, and future, are integrated into what some theologians have defined as "a simultaneity of eternity." I explain this conception.

If we think of the history of man as ordered according to an accumulation of discovered universal physical principles, and think of this in terms of a Riemannian geometry like that I have described earlier in this report, we can grasp the universe as a whole, past, present, and future, as a physical space-time, as if instantaneously. All events within that space-time exist simultaneously. In place of clock-time, or the lock, we have a sense of direction, a notion we might subsume under the label of "development." The notion of "development" is that of a Riemannian hyper-geometry so described.

In this physical-space-time, relations are not defined in terms of sense-impressions, but, rather, in terms of functional relations among universal physical principles. This is physical-space-time composed of three, multiply-connected phase-spaces, as I have reported above. We assume, as a matter of limiting ourselves to knowledge to date, that the total array of principles in the first abiotic phase-spaces is fixed, but that the development of subordinate universal principles is not fixed. When we add the universal physical principle which corresponds to life, the self-development of that phase-space acts upon the abiotic as well as internally upon itself. The introduction of the notion of a cognitive principle, Vernadsky's *noësis*, operates similarly with respect to both the abiotic and living phase-spaces.

As I have underlined this point above, the discovery by mankind of any universal principle from any among the three phase-spaces, changes the universe by the discovery of a conscious principle of creative intervention into the whole universe by mankind.

In this wonderful simultaneity of eternity, with all such beautiful development under way, the mortal existence of each of us occupies an immortal place. In this eternity, we act within the relatively small place which is our mortal life; but, in the larger domain, that form of action associated with the discovery and development of universal physical principles reaches beyond mortality into the relative past and future of mankind.

We know this each time we re-enact the living thought of the first known discovery of a universal physical principle centuries or millennia ago. The scientist or Classical artist who relives such thoughts has an efficient personal relationship to the original discoverer, and the relevant original discoverer now acts upon the society of our own present time, on the basis of our cognitive relationship to them.

Pause here for a moment. Take the case of the contemporary musician who performs a composition by J.S. Bach, Haydn, Mozart, Beethoven, Schubert, Mendelssohn, Schumann, or Brahms. For the purposes of this discussion, we should limit ourselves to the works of composers who have a thorough commitment to the kind of well-tempered counterpoint implicit in the application of a Florentine *bel canto* mode of expression for both human voice and other instruments, and whose intent is to compose works which represent the development of a single musical idea, from the breath a moment before the first tone is sounded, until the breath or two of silence following the final tone. In such a case, one can not play the score; one must perform the composition as an integrated process of development, and as nothing less, nor more. The object of the musician is to mediate the direct relationship between the creative mind of the composer and the minds of both performers and audience.

In Classical music, these connections are implicit in the ABCs of a well-tempered counterpoint agreeable to the singer of a Florentine model of *bel canto* voice-training, and also to the instrumental performer who imposes the conception of the *bel canto* singing voice on the behavior of the instrument. When a work so composed in the mind of a Classical composer is copied to a score, something essential is lost in print, but not necessarily irreparably. The score must be, so to speak, “decoded,” to discover the original musical intent of the composer. Thus, the qualified performer relives, in one degree or another, the cognitive processes of discovery of the composer, and thus comes to know, at least approximately, the mind of the composer as if to relive his or her mind’s processes in the original composition.

This same point can, and should be made in a second way. In Classical poetry or music, the idea which generates the composition precedes the development of the composition. It were as the entire composition burst into existence in the concentrated form of a single act of thought. After that, the composer is gripped by a relentless passion to elaborate that single burst of thought as a worked-out composition. The performer approaches a score attempting to evoke that “burst of thought” which had prompted and guided the elaboration of the relevant composition.

This principle, so illustrated here, is the characteristic feature of all forms of great Classical composition and of their intended relationship to contemporary and future audiences. This expresses the “spiritual” quality of all great Classical art; this strictly defines the meaning of Classical art.

This quality of relationship between the Classical composer and the audience typifies the concept associated with my use of the term *Sublime*. Great Classical art resembles Classical scientific discovery in that it pertains to those powers which exist behind the shadow-world of sense-perception. Classical scientific discovery is also social. but, the subject of science is, primarily, the relationship of the individual cognitive mind to the universe at large. With Classical art, the subject of the *noëtic* processes, is the relationship among cognitive powers of minds, as such.

To situate the subject of Prometheus, recall that the concept of Prometheus as a case of the Sublime, is primarily associated historically with the relevant dramas of Aeschylus and Shelley.

What Are Human Relations?

The elementary expression of human relations, is the process by which one person provokes, intentionally, in another, that act of (Platonic) hypothesizing, by means of which the other

recreates the idea called an experimentally valid universal physical principle in his or her mind. On this account, there is but one significant distinction between Classical science and Classical art. In the first case, the subject of the transaction is a principle of man's relationship to the abiotic domain and Biosphere. In the second case, the subject of the transaction is the act of hypothesizing among persons.

Classical drama is a suitable illustration of the second case. Tragedy, especially tragedy which situates the concept of the Sublime, is the most rigorous expression of Classical drama.

The characteristic subject of tragedy, is the self-destruction of a society at the hand of its own culture, as, for example, by its own prevalent popular opinion. The more typical tragedy is, like Schiller's *Don Carlos* or *Wallenstein*, that in which the leading figures of the drama represent the common folly of the culture and those leaders who, in various ways, act out the situation in accord with that culture's prevalent customs. These more typical cases are contrasted with the cases of Aeschylus's and Shelley's Prometheus, and the historical Jeanne d'Arc.

The importance of Classical tragedy for the study of the principles of history, arises from posing the challenge of hypothesis as a life-death issue for the nation or group of cultures considered. The quality of the playwright's (and, also, the performing company's delivery), is to be adduced from the degree to which the issue of the relevant hypothesis is presented to the audiences in ways which make the experiencing of the relevant paradoxes and hypotheses a moving one. As Schiller demanded: The spectators must depart the theater, at the conclusion of the performance, better people than had entered it.

Better does not mean learned, or reenforced obedience to some set of rules; rather as in Paul's *I Corinthians* 13, as for the Socrates of Plato's *Republic*, better means *agapē* (i.e., *the general welfare, the common good*). So, the audience leaving the performances of the *Wallenstein* trilogy, should have a warm appreciation of the influence of France's Cardinal Mazarin in bringing about that adoption of the 1648 Treaty of Westphalia which ended the Thirty Years' War. The object of Classical drama is not "happy endings" for the characters in the play, but for the audience which grasps the hypothesis posed.

For related reasons, all great drama is based upon a valid conception of either a dramatic paradox posed by actual history, or a plausible legend which functions as a real history might.

All valid and important Classical poetry, and of Classical-musical setting of poetry to song, is governed by the same role of hypothesis. Good Classical prose aims for the same result.

To serve those same ends as great Classical tragedy, art must employ the same tools of irony and metaphor which are the essential features of hypothesizing in physical science. For example, on the stage, or delivery of Classical poetry, the methods of Florentine-modelled *bel canto* singing-voice training are essential, or, the methods used by conductor Wilhelm Furtwängler. The element of surprise, as otherwise typified by irony and metaphor, must free the mind from a literal hearing of the passage, to hear the paradoxical elements on which the prompting of hypothesizing depends.

The subject of Classical art, is always the hypothesizing of human relations. By such art, a human cry can be heard across intervening millennia. The message is always the same: "We are all, in this way, essentially immortal."