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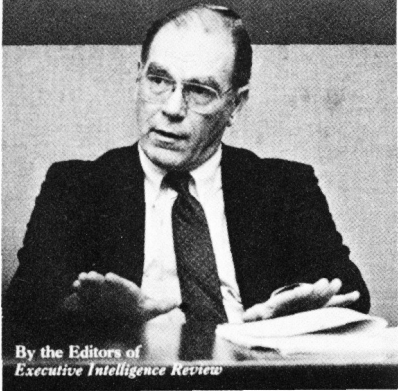


THE SCIENCE OF THE HUMAN MIND

by Lyndon H. LaRouche, Jr.

LaRouche

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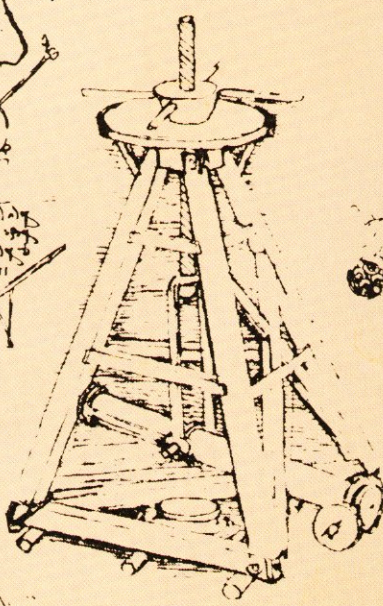
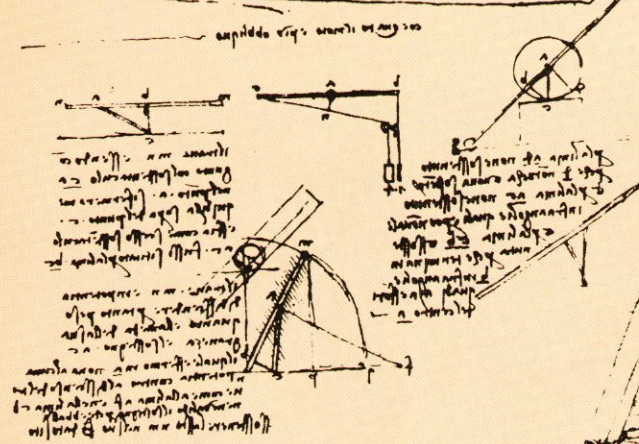
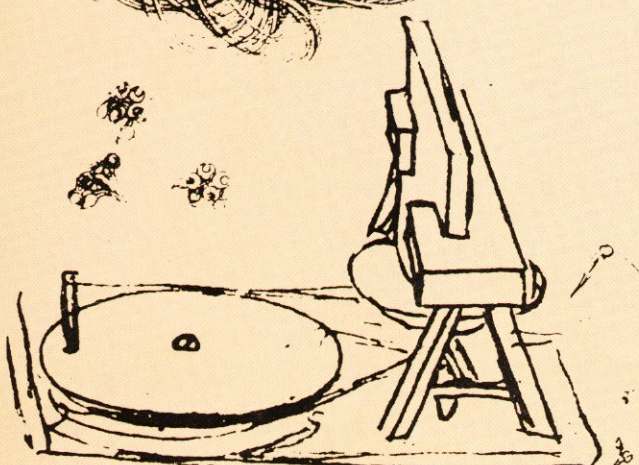
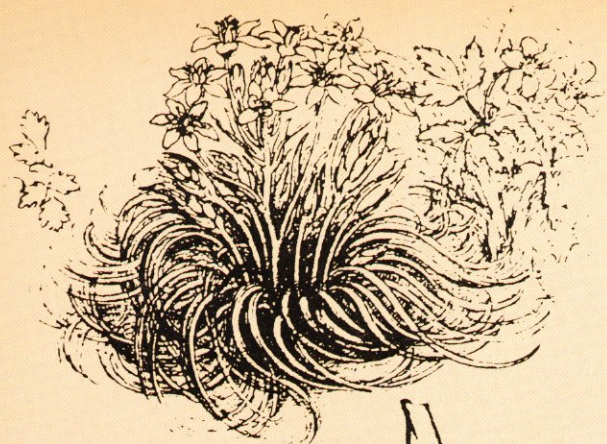
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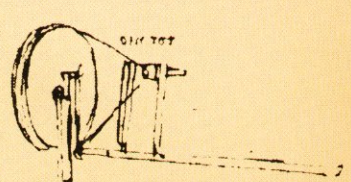
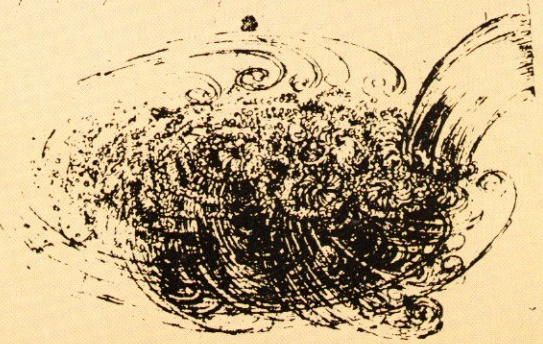
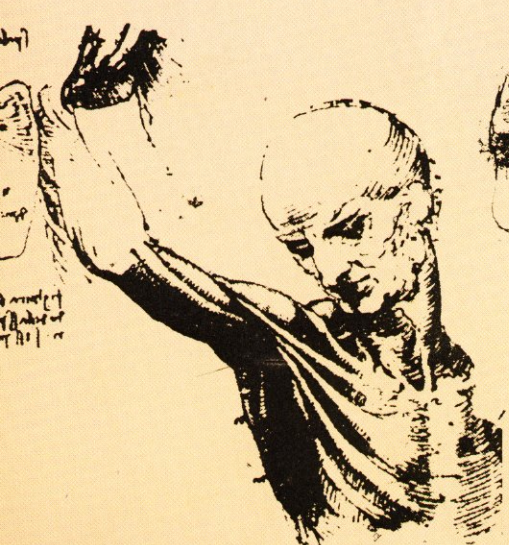
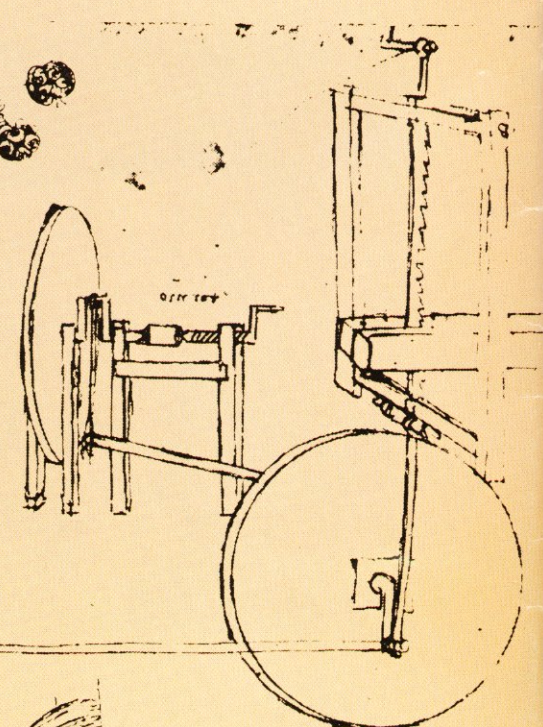
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The Science of The Human Mind

A Treatise On Fundamentals

by Lyndon H. LaRouche, Jr.



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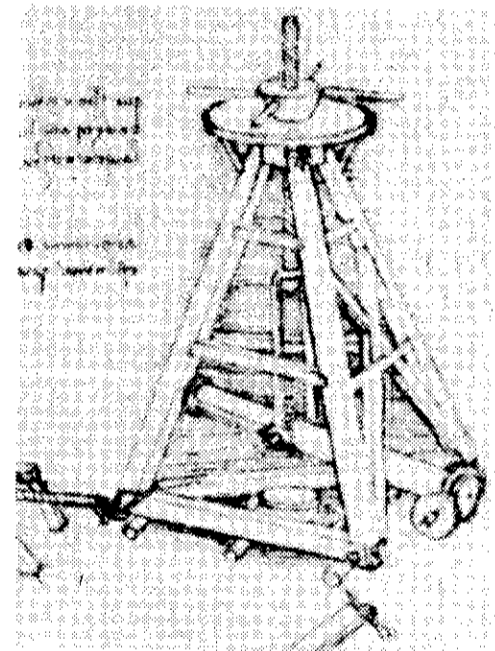
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Dante's *Commedia*



*On the Cover: "The Coronation of the Virgin," by the 15th century Florentine artist Fra Angelico. The experience of "illumination"—the excitement of contributing to society's development through successive mental breakthroughs—was a frequent subject of Renaissance depictions of Paradise, as this notion of Paradise was defined as a science of mind in the *Commedia* of Dante Alighieri.*

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Editor-in-Chief
Carol White

Associate Editor
Kenneth Kronberg

Editorial Assistant
Fay Rosinsky

Art Director
Deborah Asch

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Author's Foreword

Fifteen years ago, the author and his friends numbered not more than thirty-five individuals engaged in a temporarily successful operation against a New Left project backed by McGeorge Bundy. Bundy's circles reacted nastily, pouring Ford Foundation subsidies into funding a political operation against the author and his friends. Bundy's operation later produced the kernel of the Weatherunderground terrorists. Since then, Bundy's name has turned up repeatedly in relatively larger, and invariably nasty operations against the author and his associates. Bundy's and allied circles have expended vast funds from their own and various governments' resources, in what has grown into one of the largest and most intensive attempted "political containment" operations of the post-war period.

Despite this massive containment effort by Bundy, Kissinger, and many others of that general stripe, the author's name has become a proverbial household word among leading governmental and private circles in most corners of the world, and the work of the author and his associates has become an increasingly significant, if intangible factor in policy-making within and outside the United States. It is not bragging; it is a simple fact: there is no comparable case in recent decades. The secret of this remarkable, if relative accomplishment is a choice of adopted method.

The author has been most fortunate. He has found the company and collaboration of a network of persons, about a thousand now ranging chiefly in their thirties and forties, of remarkably gifted and impassioned talents. Most of these have mastered the method in question to some significant degree, though perhaps none as thoroughly as the author himself. Perhaps it is because he is older—sixty-one—and tougher than his associates; perhaps it is because he has been long conditioned to being the executive who must in the final analysis take all responsibility for crucial strategic and tactical decisions. It has been his nagging concern for at least ten years, that numerous among his associates genuinely master the method fully.

Beyond the thousand-odd who compose the inner core of an international philosophical association in the model of Leibniz's (and Plato's) notion of an academy, there are tens of thousands presently immediately associated with the same political efforts as the author within the United States, and millions in the United States and

abroad touched significantly by the influence of his work at all levels of public and private work and responsibilities. It is abhorrent to the author that there should be anything secret about the method he employs. There are growing numbers who have the wish and right to know.

This method, which is that of Plato, of St. Augustine, of Cardinal Nicholas of Cusa, and others, has two cohering facets. In one aspect, it can be outlined as a scientific method, a method of creative discovery. Yet, mere knowledge of the formalities of the method does not suffice. There is an "emotional" facet to the method, an indispensable "emotional" facet. Without the driving energy supplied by the latter, the former is inert knowledge. To present the two facets as one is to describe a scientific psychology, a science of the human mind. It were perhaps the most effective choice to present the method as such a scientific psychology.

This "psychological" aspect of the method is in no sense accidental. The author's formal work to this effect began thirty-five years ago. It began in response to the central flaw of Professor Norbert Wiener's celebrated *Cybernetics*, the so-called Wiener-Shannon "information theory" dogma, which purported to confine the definition of human intelligence to the methods of the Clausius-Helmholtz-Maxwell-Boltzmann statistical theory of heat. This work led rather directly, through five years of intensive researches, into the author's original discoveries in economic science—what is called today the LaRouche-Riemann method. At the same time, 1952, it led into the author's first formal treatment of fundamental questions of psychology, a refutation of Nietzsche which defined three classical archetypes—the Dionysian, Apollonian, and Promethean—in respect to the subjects of poetry and music.

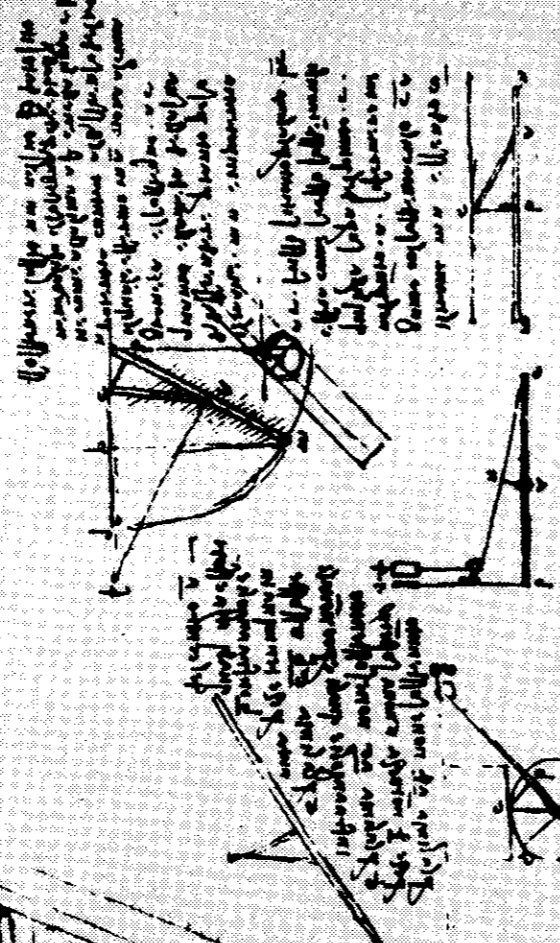
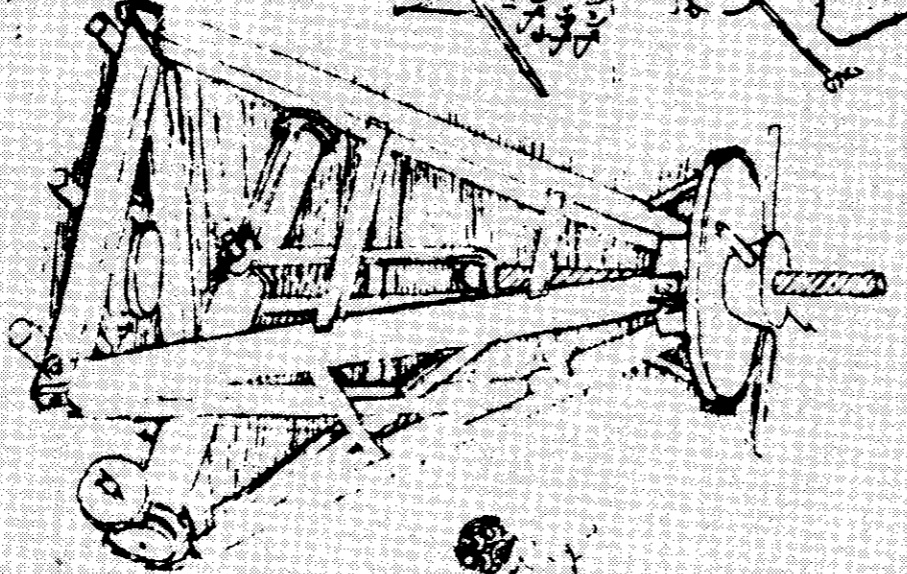
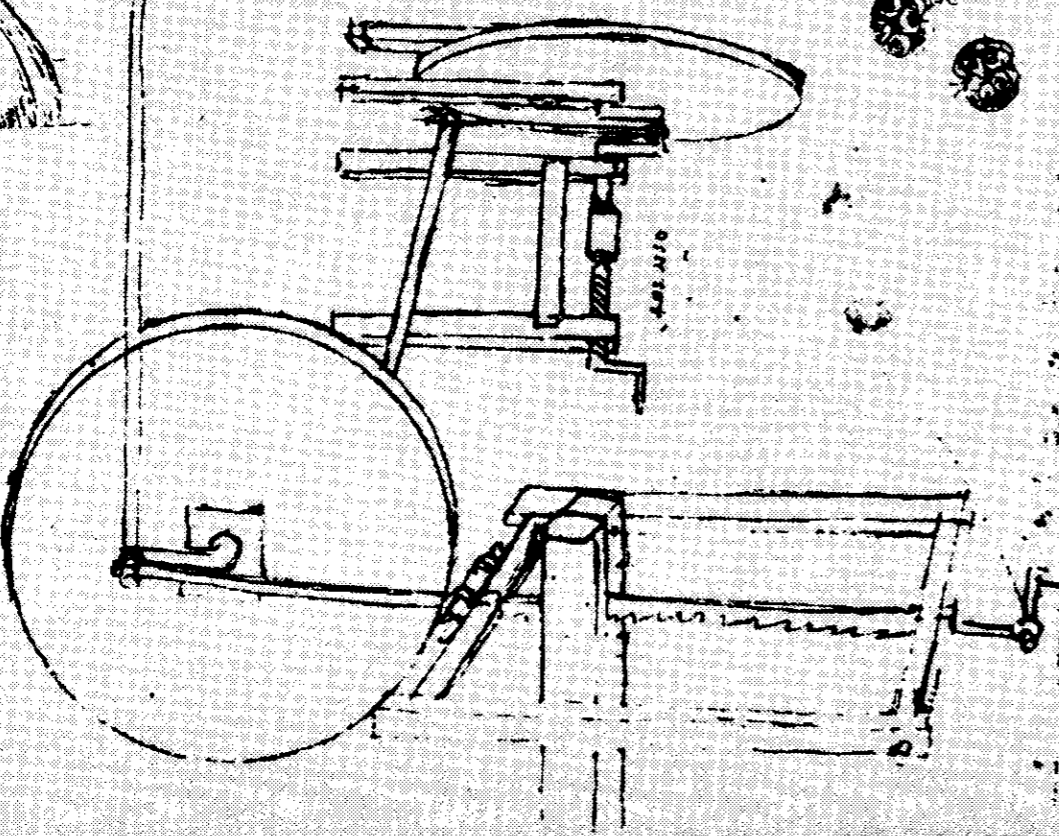
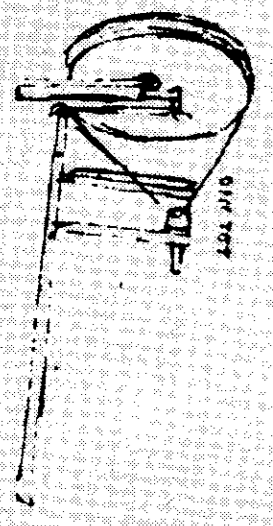
Later, the same line of attack was resumed in composing a refutation of the fallacy that it were possible to simulate human intelligence with a digital computer. This refutation took the author through exhaustive treatments of mathematical logic, and also Freud's psychoanalysis and Durkheim's sociology, preparing the way for the critical refutation of the underlying doctrine of psychoanalysis published during 1973 and 1974.

The author's standpoint was not original in respect to any of its fundamental features. The science of the mind was broadly defined by Plato—and the opposing view given by Aristotle—during the fourth century B.C. Leading aspects of this were freshly treated by St. Augustine. The science of mental development was famously elaborated in depth by Dante Alighieri in his *Commedia*. Rigor was added to this by Cardinal Nicholas of Cusa. These sources are only exemplary of the authoritative classical literature on the matter. The errors of underlying assumptions perpetrated by the professional psychologists of the recent hundred years had all been conclusively exposed and refuted centuries earlier.

Apart from intensive criticism of psychoanalysis and sociology from the standpoint of such classics, what the author has added to the work of his ancient predecessors flows chiefly from his successes in economic science. It is not necessary to say more on that point in this foreword; those contributions are amply identified within the text of this introductory treatise on the science of the human mind.

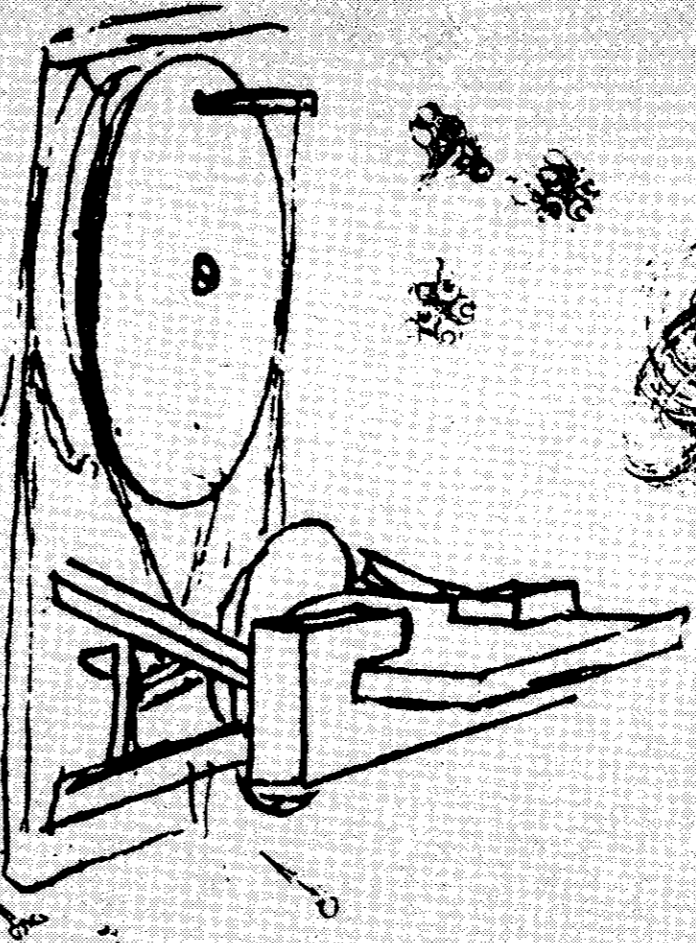
The purpose is to aid the reader to locate within himself or herself those kinds of developable potentialities, so that the author's inevitable death will not render the mastery of this method once again a "lost art."

15 October 1983
Wiesbaden, BRD



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How Science Defines The 'Human Mind'

We begin with primitive man—in the proverbial hunting-and-gathering society—in whose babbling and facial expressions that quality of mind which distinguishes man from beast is scarcely discernible.

A team of experts charged to estimate the *potential relative population density* of primitive man reported that approximately ten to fifteen square kilometers of land were required to sustain an average such individual.¹ A miserable individual he (or she) was. The average life expectancy was significantly below twenty years of age. It must consist of barely more than miserable extended families, each such susceptible of being wiped out entirely by probable catastrophes. Predominantly, it would be a society of babbling, pre-adolescent children, existing in a cultural and material state comparing more or less unfavorably with the condition of stronger and faster baboons.

At most, the human population of this planet in such a condition would be about ten millions individuals.

Presently, the human population is estimated to be approximately four-and-a-half billions individuals, about 450 times the maximum possible for primitive man. Soon, with the aid of new technologies, such as controlled thermonuclear fusion and high-powered directed-energy beams, we should command the technology wanted to sustain tens of billions of persons at a significantly higher degree of comfort than existed in the United States during the pre-1974 'seventies. In the mathematician's language, an increase of human potential relative population density by three orders of magnitude. No baboon or other species of beast could *willfully* increase its potential relative population density by even a significant fraction of one order of magnitude: *in this fact, and no other, lies the beginning of the science of the human mind.*

As briefly as possible, we define *increase of the poten-*

tial relative population density, a datum which is in fact the primary datum of all fundamental scientific work—for reasons we shall identify in due course here.

Population density signifies, most broadly, the average number of persons per square kilometer of habitable land which can be (or, is) sustained solely by the productive activities of that society. This does not, and could not properly, assume a fixed level of per capita subsistence for all time; the productive powers of society require a corresponding material and cultural level of average human existence, a level which must increase as productivity increases. This increase of required per capita subsistence does not increase as rapidly as correlated rises in per capita productivity, but it increases. To restate this point, successful development of society requires that productivity increase more rapidly than the increase of subsistence required to establish and maintain that increase in productivity.

The measure must be *relative* to the quality of land inhabited. A desert and a lush river valley cannot be simply compared as having the same value for human habitation per square kilometer. Yet, desert land can be improved to be the equal of the best river bottom land, as the case of California's Imperial Valley illustrates most dramatically. Yet also, improved land can deteriorate through a combination of depletion and lack of maintenance. There is no fixed value to be associated with any sort of land in its "natural state." That relative value is determined by the cumulative balance of improvements and depletion.

The comparison of the population densities of France and the United States with that of Belgium, nations approximately comparable in development, illustrates the point that we must distinguish between actual and *potential* relative population densities. It is the *potential* which corresponds to the measure of the productive

◀ By wide-ranging observations and measurements, Leonardo da Vinci and his physicist collaborator Luca Pacioli, demonstrated that the morphological patterns of living processes were harmonically ordered according to convergence upon the principle of the Golden Section. Leonardo applied this knowledge to his design of machine technologies, where the principle of the Golden Section and self-similar spiral rotation is used to concentrate the power and increase the energy-flux density of the machine, thus accomplishing work. Leonardo recognized that the same principle of negentropy governs the lawful development of the physical universe and the human mind. Shown are sketches from Leonardo's notebooks.

powers of labor, and is therefore the required measurement, rather than the actual.

However, *potential relative population density* is not yet an adequate definition of our primary experimental datum.

For each fixed level of relative development of productive technology, there exists a corresponding spectrum of what we call loosely "natural resources." If the society continues in a fixed mode, some of those "natural resources" are relatively depleted. The primary effect of such depletion is a rise in the average social cost of producing raw materials. Since raw materials represent a measurable proportion of the total market baskets of combined, essential consumer goods plus production goods requirements for that fixed level of technology, the rise in the proportion of total labor available required for raw materials production means a fall in other categories of production, and therefore a fall in the rate of physical output of necessities per capita. In other words, a fall in the potential relative population density. In other words, a spiral of collapse of that society.

Only advances in technology can prevent such spirals of society's collapse. In the first approximation, merely increasing the productive powers of labor cheapens the cost of production of all physical necessities of consumer goods and production goods consumption, including raw materials. This offsets the effects of marginal depletion. Those advances we associate with the term "technological revolutions" broadly redefine the spectrum of usable natural resources, breaking absolutely the apparent limits to growth defined by the spectrum of natural resources associated with relatively fixed levels of technology.

In other words, a society characterized by zero technological growth as a policy of general practice is a dying society, a form of society morally unfit to continue existing. Repetition of modes of production and related cultural practice inherited from fathers, grandfathers, and so on, is the distinguishing policy of a dying society. For this and related reasons, all economic analysis and policy-shaping premised on systems of simultaneous linear equations, such as those proposed by the late John von Neumann and others, are worse than absurd.

Conversely, a successful form of society is characterized by technological progress. Such progress is the characteristic feature of the total activity of the labor force of that society. Technological progress is the precondition even for merely maintaining a fixed constant value of potential relative population density.

However, to overcome absolutely the apparent limits to growth associated with the "natural resources" of a fixed range of technology, there must be technological revolutions periodically, through which leaps in potential relative population density occur. Moreover, technological progress always tends to cause a net increase in the required social division of total labor, which in

turn signifies an increase of population—and therefore of population density. Thus *increase of potential relative population density* is the irreducible datum required. It is human activity integral to effecting that *increase of potential* which is the irreducible definition of *human activity*.

It is that specific, irreducible datum of *human activity* which correlates directly with those qualities of the human mind which distinguish humanity absolutely from the beasts.

This "economic" form of *human activity* is mapped to the activity of the human mind by aid of Plato's conception of the *hypothesis of the higher hypothesis*. From the standpoint of hypothesis (e.g., rational problem-solving activity of the mind), the human mind has three distinguishing possible states: (1) *Simple Hypothesis*, (2) *Higher Hypothesis*, and (3) *Hypothesis of the Higher Hypothesis*. These are summarily defined as follows, using modern language.

Simple Hypothesis. On the lowest level of human problem-solving (rational) activity, we attempt to comprehend a problem by aid of the assumption that prevailing opinion is broadly correct. We seek to describe the problem considered in a manner which is credible and acceptable to either prevailing assumptions of general opinion, or the body of opinion associated with some chosen professional or other peer group of reference. This is what is sometimes described as an "other-directed" state of mind, which limits one's self-approved thoughts to such thoughts one imagines to be approved among neighbors, family, prevailing authorities, and so forth.

In scientific work, the peer group of reference is one's old university professors (who awarded one the social, professional status of a scientific degree), one's professional peers (as typified by co-workers and referees of professional publications), current or prospective employers, and so forth. The prevailing (e.g. textbook) lattice-work of algebraic formulations, and the axiomatic assumptions directly or implicitly underlying such lattice-works, are accepted as broadly inalterable, and similar assumptions are made bearing on prevailing professional opinion in the specialized domain of experimental practice in which the problem treated is assumed to lie. The formulation of the simple hypothesis seeks consistency with such lattice-works.

Persons in this state of mind will never discover anything of useful importance bearing upon fundamental issues of scientific knowledge. Worse, they will be hostile to creative discoveries, no matter how exhaustively, conclusively demonstrated, and will have enormous difficulty in attempting to master such discoveries. If obliged by pressures of practical circumstance to employ such a discovery, they will attempt to explain

the discovery away, to reject the method by which the discovery was actually formulated.

Higher Hypothesis. In this approach to problem-solving, the thinker rejects the "other-directedness" of simple hypothesis. He is interested chiefly in those kinds of experiments which test one or more of the underlying, axiomatic assumptions of prevailing opinion, and expects to be able sooner or later to overturn one or more of such assumptions through a "crucial" experimental demonstration. This creative thinker is inherently an "iconoclast" in the eyes of his "other-directed" fellow professionals, and they "philistines" in his eyes, as such were in the eyes of Plato's Socrates. He is "inner-directed"; he must prove everything for himself, especially those features of the logical lattice-work of established opinion which are underlying, axiomatic.

The formulation of the higher hypothesis is best accomplished by a thorough education in the internal history of ideas, especially scientific ideas, with reliance upon the original sources of the present and past. This historical approach to contemporary scientific work emphasizes those kinds of axiomatic assumptions which are *ontological*, which bear directly on identifying which aspects of the universe as a whole are properly treated as efficiently substantial, and also how such ontological assumptions implicitly determine the method of adducing the lawful principles governing action in the universe. From such an historically-informed vantage point, the thinker is able to recognize that the elaborated logical lattice-work of the algebraic formulations associated with some branch of scientific inquiry is a kind of "hereditary" elaboration of the axiomatic ontological-methodological assumptions which underlie those constructed edifices of algebraic formulations. From this vantage point, the thinker is enabled to recognize that certain classes of experimental problems put an entire edifice of that sort into question, that certain classes of experimental problems, properly defined in that light, have implicitly a "crucial," or "revolutionary" significance for scientific knowledge in general.

So, the formulation of a higher form of experimental hypothesis is addressed to some selection of empirical evidence, evidence which is appropriate to prove whether or not certain prevailing assumptions of scientific work must now be overturned in order that scientific (and, technological) progress might continue. If this experiment is successful, a greater or less scientific revolution—or, the equivalent in some other aspect of knowledge—results. If this occurs, the entire edifice of mathematical knowledge resting hereditarily upon flawed assumptions collapses, and a new, replacement ed-

ifice must be constructed according to the hereditary implications of the newly proven principle.

In the final analysis, the question whether such experimental proof of a new principle is valid or not, is determined: *does this discovery implicitly lead to an increase of the potential relative population density of society?* Does the discovery effect an increase in mankind's per capita power over nature as a whole?

There are many false discoveries which purport to be of this form. Everywhere, this or that anarchist whose ego has been inflated by a little professional learning, frankly deludes himself that iconoclasm for its own sake, merely being eccentrically different, constitutes valid discovery. The case of so-called modernism in art today, or nineteenth-century romanticism, is illustrative. Fellows who have never mastered Albertian perspective, to say nothing of Leonardo's system of convex-spherical mirror projection, delude themselves that childish smears, echoing infantile smearing of feces on walls, constitutes an expression of "creative freedom." In music, those who have no comprehension of the principles of coherent contrapuntal development (such as that of the post-1782 Mozart or Beethoven), delude themselves to surpass the classical masters by the anarchistic chromatic imbecilities of a Liszt or Wagner or the irrationalist nihilism of Webern and Schönberg. In scientific work, such feces-smearing artistic productions would be regarded as the bungling of illiterate tinkerers.

In significant degree, the toleration of such artistic and social sciences frauds by society today echoes a breakdown in primary and secondary education. If students today were educated at standards of classical education associated with the eighteenth-century French-Italian Oratorians, the leading schools of the young United States, or the Humboldt program in Germany, the graduates of secondary institutions would already possess a much higher degree of education in fundamentals than is commanded by more than a tiny minority of professionals holding terminal degrees today. The steeping of the student in the original classics, beginning with Greek classics, is not unnecessary exposure of the student to dead languages and "outdated" opinions. It is affording the student both a familiarity with the past 2,500 years of development of the ideas of Western civilization, and the power to think of ideas in terms of universality and historicity. Out of such education emerges a sense of rigorous thinking, the power to discriminate between new eruptions of what has been proven trivial nonsense many times in the past, and genuinely new solutions to problems left unresolved from the entirety of whole spans of work of mankind up to the present.

For example, all fundamental accomplishments in modern European mathematical physics over the recent five hundred years are derived most directly (hereditar-

ily) from the work of Cardinal Nicholas of Cusa. Cusa's adolescent training was under the Brothers of the Common Life, education based on rigorous reworking of the classics prior to mid-adolescence. Cusa's principal discoveries in science centered around his thorough reworking of the writings of Archimedes, most emphatically Cusa's rediscovery of the isoperimetric principle of topology as a superior approach to that of Archimedes in treatment of the problem of quadrature of the circle. The genius of Karl Gauss, the greatest thinker of the past two centuries, is typified by and centered in his thorough reworking of the work of Kepler. In Georg Cantor's *Grundlagen*, in which Cantor summarizes the solution to comprehension of transfinite manifolds, Cantor devotes much of the writing to reviewing the preceding centuries' work in that same direction.

The work of formulating valid higher hypothesis is not less rigorous than that of formulating simple hypothesis; it is far more rigorous, more demanding upon the historical education in depth and concentration span of the investigator.

Once one has worked through one such discovery (as the author experienced this in the culmination of five years of work in 1952, in his fundamental discovery in economic science), one has broken through into the inside of the matter of method, and from that vantage point, to descend once more into the lower realm of simple hypothesis is like eating bad dishwater for soup. The term, "genius," for persons associated with fundamental scientific discoveries, is an unfortunately mystical, and therefore wickedly misleading choice of term. "Genius" is learned, as a development of a potential inherent in every newborn (biologically undamaged mental apparatus) human individual. Depth and width of development of that potential, strongly motivated "inner-directedness," and the experience of one good, worked-through true discovery, are all that is required to bring forth such potentialities in almost any human being.

From this vantage point, we must view as criminal the educational policies associated with John Dewey, and the more radical steps in the same direction fostered by the National Education Association under influence of the National Training Laboratories during the more recent decades. Where proper education might have produced legions of true "geniuses," we permit our children to be encouraged in irrational infantilism, to "protect them" from the "oppression" of rigorous development of their creative potentials in depth and breadth of classical and pre-science education, and to deny them the development of that rational maturity indispensable to survive psychologically as adults.

Hypothesis of the Higher Hypothesis. The fact that successions of higher hypothesis (scientific-technological revolutions) prompt increase of potential relative population density of society, implies that

such a succession of scientific revolutions has an ordered character. In other words, the succession of higher hypotheses subsuming such an ordered succession of scientific-technological revolutions has an ordered character. This defines a new experimental problem for hypothesis, the experiment which isolates the consistent feature of successive scientific revolutions, the common principle of discovery uniting revolutions which are otherwise different. This defines an hypothesis of the higher hypothesis.

Just as no experimental hypothesis can be the last word in human knowledge, the same is true for successful hypothesis of the higher hypothesis. It cannot be perfect, and it need not be perfect. It is required that the successive improvements in this hypothesis successfully direct man to the needed next step upward through scientific revolutions.

It is in this latter activity, successful testing of the hypothesis of the higher hypothesis, that true human scientific creativity lies. This is the irreducible feature of human mental activity which distinguishes man from the beast, the irreducible datum of a science of the human mind.

The Common Principles Of Creative Thought

We shall now proceed through three steps, to show the reader what "hypothesis of the higher hypothesis" signifies concretely.

The first of these three steps, which we shall begin promptly, focuses upon the establishment of the foundations of modern European science, through the fresh reading of Plato's *Timaeus* which was made possible by Cardinal Nicholas of Cusa's rediscovery of a fundamental principle of geometry, a fundamental principle best known to modern textbooks as the *isoperimetric theorem of topology*.

The second of the three steps, is a summary examination of Gottfried Leibniz's discovery of the conception *technology*. We shall include the advanced view of Leibniz's discovery made possible by the work of Karl Gauss and Gauss's great successor Bernhard Riemann. This will show the explicit, comprehensible connection between scientific discovery as such and increase of the productive powers of labor (increase of potential relative population density). This brings us to knowledge of a higher form of the isoperimetric principle: that all fundamental action in our universe is "hereditarily" rooted in conic self-similar spiral action occurring in what is termed *the continuous manifold*.

In the third of these three steps, we shall summarize the deeper significance of the material outlined in the first two steps. We shall expose the solution to the prob-

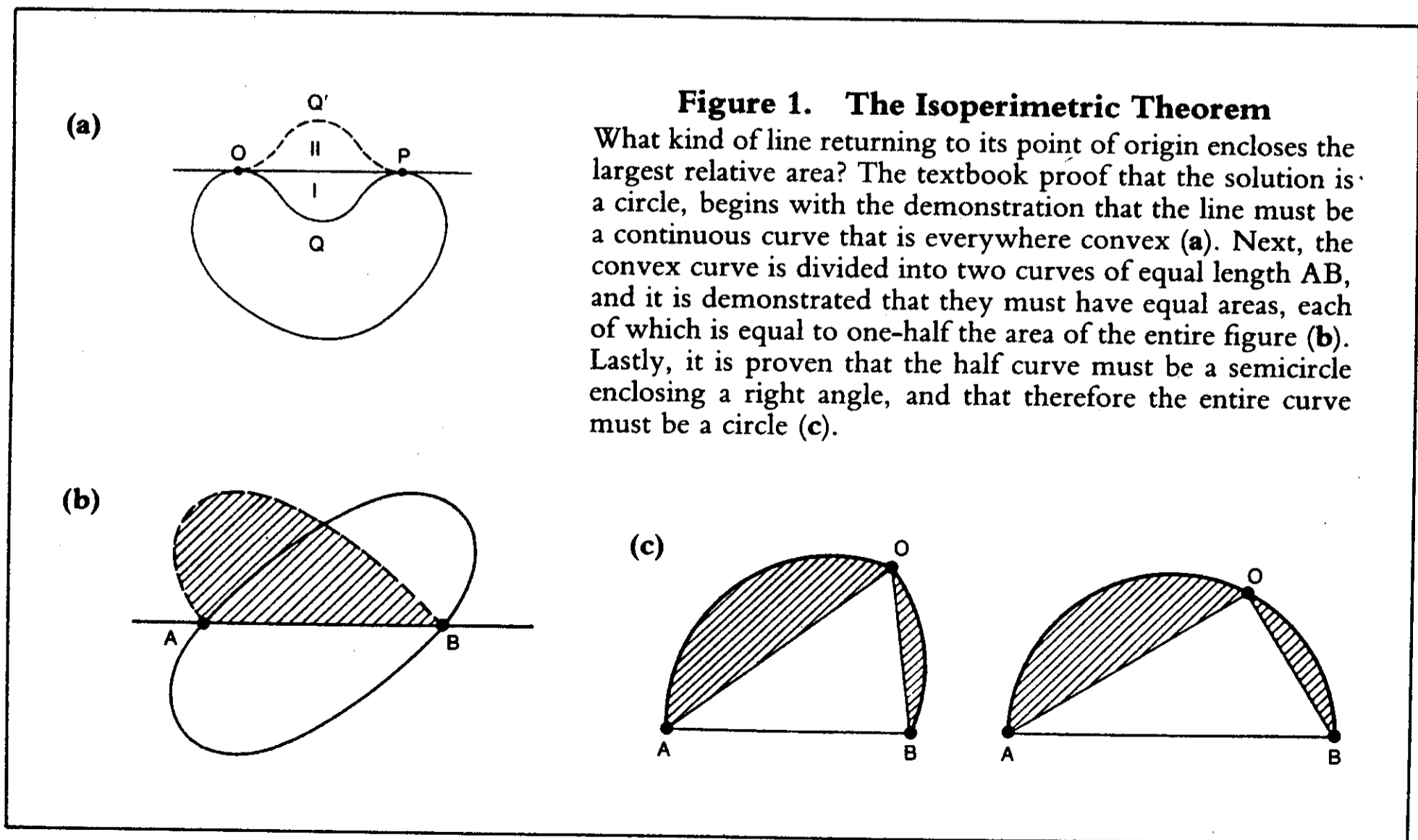
lem which Immanuel Kant failed to master, the solution to the question: what is the knowable, efficient form of *pure synthetic thought a priori*? In other words, elementary creative mental activity as empirically demonstrable in its own right.

Plato's *Timaeus* is constructed essentially from the coincidence of three initial sets of knowledge. The first of these is what we have identified as the isoperimetric theorem; the rudiments of this theorem are readily accessible to the layman who has knowledge of the barest rudiments of geometry, and we shall explain it in such terms of reference. The second is the proof, supplied by a contemporary and collaborator of Plato's working at the Cyrenaic temple of Ammon, that in visible space (Euclidean space) only five kinds of regular polyhedra can be constructed. This is called the principle of the Five Platonic Solids. The third initial point of reference is the notion of the hypothesis of the higher hypothesis.

Although Plato's *Timaeus* was the leading scientific and theological reference for European Christianity and Judaism in every renaissance period of the Christian era, notably including the work of St. Augustine, until the work of Cardinal Nicholas of Cusa during the middle of the fifteenth century, the isoperimetric principle employed by Plato was lost to European knowledge. On this account, the argument of the *Timaeus* could not be adequately reconstructed and reproven by Europeans until the lost knowledge was recovered. Once that loss was remedied, an explosion in scientific progress directly resulted.

The only important objection to this line of argument comes from those modern, educated professionals who trace the progress of modern European science not from Cusa, Leonardo da Vinci, Gilbert, Kepler, Desargues, Leibniz, Gauss, Riemann, et al., but rather from Bacon, Galileo, Fludd, Descartes, through Newton, Cauchy, Helmholtz, Maxwell, et al. The fallacy in that objection is twofold. First, every fundamental advance in mathematical physics of the past five hundred years originated within the current of Cusa and his successors, through Riemann et al. These discoveries were subsequently used by members of the opposing, neo-Aristotelian, faction, as Newton plagiarized (badly) Leibniz's 1676 differential calculus in his own *Principia* of a dozen years later, and as Maxwell himself professed to have "delphically" reworked the earlier contributions to electrodynamics by Gauss, the Webers, and Riemann. The original work on fundamentals has always occurred first in the work of the first current, after which it has been used (or rejected) by representatives of the second. Secondly, the neo-Aristotelian and empiricist factions of European science appeared about 150 years later than the development of Cusa's work, at the beginning of the seventeenth century. Before Bacon, Galileo, Fludd, and Descartes wrote, the foundations of science had been fully established by the work of such figures as Gilbert, Kepler, and Desargues.

The picture of the two currents just outlined summarily is based on documented argument and primary sources. The report is painful to persons whose sense of



social status is strongly attached to over-admiration of Newton, Cauchy, Maxwell, et al., but the evidence is conclusive and the conclusion a necessary one. It would be inappropriate to restate the documentary proof in full here, in this treatise, but the nature of that proof will be made clear as we progress through the remainder of this present chapter.

With that, we turn to the isoperimetric theorem. The kernel of the formal, textbook treatment of this theorem is summarized in *Figure 1* accompanying: *What kind of line returning to its point of origin encloses the largest relative area?* That portion of the proof begins with the demonstration that such a line must be a continuous curve, and that that curve must be everywhere convex. The textbook demonstration thereafter proceeds as indicated in *Figure 1*.

Looking at the content of *Figure 1* more closely, it should be evident that the proof supplied depends upon a preceding step. Whence do we obtain the definitions of line, point, and measure by one-half, employed in *Figure 1*? The point is, the proof supplied in *Figure 1* is an incidental, but necessary phase of a larger theorem, a theorem in the form of a higher hypothesis.

Before such a theorem is posed, historically, geometry, including astronomy, has already shown man the uniqueness of the circle among all figures in visible (Euclidean) space. In astronomy, the circle takes the form more often of circular action, than of a static circle as such. Moreover, in geometry, it is circular action (e.g., with compass) which is relevant to uncovering the relationship between the circle and other figures. The higher hypothesis is thereby implied: *Can we not discard all a priori assumptions of self-evident straight lines and self-evident points, and construct a geometry based only upon circular action, a geometry in which only circular action is self-evident?*

By folding a circle against itself (circular action upon a circle), we create a straight line. This eliminates all definitions of a straight line except that of a straight line defined as produced by circular action upon the result of circular action. Similarly, by folding a half-circle against itself, we create a point. So, implicitly, all definitions of straight lines and points which presuppose those forms to be a priori self-evident are discarded from geometry.

Having proceeded once in that way, we repeat the same actions in the most generalized way possible, yet limiting our generalization to the conditional assumption that visible (Euclidean) space is the totality of physical space.

Given nothing but a formless and measureless void, perform circular action upon that void. This produces a circle the extent of the universe of visible space, depending upon no prior assumptions of points, straight lines, or planeness, excepting as those are embedded as products of circular action itself. This gives that space

form, but leaves that space without measure. Now, perform circular action upon that circle, folding the circle precisely against itself. This forms the diameter of the circle, which divides the original circle by one-half, and also divides the circle's rotation by one-half. This second action introduces measure into what had been a measureless void. The next circular action, performed upon the half-circle, creates the point as an intersection of two straight lines.

With that apparatus, and only that apparatus, the test of the higher hypothesis is completed by means of the kind of demonstration summarized in *Figure 1*.

The implicit result is a geometry of visible (Euclidean) space in which no axioms or postulates are tolerated, and no syllogistic-deductive methods of supposed "proof" (theorems) permitted. This implicit result of Cusa's fifteenth-century rediscovery of the mini-max form of the isoperimetric theorem was brought to near completion by Professor Jacob Steiner during the nineteenth century: *synthetic geometry*. Synthetic geometry begins with no assumptions but circular action and the derivation of straight line and point from such circular action. All constructions in visible space are derived from nothing but circular action, and the derived line and point; no other method of proof is permitted. All geometrical construction in visible (Euclidean) space is based upon a "hereditary principle" of successive constructions, to the effect that no original element is ever introduced to the sequence except the original point of departure, circular action and the derivation of the line and point from circular action.

This progress from Cusa through Steiner is shown conclusively to replicate the approach to geometry adopted by Plato and his contemporaries at the Cyrenaic temple of Ammon. The manner in which Plato treats the matter of the so-called Five Platonic Solids in his *Timaeus* is sufficient basis for proving this to be the case.

However, approximately a hundred years or more after Plato's death, followers of Aristotle's doctrines, working in Egypt, created a second, false "Euclid." The method of synthetic geometry was written out of the new version of *Euclid's Elements*. A system of axioms and postulates, assuming the a priori self-evident existence of arbitrary points and straightness of straight lines was introduced. Most of the content associated with the initial books of *Euclid's Elements* was restated in terms of syllogistic-deductive theorems based ultimately on a system of axioms and postulates. Only the concluding books of the version of *Euclid's Elements* supplied to Europe later contained significant evidence of the earlier existence of the synthetic-geometrical method.

All of the fundamental advances in physical science of the recent hundred years are to be traced to Cusa's rediscovery of the isoperimetric principle. The fundamental advances in mathematical physics have been the process of elaboration of successive experiments ac-

According to the principle of higher hypothesis, a successive, experimentally referenced overthrowing of axioms and postulates, ridding leading European scientific thought of the counterfeit assumptions of Ptolemaic versions of axiomatic geometry, and also ridding science progressively of the notion of a mathematics derived from an axiomatic-deductive structure in arithmetic.

In the following sub-topic here, the second of the three in progress immediately, we shall show that circular action as such is not self-evident in the universe; we shall show that the conic form of self-similar spiral action is. Nonetheless, even after that necessary correction is made, it remains true that circular action is the only form of action which is self-evident within visible (Euclidean) space. Everything which can be constructed *within the confines of Euclidean space* is traced by the "hereditary principle" of synthetic-geometrical construction back to circular action and nothing more.

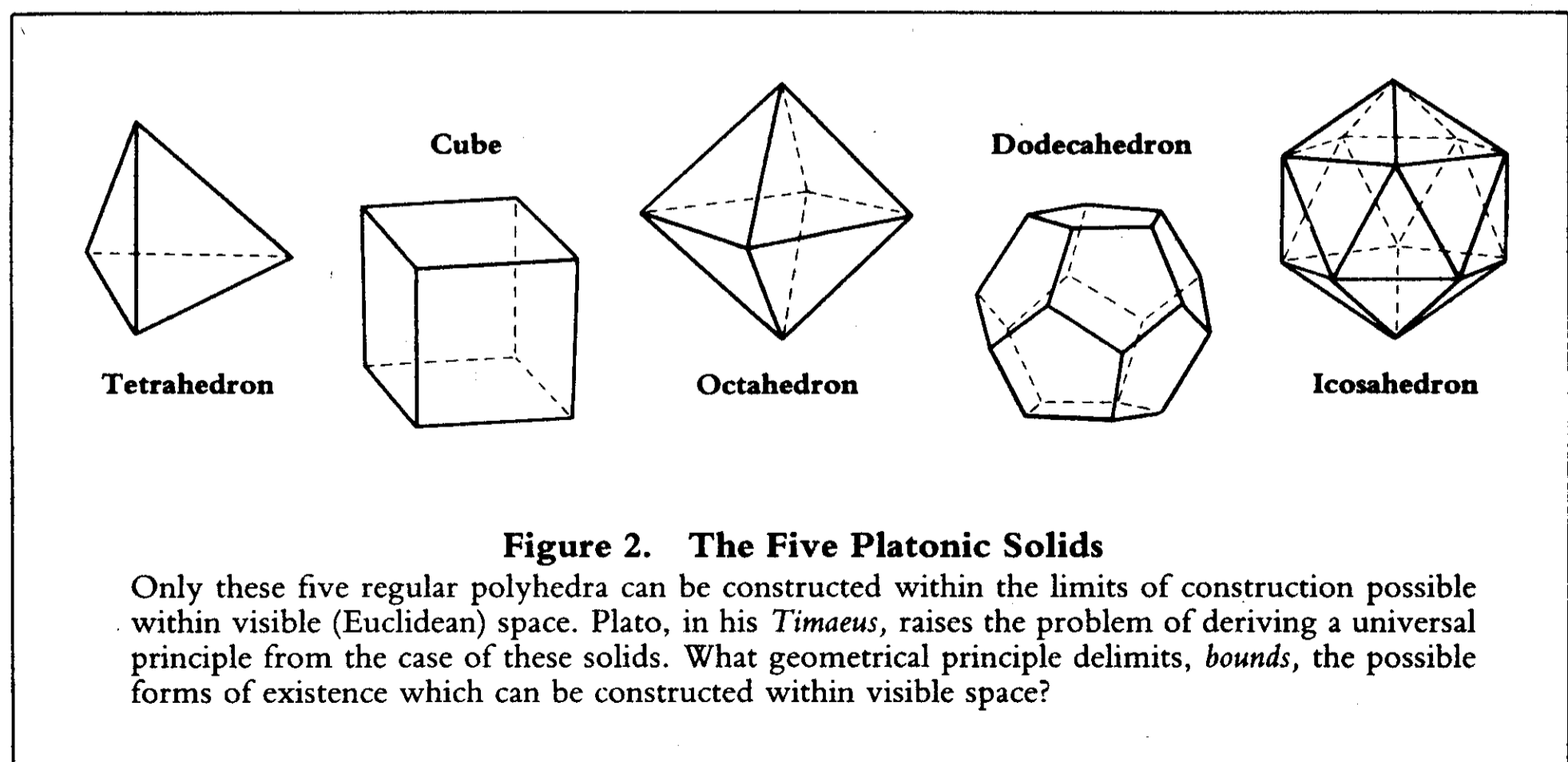
The pivotal fact which leads us to such a correction is that there exist in visible space forms, such as the regular seven-sided polygon, the heptagon, which cannot be defined by construction within Euclidean space. Like the heptagon, all of these exceptional cases which have the form of existence within visible space can be constructed by aid of conics as "helping figures." The deeper, general significance of such "helping figures" is that they correspond to what are generally named *transcendental functions, functions of a complex variable*. The self-similar (e.g., logarithmic) spiral on the outer surface of a cone is the elementary form of all transcendental functions, subsuming the special case of the self-similar spiral on the outer surface of a cylinder. How-

ever, all forms constructable within the confines of visible space are also constructable by means of conics. Therefore, self-similar conic spiral action is shown to be a universal basis for all forms which can either be created within or projected as images upon visible (Euclidean) space.

We are obliged to conclude from this and related physical (experimental) evidence, that conic self-similar spiral action is the image of the only self-evident action in the real universe. As circular action seems to account for the creation of form and measure within Euclidean space, self-similar conic spiral action accounts uniquely for the creation of form and measure in the real universe, the real universe of non-Euclidean physical space.

This signifies that mankind's mental-perceptual apparatus distorts reality's image in our minds, such that we see non-Euclidean reality in Euclidean images. Plato uses the simile of the shadows projected by firelight upon the walls of a darkened cave. St. Paul reports that we see reality falsely, as if in a darkened mirror. The limitations of our mental-perceptual apparatus cause us to see reality in distorted images, such that to our senses it is as if there were distorting mirrors embedded everywhere in the universe, and we could see only the distorted images in those mirrors, and not the real universe.

Yet, can we assume that the distortion is arbitrary, that the nature of distortion is such that we might never hope to comprehend some lawful principle through which our minds might reconstruct non-Euclidean reality from the Euclidean phenomena of our senses? As guessed by aid of surviving literary sources, it appears that Plato was the first to prove that the distortion is



consistent and lawful, and that that lawful distortion is susceptible of efficient comprehension by the human mind. By adequate mastery of the principle underlying the lawful distortion, we are able to reconstruct within our minds an *efficient* image of non-Euclidean physical space.

We begin to see that the possibility of an efficient science depends upon, first, discovering what lawful principles govern the distortion of our perception, and, second, employing that comprehension as means to reconstruct images of the real universe—non-Euclidean physical space—by aid of sensory data. The next step toward comprehension of the lawful character of the lawful distortion, after identifying the general implications of the isoperimetric theorem, is examination of the implications of the Five Platonic Solids.

Plato's collaborator had shown that only five kinds of regular polyhedra can be constructed within the limits of construction possible within visible (Euclidean) space. These are five kinds of solids whose surface-faces are all, in each case, equal triangles, equal squares, or equal pentagons. These are the four-sided figure whose sides are each triangles, the tetrahedron, the cube, the eight-sided figure whose sides are triangles, the octahedron, the twelve-sided figure whose sides are pentagons, the dodecahedron, and the twenty-sided figure whose sides are triangles, the icosahedron. No other regular polyhedra can be constructed in visible space. (See *Figure 2*.)

Of these five, four are constructed by derivation from the fifth, the dodecahedron. All this was proven in Plato's lifetime, was freshly proven by Leonardo da Vinci's collaborator, Luca Pacioli, and a more rigorous proof was developed by Leonhard Euler.

This fact of the Five Platonic Solids demonstrates the location of a special kind of limitation placed upon the possible forms of existence in visible (Euclidean) space. The implied task, adopted by Plato for composing his *Timaeus*, is that of adducing a universal principle from the case of these solids: what geometric principle delimits, *bounds*, the possible forms of existence which can be constructed within visible space?

The most crucial of the facts available for such a study are, first, that the solids are derived by synthetic-geometrical construction from the isoperimetric principle, and, second, that all of the solids reduce by construction to the dodecahedron. Therefore, first, we must place the peculiarities of the solids into direct juxtaposition with circular action itself. Second, we must make the centerpiece of this inquiry the relationship between circular action and the most characteristic, irreducible feature of the dodecahedron.

Plato, as did Johannes Kepler later, accomplishes the first of these tasks by inscribing the regular triangle, square, and regular pentagon within the circle from which these forms are constructed. He then treats the

circumference of that circle as like the vibrating chord of a musical instrument. The points of the inscribed polygon's intersection with the circumference divides that circumference as the fingers placed upon the fret of a stringed instrument do a single string. The result is the harmonic intervals of the third, fourth, and fifth of the diatonic musical scale.

Added to this is the fact that the construction of the regular pentagon requires the intermediate step of producing a relative length called the Golden Section. This same Golden Section is the characteristic feature of the construction of the dodecahedron within the sphere. In other words, the Golden Section expresses the most characteristic feature of the principle which defines the boundedness of visible (Euclidean) space.

It is necessary to interpolate a point here, to leap ahead of the material immediately under discussion. The diatonic values used by Kepler are not precisely the correct values for physics (or music), although no other defect occurs within Kepler's formulation of the laws of astronomy on this account. Indicating now how the correct values are obtained bears directly on the kind of empirical evidence which proves the need to use non-Euclidean geometry, rather than Euclidean, for physics.

Using an extension of the principles of synthetic geometry, we construct a cone with a self-similar spiral on its outer surface. (See *Figure 3*.) The projection of the image of this spiral on the circular base of that cone is a plane spiral whose most characteristic feature is the Golden Section: a radius of the circular base is divided by the arm of the spiral in a manner congruent with construction of the Golden Section. Since we are projecting a three-space body onto a two-space surface, we must divide the circular base into twelve equal sectors. The radii dividing these sectors cut the arm of the spiral such that the spiral, treated as a vibrating string, defines the well-tempered ratios of Bach's musical counterpoint for the 24-key, 12-tone, octave scale.

As we have already noted, the most elementary, irreducible form of transcendental (complex-variable) functions in mathematical physics is the conic form of self-similar spiral. The degenerate form of this sort of function is the self-similar spiral on the outer surface of a cylinder. In mathematical physics, the conic form is the geometrical representation of *work*, and the cylindrical form is the geometrical representation of radiation of *energy* in its "normal," or coherent, monochromatic form. In physics, especially in economic science, we measure the work required to produce energy, and then measure the work accomplished with use of that energy. The comparison of the two works measures the net work accomplished.

A comparable case is the accomplishment of Leonardo da Vinci in replacing Albertian straight line perspective with perspective defined in respect to reflections in a convex spherical mirror. Leonardo was led to

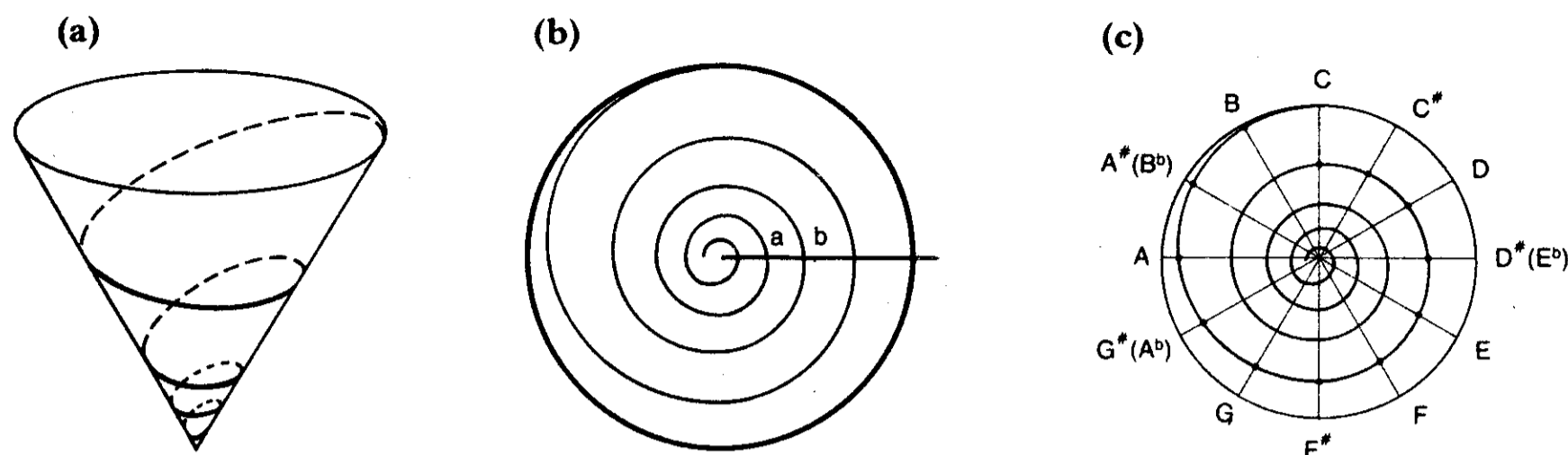


Figure 3. The Golden Section and Self-Similar Spiral

The Golden Section expresses the most characteristic feature of the principle which defines the boundedness of visible (Euclidean) space. (a) A cone constructed with a self-similar spiral on its outer surface. (b) The image of this spiral projected on the base of the cone. This plane spiral is characterized by the self-similar growth pattern of the Golden Section, as is shown by the division of a radius of the circular base by the arm of the spiral: $a:b::b:a+b$. (c) The radii dividing the circular base into 12 equal sectors, are cut by the arm of the spiral such that the spiral defines the well-tempered ratios of the 24-key, 12-tone octave scale.

this by noting the distortion of reality caused at extreme values by use of Albertian perspective, a distortion corrected by the change.

Among the first-order categories of empirical evidence pointing us toward the need to shift into non-Euclidean geometry are empirical demonstrations that Euclidean geometries impel us to produce provable anomalies, anomalies which vanish with proper non-Euclidean geometries. This interpolation is made here both to forewarn the reader of the included errors in a simple application of Plato's and Kepler's methods of calculation, and also to indicate that there is nothing mystical in our preference for non-Euclidean geometry. In making this shift, we are guided by the most rigorous use of verifiable empirical evidence.

So, back to Plato.

The fact that the deepest of the laws of visible space were congruent with musical-harmonic values centered upon the interval of a musical fifth (Golden Section), indicated to him that there was a congruence between the principles of musical composition centered upon the fifth and the lawful composition of visible space taken in its universality. On this account, he causes the Socrates of the *Timaeus* to name God "The Composer," and to direct the participants in the dialogue to concentrate upon defining the principles by which the universe is "composed."²

This was Kepler's approach, the prompting of the title, *World Harmony*, of his famous text.

Table 1 compares the values for the solar orbits as given by Kepler's laws with determinations given by modern astronomers. There have been repeated efforts, beginning with Galileo, Fludd, and Newton, to debunk Kepler, including some modern attempts published.³ All of this debunking is proven variously either a result of illiteracy in the matter, or careless reading of the text. Excepting for the problem of relativistic modifications

Table 1.
Solar Orbits: Kepler's Laws
and Modern Astronomy

(measured in astronomical units, A.U.; the distance of Earth from the sun equals 1 A.U.—actually 92.9 million miles)

Planet	Kepler's Laws	Modern Astronomy
Mercury	.400	.387
Venus	.738	.723
Earth	1	1
Mars	1.432	1.524
Jupiter	4.881	5.203
Saturn	9.726	9.539

(e.g., the case of the orbit of Mercury), Kepler's laws give the most accurate values among competing varieties of astrophysics; his competitors have been proven consistently absurd over the centuries.

Most overlooked is the significance of the case of the asteroids. Not only did Kepler specify the necessary former existence of an exploded planet in an orbit between Mars and Jupiter, but the method by which he derived the entirety of his laws of astronomy and the principle of gravitation demands this specification. It may be said, therefore, that proof of either the former existence—or, non-existence—of such an exploded planet in that orbit is crucial for any attempted proof or disproof of Kepler's astronomy. Kepler gave the harmonic orbital values for this exploded planet. Karl Gauss was first to discover and prove that the principal asteroids have the harmonic orbital values calculated by Kepler.

The false objection has also been raised against Kepler's work, that he did not discover the principle of universal gravitation. Such a charge against Kepler could be made only by an illiterate who has not read Kepler's published writing. Moreover the values for universal gravitation are obtained by simple algebraic inversion of Kepler's laws of astronomy. On this account, both Galileo and Newton, who referenced Kepler's work on these matters, discovered nothing, but merely plagiarized Kepler.

The final principal objection which has been made against Kepler's work is that his estimations for elliptical functions are erroneous, to the point that his calculations must be discarded on this account. Such a charge was made by Newton et al. This issue was settled by Karl Gauss. Gauss's principal youthful work was centered upon a re-working of Kepler's calculations, with special emphasis on solving Kepler's demand that a generalized solution for calculation of elliptic functions be accomplished. (The specifications for creation of a differential calculus were also given by Kepler, the same Kepler who created the first digital calculating machine, before Blaise Pascal).

In one of the most important mathematical discoveries of modern history, Gauss derived the principles of elliptic functions from the function of conic self-similar spirals. This was centered in Gauss's elaboration of the so-called arithmetic-geometric mean, which Gauss showed to be key to comprehension of elliptic functions. Gauss's solution showed Kepler's approximations to be based on valid assumptions as to direction. Moreover, this work of Gauss on conic and elliptic functions was merged with the contributions of the Ecole Polytechnique (under Lazare Carnot and Gaspard Monge), especially the work of Legendre, to establish the basis for the achievements of nineteenth-century German mathematical physics.

This work of Gauss on the connection between conic self-similar functions and elliptic functions is perhaps

the most important breakthrough in scientific knowledge after Cusa, Kepler, and Leibniz. On this basis, we have an efficient knowledge of the elementary functions of a complex variable, which we could not know otherwise. This was the foundation for the accomplishments of Gauss's greatest and principal successor, Professor Bernhard Riemann. On the basis of Riemannian mathematical physics, we are presently able to accomplish to a large degree what Plato projected about 2,500 years ago: to construct efficient images of the non-Euclidean real universe by means of sensory perceptions of images in the non-real Euclidean domain.

The work of Kepler is crucial in all this. Without his work, modern mathematical physics would have been impossible. Within this work there is one feature which is of the utmost importance for scientific work generally, and for the science of the mind most emphatically. Kepler proved conclusively that our universe is *negentropic*, not *entropic*. Exactly what that means, and how it bears directly on the fundamental principles of scientific psychology will become clearer as we proceed.

To locate this crucial accomplishment of Kepler's, we must glance back approximately a century, to the collaboration between Luca Pacioli and Leonardo da Vinci at Milan, beginning approximately A.D. 1480. Leonardo's projective geometry of the convex spherical mirror gave impetus not only to new dimensions in painting and architecture, but also the general development of projective geometry and non-Euclidean geometry. His elaboration of the principles of machine design prefigured the work of the Ecole Polytechnique under Carnot and Monge at the beginning of the nineteenth century. There is nothing to compare thus far with Leonardo's rigorous mastery of the morphological characteristics of the human and animal forms, and the application of this to the design of machines. Also, it was Leonardo who single-handedly founded the modern science of hydrodynamics, to the point that his discoveries in the determination of turbulence were not duplicated until the 1970s. The most contested feature of Leonardo's hydrodynamics, his theory of acoustics, was confirmed theoretically by Bernhard Riemann in 1859 ("On The Propagation of Plane Air Waves of Finite Magnitude"), and Riemann's doctrine has been massively corroborated by empirical evidence developed during the present century.

It is an additional feature of the work of Pacioli and Leonardo which now occupies our attention. Probably the most profound work of these collaborators was their study of the morphological characteristics of living processes. They showed, by wide-ranging and meticulous observations and measurements, that the morphological patterns of growth of living processes were harmonically ordered according to convergence upon the principle of the Golden Section. Consequently, the harmonics of function of parts of the body was also so determined. They postulated, as did Kepler after them, that

all living processes have the morphological characteristics of Golden Section harmonics, whereas inorganic processes do not! (See Figure 4.)

For convenient reference, this feature of Leonardo's work was taken up by Kepler in a remarkable paper on the subject of the determination of the geometry of the snowflake.

The characteristic of the entirety of the laws of astronomy developed by Kepler is the underlying determination of these laws by the Golden Section. The question is therefore posed: is the universe as a whole in some sense a living being? Judeo-Christian monotheism insists so, as the doctrine of *consubstantiality* argues this definition of monotheism. Plato derived the same consubstantial monotheism in his *Timaeus* by aid of the means of argument we have indicated here. From the standpoint of physical science, we are more modest, preferring to avoid theology as such. We are content to emphasize that Kepler's proof is conclusive to the effect that *the universe as a whole shares an underlying characteristic in common with living processes*. We prefer to describe that common principle shared by the universe and all living processes within it as *negentropy*, a term we shall define in due course in this treatise.

The apparent problem posed by this proven fact is not that living processes share the same principle as the universe as a whole, but that dead things (inorganic processes on the macro-scale) do not. The problem is that of accounting for the existence of dead things in the universe. A brief, broad discussion of this is sufficient at this stage of the discussion.

It is true that the popular view in professional scientific literature today, is that the laws of the universe are consistent with dead things, and that life and human consciousness are curious exceptions to this. In the radical interpretation of this popular view, the radical interpretation of the statistical theory of heat, it is argued that the universe must have been at its highest relative state of organization at some distant past point in time—when the "big bang" of creation is assumed to have occurred. It is argued from the vantage point of Helmholtz, Clausius, Maxwell, Boltzmann, et al., the standpoint of the so-called First and Second "laws of thermodynamics," that the universe has been unwinding ever since that original point in time. The same doctrine was embedded axiomatically in the work of René Descartes and of Isaac Newton; Newton noted this fact, and that admission figured in the Leibniz-Clarke correspondence later.

Yet, before the time Descartes and Newton asserted such a view of the universe, their view had been conclusively refuted by the successive work of Cusa, Leonardo, and Kepler, most emphatically by Kepler's universal laws. This is a condition unfortunately typical of scientific work; once false assumptions are embedded axiomatically in the elaborated structure of algebraic dogmas, even assumptions proven to have been false at

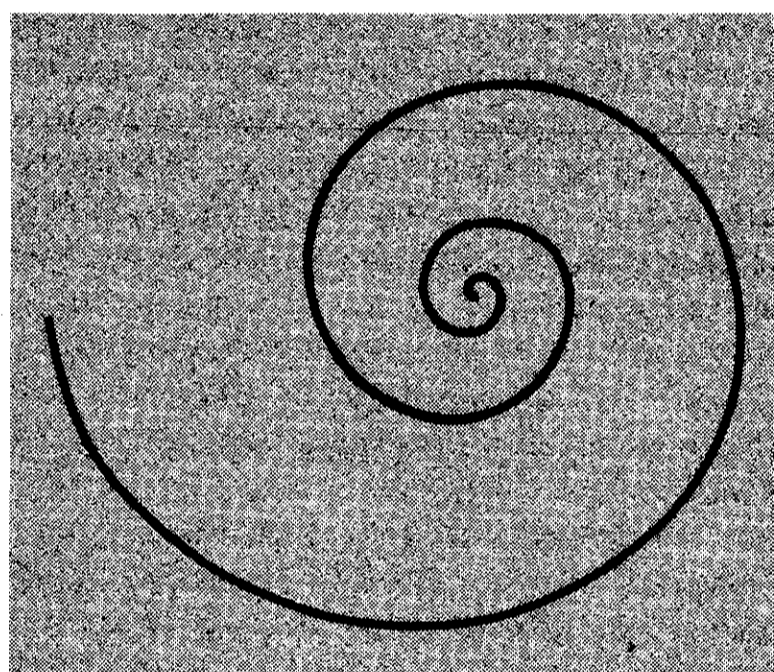
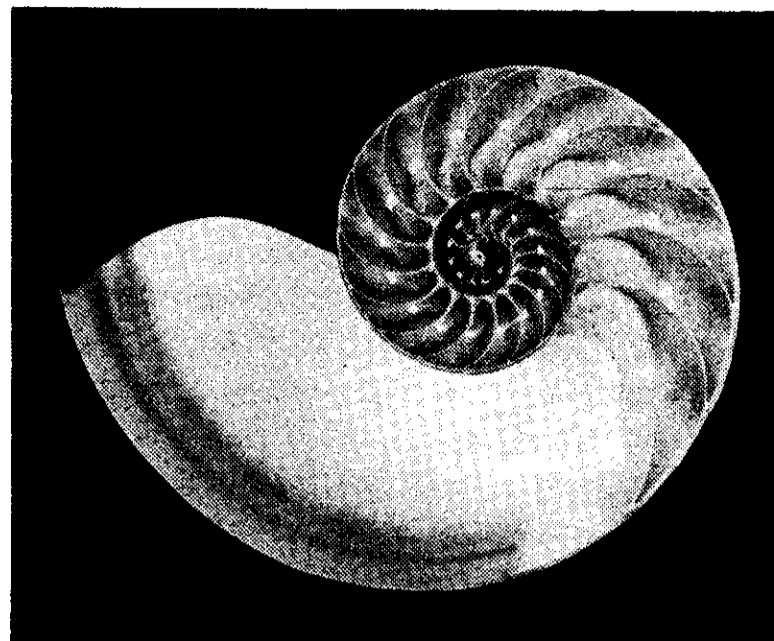


Figure 4.
**The Golden Section and
Living Processes**

The morphological patterns of growth of living processes are harmonically ordered according to convergence upon the principle of the Golden Section. Above, a chambered nautilus exhibits the spiral characteristics of organic growth.

the point of their original introduction, it is the devil's own work to attempt to rid the heads of professors and textbook writers of such axiomatic fallacies. The fact is, if Kepler's laws are valid as far as Kepler goes, as remains proven to the present date, then the universe is not *entropic*, as prevailing doctrine argues, but *negentropic*.

In other words, the universe is growing and becoming more highly organized, in approximately the same sense Cusa insisted that biological evolution produces successively higher forms of life. (This is approximately the proper meaning of the term *negentropy*.) This is also

the view of mathematical physics elaborated by Bernhard Riemann, notably beginning his 1854 habilitation dissertation, "On The Hypotheses Which Underlie Geometry."

Whence, then, dead things?

The broad answer is, first, that negentropy, the principle of living processes, is the characteristic feature of our universe as a whole, and that all things which exist in that universe are produced as substantiality by negentropic action. However, the negentropy exists in the universe only in its universality, and is not a property of each and every ephemeral thing which appears in the span of the universe's development. This quality of the universe as a whole is reflected in the process of life in general; life participates in the underlying principle of the universe, although not consciously so. Only mankind, among living processes, participates consciously in the underlying principle of the universe as a whole. Inorganic matter is simply dead things, leftover raw material to be used by living processes in particular and, otherwise, by the negentropic building process of the universe as a whole. Inorganic matter is the relics of the dead past of our universe, as distinct from the living present.

However, it is not consciousness in the broad sense which fulfills this qualification. Irrationalism, or even simple hypothesis, is entropic, not negentropic. What distinguishes man from the beasts in practice is a process of successive increases in the potential relative population density of society—for reasons indicated already above. These increases are made possible by technological revolutions, revolutions which can occur only in the form of a successful higher hypothesis in each and every instance. However, one higher hypothesis' success does not in and of itself ensure a successful successor. A succession of successful higher hypotheses is assured only if society is self-governed to this effect by the influence of elite institutions which are themselves governed in intellectual activity by that efficient common principle of successful scientific discovery defined as the hypothesis of the higher hypothesis.

Another name for hypothesis of the higher hypothesis is "reason." Conversely, the hypothesis of the higher hypothesis, as we have stated the case thus far, is the only meaningful definition of reason, the only definition of "reason" which points to that quality by which mankind is set above the beasts.

Human irrationalism or even the rational activity of simple hypotheses are not distinctly human qualities of the mind in and of themselves. The ability of the mind to perform logical-deductive operations is not distinctively human; to a certain extent, such logical-deductive operations can be, and presently are performed by machines, computer systems, by dead things. The notion that computer systems might simulate "human intelligence" reflects only the proponent's ignorance of the rudiments of human intelligence. A society whose men-

tal activity never progressed to a higher level than simple hypothesis, must die, entropically, through marginal depletion of the natural resources associated with a fixed axiomatic-deductive lattice-work of technology; thus, a society based on nothing better than logical-deductive behavior does not truly qualify as human, as a form of behavior by means of which the human species could be perpetuated at cultural levels higher than those of a baboon.

This does not signify that a species of ape could develop a logical-deductive system of the sort we find commonplace among rationally-ordered forms of society. The crucial point here is that an ape might be induced to learn logical-deductive behavior, but could not create, as an ape-culture, the kinds of logical-deductive behavior which behaviorists might induce captive apes to learn. Logic is a dead thing, but the logical-deductive cultures developed within society have been developed, developed by means of something more living than dead logic. So, logical deductive mental behavior reflects something distinctively human, even though logical-deductive behavior per se does not itself contain anything distinctively human.

Fixed technology does admit of those forms of description recommended by Aristotle, for example. In that sense, and only in that specific sense, we might describe advancement of technology in terms of successive layers of logical-deductive systems, each successor representing the practice of a higher potential relative population density than its predecessor. The crucial point is that the methods of description outlined by Aristotle, for example, could not produce the "leap" from one stratum to its higher successor. What is human in fixed technology, in logical-deductive behavior of a certain level of technological advancement of society, is not that behavior itself, but the mental activity which has transformed the culture from a prior, relatively inferior, to a higher level. Thus, even irrational behavior, as well as merely logical-deductive behavior, is a dead thing which reflects the process by which it was produced, as a corpse reflects the life of the deceased.

In these terms of reference, the only human feature of the mental behavior of persons is reason as we have defined it here, the capacity of the human mind to master with increasing perfection the hypothesis of the higher hypothesis. This is the primary fact of any science of the human mind, the fact which distinguishes a scientific psychology from quackery.

Technology and Negentropy

With the completion of the discoveries of Kepler, the Platonic philosophical outlook for physical science was conclusively established as the only scientific philosophical outlook, relative to proposed alternatives. The broad principles of the human mind were established, and also the most crucial feature of universal physical

laws. Although that accomplishment was indispensable, it was not adequate for our purpose. Next, we must discover exactly how reason becomes efficient in effecting increase of potential relative population density.

This obliges us to turn to the relevant work of Gottfried Leibniz, the discoverer of *technology*.

The rigorous modern definition of technology was developed by Leibniz within the context of his study of the principles underlying the functions of heat-powered machines. It must be emphasized here at the outset of this sub-topic of our inquiry, that the principles which Leibniz discovered and elaborated are not limited in application to heat-powered machines. It is stressed that the principles Leibniz developed in that specific setting are of universal applicability long before the first heat-powered machine was anticipated, throughout the history and pre-history of man's ascent from baboon-like "primitive society." It was looking at the principles embedded in that earlier social development from the standpoint of reference of the heat-powered machine which made the discovery of the universal principle possible.

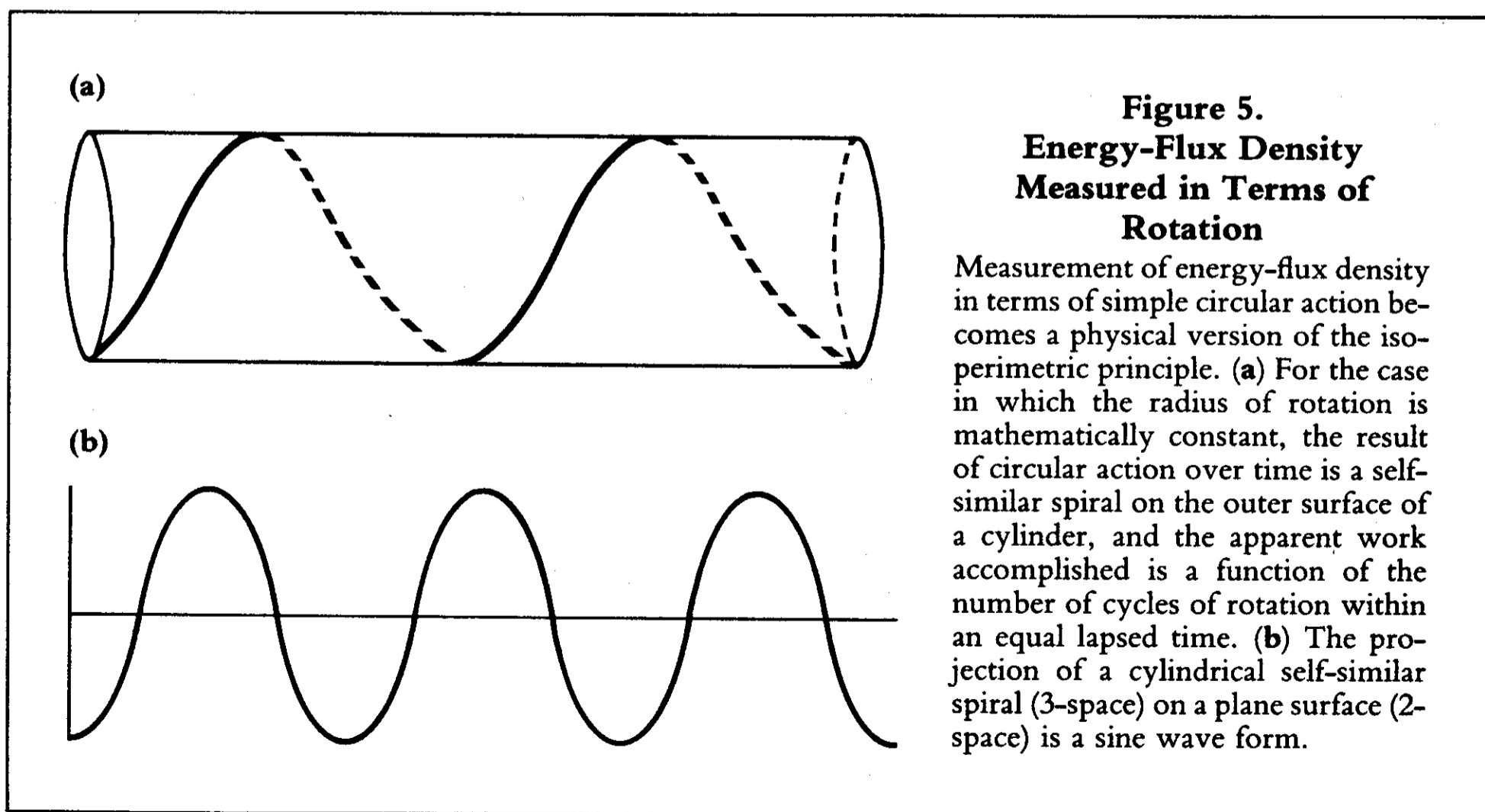
Leonardo da Vinci had already elaborated to a degree of richness the principle of design of machines. In general, in the instance of design of machines as such, we study the physical movements of the human or animal body to isolate those movements which bear directly on the accomplishment of useful work. First, we transfer those movements into the form of a machine cycle. Second, we have the option, in design of machines of either increasing or reducing the concentration of power supplied by human or animal musculature, or

from some other power source.

Today, it is customary to measure the impulse supplied to a machine by an external source as *energy-flux density*, the rate at which energy is transmitted in a straight line through a unit of cross-sectional action of the process studied, such as kilowatts per square meter. This is a useful first approximation, but is neither sufficiently rigorous nor accurate. It is necessary to restate the measurement of energy-flux density in terms of rotation: in first approximation, as simple circular action, and, in second approximation, as self-similar spiral action.

In the first approximation, measurement of energy-flux density in terms of reference of simple circular action, this becomes a physical version of the isoperimetric principle. The relationship between the circumference of one cycle of rotation and the area defined by that circumference, is elementary. If this area is normalized mathematically, such that a standard unit of area in each calculation corresponds to a fixed amount of apparent work accomplished, for two equal circular areas, the one with the higher frequency of rotation accomplishes the greater amount of apparent work. In other words, for the case in which the radius of rotation is mathematically constant, the result of circular action over time is a self-similar spiral on the outer surface of a length of cylinder, such that the apparent work accomplished is a function of the number of cycles of rotation of that spiral within an equal lapsed time. (See *Figure 5*.)

The projection of such a cylindrical self-similar spiral on a plane surface, such as the screen of an oscilloscope, is a sine wave form. The relative height of the



highest point of the wave in each cycle is derived from the relative radius of the rotation of the spiral; the relationship between this height and the wave's frequency is crucial. This serves as the normalized mathematical form for stating what we recognize as energy. The transmission of an energizing impulse to any process is thus stated in normalized form as projected radiation of coherent monochromatic radiation of a cylindrical form of self-similar spiral action. We then measure all other energetic action against this standard normal form of transmission.

In this light, consider one of the simplest cases of application of energy in machine processes, the simple drill. This illustration has the pedagogical merit, that it is action of the cutting edge along the circumference of rotation which is normally of interest to us. Normally, the drill bit has an approximately conical point, such that we sacrifice scale of total work accomplished, as measured by the cross-sectional areas, for greater concentration of energy of circular action. Comparing the widest radius of the drill's cutting surface, with the smaller radius of rotation of some cross-sectional area of the cutting surface near the point of the cone of the drill point, we note the following. The total amount of apparent work done is more or less constant along the entire length of the cutting surface of the drill; however, this action is concentrated near the point of the cone, applied to a smaller cross-sectional area of the material drilled. Frequency remains constant, the input impulse supplied remains constant, but the density of the action is greater, such that the cross-sectional area near the tip of the cone has much greater energy-flux density than along the main stock of the drill's cutting surface.

The same principle of machine design applies to the comparison of a blunt and sharp knife, the principle of the lever's rotational action, the principle of rotational transformation in systems of pulley and gears, and so forth.

We situate this now in the setting of Leibniz's study of heat-powered machines.

The first feature of heat-powered machines is a carryover of the principle of designing machines to transfer much of the physical effort from human musculature to supplementary impulses supplied either by animal musculature, or windmill power, or water power. This, in turn, is derived from the principles of design of simple hand tools and simple machines designed to be powered by human musculature. Those work-accomplishing motions of hand tools and hand machines are incorporated in a tool or machine supplied a non-human source of impulse, but under the willful control of the human operative. By extending this elementary principle of machine design to the heat-powered machine, we place implicitly unlimited resources at the disposal of the will of the individual operative, such that, in Leibniz's description of this principle, "one man can do the work of a hundred" others lacking the advantage of such heat-

powered machines.

It would first appear, therefore, that the increase of man's power to accomplish work depends ultimately upon increasing the total amount and energy-flux density of the motive power which society supplies to the activity of the individual operative. For obvious reasons, this is broadly true. A simple comparison of both agricultural and industrial productivities with the average number of kilowatt hours of "artificial energy" supplied to society per capita for nations with varying levels of physical output per capita, illustrates that point more or less adequately.

However, within this picture there is a subsumed anomaly. Let us consider the case in which two machines consume the same amount of coal burned per hour, in which the machines are employed for the same kind of physical output by the same operative, but yet to the effect that the operative's hourly rate of physical output is greater in one instance than the other. This difference supplies the first approximation for a rigorous definition of the term *technology*. *Technology* signifies the principled features of organization of a machine, or analogous process, which cause one machine to be more thermodynamically efficient in terms of useful physical output accomplished than another. Leibniz's term for this, *technology*, was thereafter established in German language and English language usage. In France, this conception of Leibniz's was incorporated under the name of *polytechnique*.

After Leibniz, *technology* or *polytechnique* became the name for scientific practice as a whole, a usage best exemplified by the practice of the Ecole Polytechnique of France under the direction of Lazare Carnot and his former teacher and collaborator, Gaspard Monge.

The principled feature of design, or of analogous processes, which accounts for the anomaly noted is a principle of *organization*, a purely geometric principle, or, better, a principle of *physical geometry*.

In the case of heat-powered machines, for example, the analysis of the organization of the machine process begins by reducing that process to the terms of reference of rotation, the machine cycle. In first approximation, this features the ordered sequence of changes of direction of application of the action impulse supplied to the machine. In second approximation, we examine the changes in energy-flux density occurring within that cycle. All this is normalized in the general manner indicated above: normalized to the definition of energy associated with self-similar cylindrical spiral action.

The case of the high-powered laser illustrates most efficiently, most directly, the relationship between required increase of energy-flux density and absolute quantity of energy supplied to society's work per capita, and the subsumed requirement of improved technology to realize the potential advances of increased energy supplies. The accompanying figure (see *Figure 6*), prepared at the direction of Dr. Jonathan Tennenbaum,

**Microscopic to
macroscopic length scales
(in centimeters)**

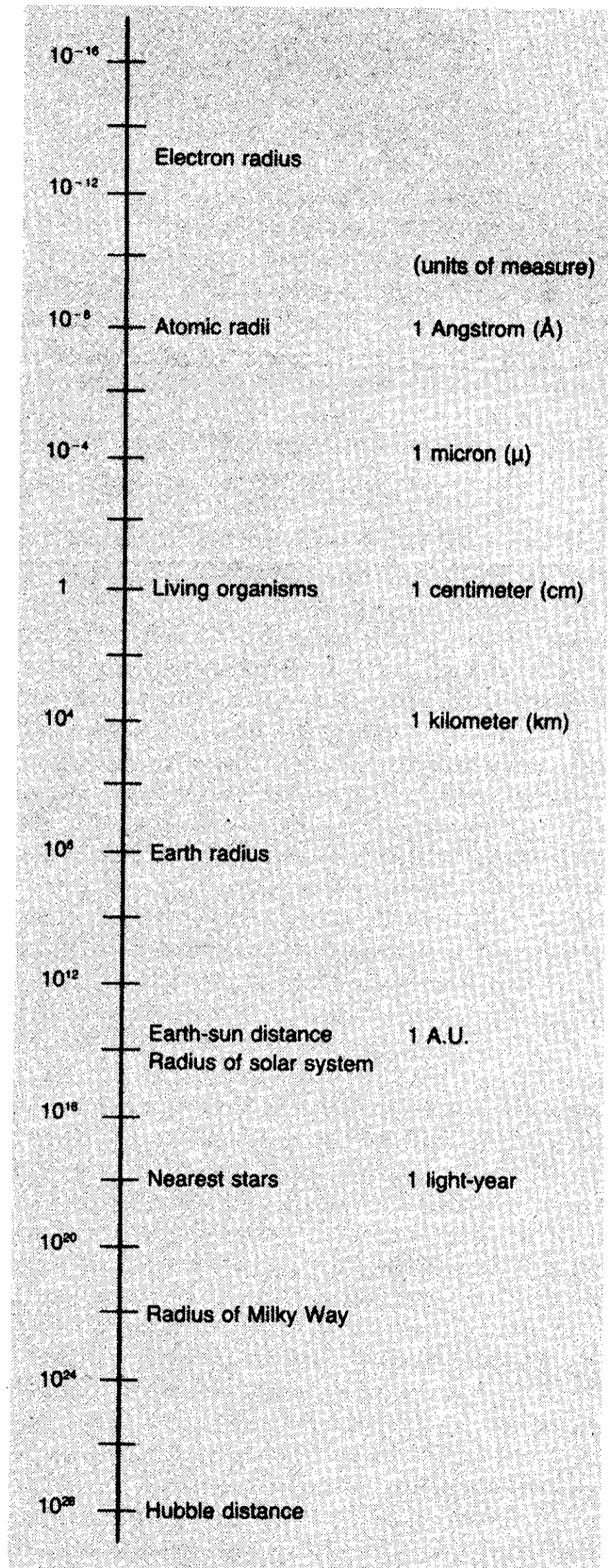
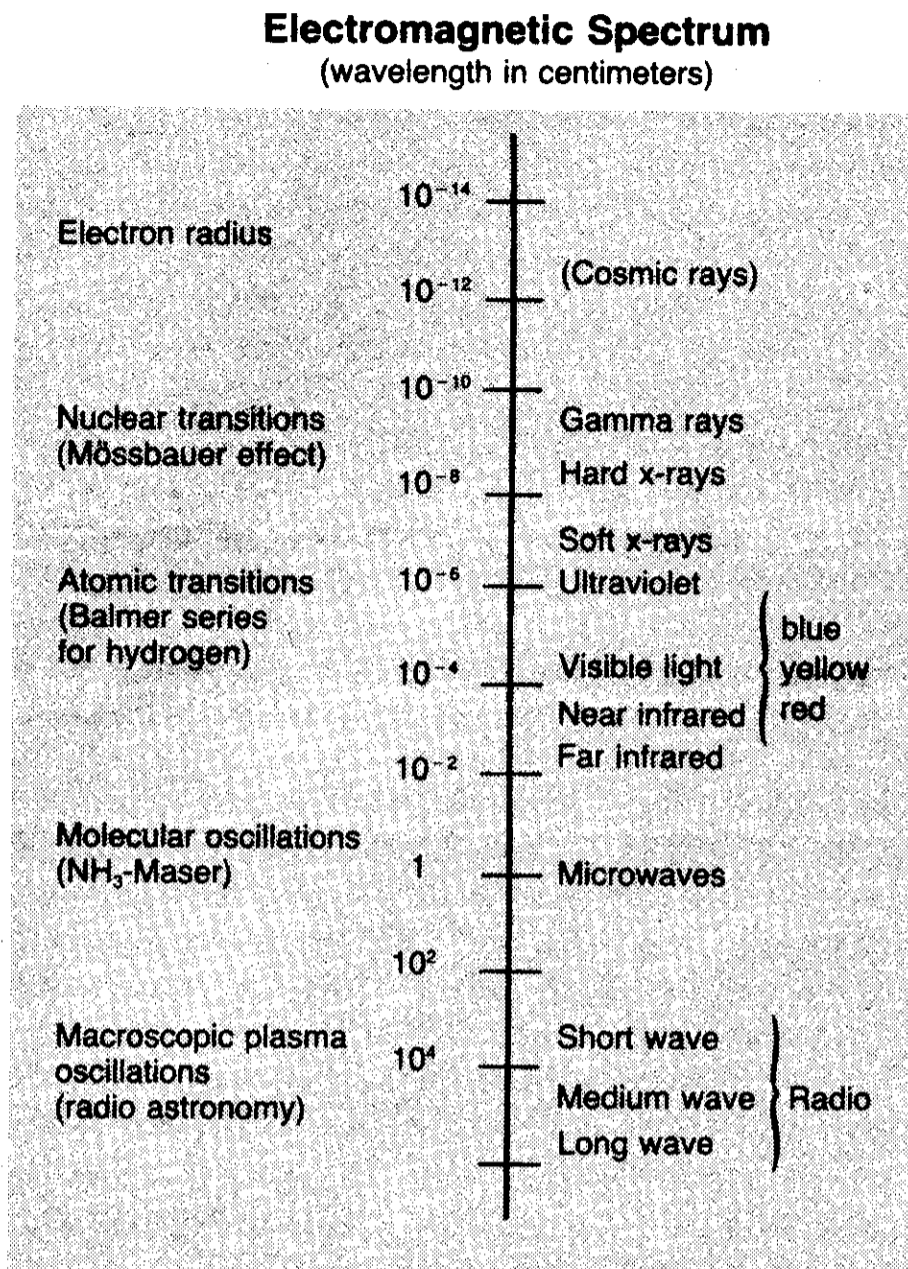


Figure 6.

**Organization of the Known Universe by
Order of Magnitude**

Technology signifies the principled features of organization of a machine, or analogous process, which cause one machine to be more thermodynamically efficient in terms of useful physical output accomplished than another. The relationship between required increase of energy-flux density and absolute quantity of energy to society's work per capita, and the subsumed requirement of improved technology to realize the potential advances of increased energy supplies, is based upon a principle of *organization*, or *physical geometry*. In the case of the high-powered laser, as the wavelength of the laser is shortened (and frequency increased), the work of the laser is concentrated on relatively smaller target areas. The chart compares the wavelengths of the electromagnetic spectrum with orders of magnitude among known qualities of substance in our universe.

shows the comparison of wave lengths of electromagnetic radiation with orders of magnitude of distinctions among known qualities of substance in our universe. As the wave length of lasers is shortened (the frequency increased), the work of the laser is concentrated, by means of a principle called self-focusing, on relatively smaller target areas of the substance against which it is directed. The analogy to the conical tool bit of the simple drill is useful. Imagine the effect of transforming less than 10,000 kilowatts per square meter, for example into energy concentrated by self-focussing down to 10^{-8} square centimeters of target area. This implies a limit of $10^3 \times 10^6$ kilowatts per square meter concentration, a billion kilowatts, about 360 millions degrees centigrade, more than twenty times the inner temperature of the sun. At higher frequencies (wave lengths approximately the radius of an electron, for example) the effective temperature realized with 10,000 kilowatts per square meter as input reaches the range of eighty billions degrees centigrade, about thirty times the temperature of a supernova.

To transmit 10,000 kilowatts or even somewhat less to a laser is, today, a feasible task, but no minor technological challenge. Moreover, this in itself represents a significant level of development of the per capita energy throughput of the economy which accomplishes such specific work. The gross energy throughput per capita is a limiting condition for the continued general advancement of society. At the same time, however, this necessary increase in energy throughput per square kilometer and per capita requires an accompanying advancement in technology, otherwise the benefit of the increase cannot be realized efficiently.

Yet, *energy* is not a sufficient vantage point from which to examine technology. Contrary to the implied standpoint of textbooks, *energy* and *work* are not equatable magnitudes. The amount of energy consumed or supplied is not a measure of the work accomplished. Whereas *energy* is normally represented in terms of cylindrical self-similar spiral action, *work* is measured in terms of conic self-similar spiral action.

The most direct and fundamental proof for this distinction is provided by studying the net result of the action of an entire society in terms of *increase of the potential relative population density*. Since the continued existence of a society depends upon such increase of potential, only such increase of potential represents the quality of activity consistent with equilibrium. Only such increase of potential represents net work by society as a whole.

Since increase of this potential is mediated through technological progress, we must state such increase of potential in terms which are congruent with technological progress: conic self-similar spiral action. At first glance, this presents us with a series of circular cross-sections of the cone on which such a self-similar spiral

is located. For convenience, we locate each such circular cross-section at the beginning and end of each cycle of rotation of the spiral around the cone. Each circle's area represents an increase of potential: potential relative population density. This is exemplary of all elementary negentropic functions.

By contrast, the energy radiation represented by a self-similar cylindrical spiral defines, at the conclusion of each cycle, a circular cross-section equal to its predecessor. No *work* occurs. The paradigm for conversion of energy into work is given by Bernhard Riemann's 1859 "On The Propagation of Plane Air Waves of Finite Magnitude," the famous projection of acoustical shock waves' generation. In that case, as the propagator of sound waves, such as a piston within a cylinder of indefinite length, accelerates toward the speed of retarded potential of propagation of such waves—the average velocity of the air molecules, in this case—the relationships between the propagation of sound waves and their propagator become relativistic. As the propagator passes through the sound barrier, a singularity is generated, the shock front. Erwin Schrödinger started from this point of reference for his work on the "wavicle" characteristics of the electron. The same principle is central to the phenomena of isentropic compression. (See *Figure 7*.) The transformation typified by this model is exemplary of the conversion of energy into work.

The characteristic of the kind of work which supplies increase of potential of society is the elevation of the process to a higher state of physical organization, a shift in phase state associated with addition of a singular condition to the previous state. It is feasible and correct to represent such phase shifts from relatively lower to relatively higher conditions of organization of a physical process as correlated with increases in energy-flux density. So, increase of technology, increase of energy-flux density, increase of potential relative population density, and work (properly defined), are coherent phenomena.

We merely indicate here the development in mathematics which bears most directly on this matter. We have already referenced this, Gauss's development of a general theory of elliptic functions from the vantage point of the arithmetic-geometric mean. The volume between the beginning and end of one rotation of a self-similar spiral around its cone is characterized by a plane cut, diagonally, through this volume, forming an ellipse. By cutting the volume between the foci of the ellipse with another ellipse, and repeating this for the foci of the new ellipse, we define an iterative function. Wherever this iteration ceases, we have remaining a small volume of the cone, and a distance along the cone's axis corresponding to the height of that volume. This distance is coherent with the "delta" of Leibniz's differential calculus, and with the quantum of action, a smallest division below which subdivision is meaningless.

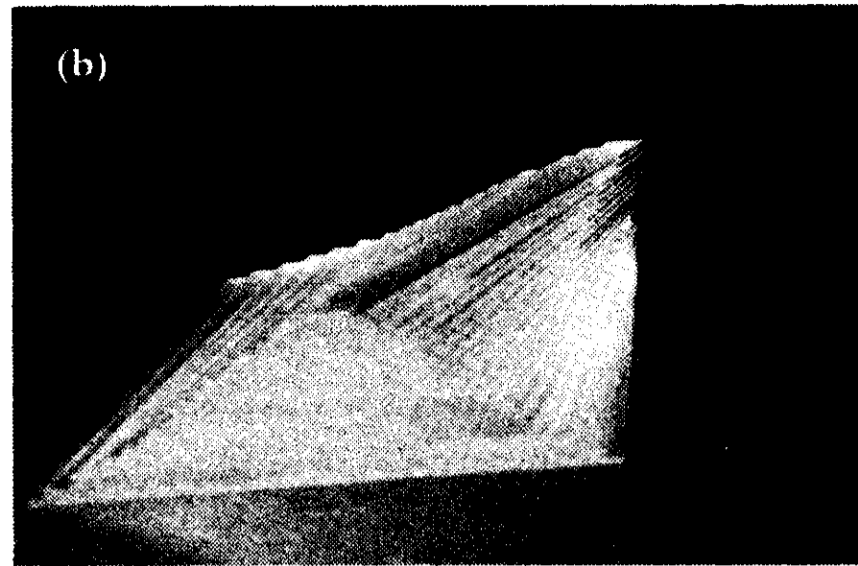
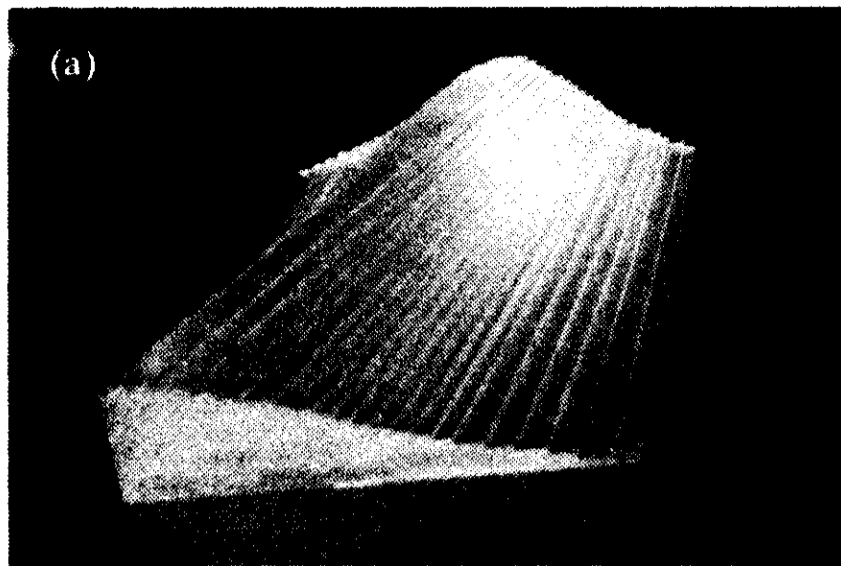
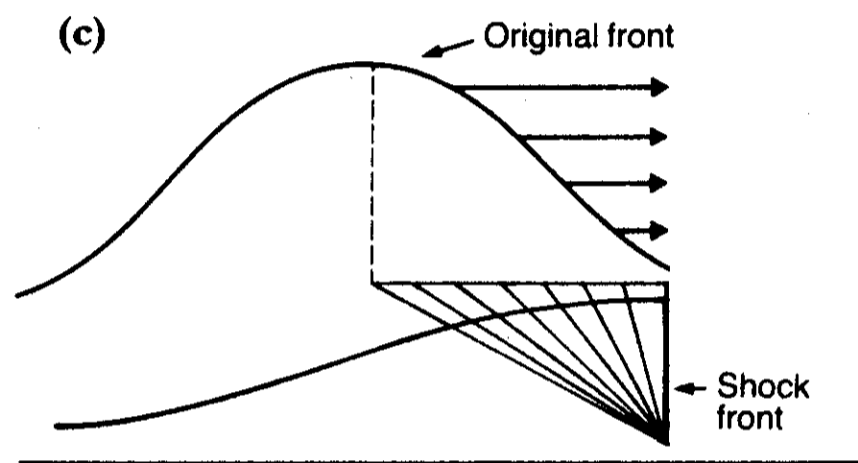


Figure 7.

Conversion of Energy into Work

The paradigm for conversion of energy into work is given by Bernhard Riemann's projection of the generation of acoustical shock waves. As the propagation of sound waves accelerates toward the average velocity of the air molecules, the relationships between the propagation of sound waves and their propagator become relativistic. As the propagator passes through the sound barrier, a singularity is generated, the shock front. Figures (a) and (b) show a model of an acoustical wave front as a shock wave is generated, as is diagrammed schematically in (c).



The significance of this is, that the universe acts by acting upon itself. What we mean by this statement is illustrated by our review of the implications of the isoperimetric principle earlier. Circular action in a formless measureless void is an adequate principle of action by aid of which, solely, we can generate all of the forms possible to construct within visible (Euclidean) space. Similarly, in real, non-Euclidean space, the self-similar conic spiral is the continuous principle of action through which are generated all of the forms and principles of measure of the real universe. This continuously acting principle, acting on what has been produced previously as a universe by its own continuing action, tends to modify that universe negentropically by its continued action.

Following the preliminary outline which Riemann gave in his 1854 "On The Hypotheses Which Underlie Geometry," let us assign an indefinite number N to the previously established state of the universe or local phase space upon which this continuing action is applied. The continuing action is now applied to a universe of a complexity indicated by N , such that the action is divided according to that degree of complexity. It is implicit that the elliptic iteration of the conical volume halts once

that degree of division of the action is defined. This is the significance of "quantum of action" from the Riemann-Gauss vantage point indicated. The normal result is a new state of the universe associated with the designator $N+1$, a new state reflected by a change in the metrical characteristics of space, such as a shift in the value of the quantum of action.

In social processes, increases in the average productive powers of labor prompted by realization of discovered advances in technology has the implication of such a change in the metrical characteristics of "economic phase space."

This is not, of course, "physics" in the ordinary textbook sense of physics. These are elementary considerations congruent with the notion of an hypothesis of the higher hypothesis, principles of reason, of discovery, which the investigator applies to forming higher hypotheses of the sort which reference the domain of existing simple hypothesis forms of physics, to the purpose of revising the underlying assumptions of simple hypothesis physics.

This significance is underlined by summary of the point just made above. We have argued that the real universe, non-Euclidean physical space, is characterized

by a single principle of negentropic action, a principle irreducibly symbolized by self-similar conic spiral action. The only elementary limitation imposed upon that primitive action is also a primitive, a second primitive derived from the first, that continuous action is limited by that which it has previously elaborated. This is the deeper significance of the fundamental discoveries successively elaborated by Gauss, Lejeune Dirichlet, and Riemann to this effect. This is a concentrated reflection of the notion of an hypothesis of the higher hypothesis.

The practical implications of this for economic science, in particular, are made clearer by examining summarily the view of economic processes imposed upon us by the standpoint of elementary thermodynamics.

In elementary thermodynamics, we divide the total energy throughput of a process into two principal components. The first of these two components is the portion of the energy throughput which the process itself must consume to avoid "running down," in the sense of "running down" associated with the mainspring of a mechanical clock, for example. This includes incurred heat losses, such as those associated with friction. This first component is termed *energy of the system*. If the total throughput of the process exceeds the required energy of the system, the remainder is usually termed the process's *free energy*.

The ratio of free energy to energy of the system is the characteristic ratio of any thermodynamic process. However, this mere ratio by itself is not an adequate measurement.

In the study of thermodynamic processes, we are preoccupied with the changes occurring in the ratio of free energy to energy of the system over successive cycles of that process. This is best described by considering the case of a *closed thermodynamic process*. In this illustrative case, the generation of the energy throughput is part of the process considered, and all of the energy throughput is treated as consumed by the process. In such a case, the significance of the free energy of the process is its "reinvestment" in the process in which it is generated. To generalize the mode of analysis, we include the case of "negative free energy," the case in which the total energy throughput is less than the required energy of the system. Taking this most generalized case, we examine the effect of the application of free energy, or "negative free energy," to the process. We measure these changes as changes in the ratio of free energy to energy of the system over successive cycles of the process.

This analysis of closed thermodynamic processes divides such processes into two general functional classes, called respectively *entropic* and *negentropic*. An entropic process is one which is "running down." It is one in which the ratio of free energy to energy of the system is intrinsically either constantly negative, or is becoming characteristically negative as the process unfolds. A

negentropic process is one in which the ratio is either constantly positive or is becoming characteristically positive as the process unfolds.

The characteristic act of "reinvestment" of free energy in a closed thermodynamic process is an increase of the energy-flux density of the process's energy of the system, as this might be measured in terms of energy of the system required per unit volume, for example. A rise in temperature might be another expression of the same action. This poses the general question, whether such increase of energy of the system causes a decline in the ratio of free energy to energy of the system? If so, the process must be, or tend to be entropic.

If the so-called First and Second Laws of Thermodynamics were anything better than purely arbitrary, intuited postulates superimposed upon thermodynamics, we should all be in deep trouble. The universe would be fatally doomed to be nothing but entropic, and the more rapidly we progress, the sooner we are all doomed to death of the universe by entropy. If such assumptions had any basis in experimental fact—which, as universal assumptions, they do not—then the addition of free energy to a closed thermodynamic process would mean a diminution of the supply of free energy as the energy of the system increased. Fortunately, Kepler conclusively refuted the First and Second Laws of Thermodynamics at the beginning of the seventeenth century, and that refutation stands today.

In the case of society, economies considered as closed thermodynamic systems locate the analogue for energy of the system as the sum of those costs of consumption and production which must be paid merely to prevent the economy from "running down," from devolving to a lower level of average productive powers of labor for the population as a whole, a lower potential relative population density. The cognate for free energy is what we may fairly describe as "the net operating profit" of the economy, treating the economy as a whole as if it were a single, consolidated agro-industrial enterprise, an autarkical "company town." The question, therefore, is whether the continuous investment of net operating profit in expanding the scale of production, while increasing the productive powers of average labor per capita, is entropic or negentropic?

If there is no advance in technology, the result is entropic.

Take the hypothetical case, in which an economy formerly characterized by technological progress abruptly and permanently halts such progress. At first, this will not cause a collapse. Since continued investment of net operating profit in production (assuming that the profit is so invested) will replace older, more primitive capital stocks of production with relatively more modern stocks, investment will raise the average level of technology of capital stocks as a whole, and thus raise the average productivity of labor as a whole. After

a time, as the more primitive stocks are significantly replaced by the relatively more modern, further investments will have increasingly less significant benefit in terms of rises of the productive powers of labor. Yet, the costs of productive capital which must be met to prevent the economy from "running down" will rise as per capita costs of production as a whole. Additionally, the effects of marginal depletion of natural resources will be felt increasingly. So, the economy will plunge into negative growth rates, entropy. Looking backward from the manifest catastrophe, it is clear that the process was entropic all along. Such are the elementary, underlying characteristics of the so-called business cycle.

In historic fact, throughout the history of the industrialization of Britain, and in most industrialized nations since the 1870s, sustained technological progress has prevailed only during exceptional periods, chiefly during wars or large-scale preparations for anticipated wars. In the main, these economies have been built up during such exceptional periods, and have more or less run down the accumulated benefits of such build-ups during other periods. It is not industrial capitalism which produces the business cycle, but rather the influence of anti-technological bias as the policy of practice of industrial economies. Remove that bias, make technological progress the imperative of practice during all periods, and the business cycle would vanish.

In this illustration, we have left out of account the matter of conflict between flows of investment into productive and non-productive ventures. This conflict is at the center of the causes for the kind of policies of practice which prompt the business cycle. However, that omission here is irrelevant to the point being illustrated.

Under conditions of technological progress as a policy of practice, \$900,000 worth of the new machine tool may replace \$1 million worth of the previous investment replaced. That is, the increase of the productive power of labor effected by the new machine tool may be much greater, per dollar of investment, than per dollar of investment for a previous generation of machine tool employed for similar production. That, in principle, illustrates the manner in which technological progress defeats the "Second Law of Thermodynamics" in economy.

Therefore, we define the work accomplished by an economy as a whole in two related ways. First, for the society as a whole, work is defined as a net increase in the potential relative population density of society. This is the result of the technological progress effected by the economy as a whole. This general result is the combined result of numerous activities, some of which do directly involve local instances of technological progress, whereas others may continue the technology prevailing during a previous period. Yet, as bread made in an old way nourishes the scientist who makes a fundamental discovery, to the degree any production is necessary to

the net result, all production of this qualification participates in making possible the technological advances introduced. With that latter qualification included, we need not be confused by the statement that the only net work accomplished within an economy is the technological progress effected by the society as a whole.

As we have noted, technological progress, increase of potential relative population density, and negentropy are functionally interdependent and congruent actions, all rooted in the notion of self-similar conic forms of spiral action. This notion, as approximately stated by Leibniz, is named *the principle of least action*.

This principle of least action is most conveniently introduced by reference to the significance of circular action in visible space. Given the area defined by any closed action, the action will have the same value as circular action sufficient to define an equal area. *In other words, the principle of least action is the physics-correlative of the isoperimetric theorem of synthetic geometry.* This must be generalized by aid of Gauss's treatment of the arithmetic-geometric mean, as interpreted by aid of the topological principle developed by Dirichlet, and as developed further by chiefly Riemann. The notion of a principle of least action associated with self-similar conic spiral action as the irreducible primitive of a continuous manifold expresses, as a reflection of the historic process traced from Plato, by which it was developed, the principle of the hypothesis of the higher hypothesis.

In that sense, this principle, so viewed, is the fundamental principle of a science of the human mind.

Verbs Versus Nouns In Human Thought

The first known philologist of record was the great Sanskrit scholar Panini. Examining the richest language, as to form, known to man, classical Sanskrit, Panini adduced the principle that all words must be comprehended as derived from verbs, and that only forms of thought conceptions congruent with the notion of the verb as primitive, were valid conceptions. After Panini, during the period of hegemony of Ptolemaic Egyptian culture, an opposing school of grammar appeared, which based language upon the noun as primary. This latter became the basis for Latin grammar, in modern Europe—excepting chiefly the great German nineteenth-century school of classical Indo-European philology referenced to both the classical Greek and Sanskrit.

It is indispensable to address this issue here. The method we have identified and practiced in the preceding pages must seem, to the typical educated individual of the United States, for example, today, to be eerily alien to what that individual is accustomed to accept as logical, scientific methods of thinking about subject

matters. Even if that individual is persuaded, by reflection upon the evidence we have cited and otherwise indicated, that our approach here is valid, that feeling of eeriness about the whole business persists nonetheless. Not only is it necessary to seek to demystify the matter, to remove that nagging sense of eeriness; the method we have outlined could not be securely understood, mastered, until the problem associated with that sense of eeriness is made conscious for the reader, and the solution to the difficulty identified in that way. On that account, the reference we have just made to verb-like versus noun-like conceptions is indispensable.

We have laid emphasis several times upon the image of a single principle of action sufficient to create a universe out of a formless, measureless void. The words appropriate to give name to such a principle are verbs of the form: "to create," "to cause to exist," or, for abbreviation's sake, "to cause."

We have shown, also, that this form of action must be called *negentropic*, as we have defined negentropy geometrically here. The term *negentropy* and the verb *to create* are one and the same term. In our treatment of the distinction between *energy* and *work*, we showed that the only meaningful use of the term *work* for mankind is a net increase of the potential relative population density of society, an increase of potential which is congruent with negentropy. We indicated that any other policy of practice but that notion of work must tend to cause the advocate of such policy to bring his society to extinction; alternative meanings for *work* are thus in principle ideas appropriate to a society of dead things. Such contrary ideas are, in the last analysis, worse than of no use to mankind, such that a science based on such ideas would be of no ultimate use to mankind as a species, or to individual men and women as patriots of their species.

As we have indicated, negentropy is not a property of things, but rather of transformations of the processes which subsume discrete objects. As a matter of imagery, we must say that the principles of the universe, efficient action in our universe, is located in between things, not as relationships among things. This ought to be obvious, and yet reflection upon this evidence bumps against deeply ingrained persuasion, that it is things, not in-betweenness, which represent "substance."

Restating the same point, what we have identified as the location of efficient action, in the in-betweenness, in terms of processes, corresponds in use of language to verbs, whereas a notion of causation based upon things treats nouns as ontologically primitive referents.

This shows up in the characteristic features of conventional algebra. On both sides of the "equal" or "inequality" sign, there are aggregations of nouns. In no part of such an algebraic expression is that a provision for inserting causality. It should not require much re-

flexion to recognize these features of algebraic formulations as mirror images of the Aristotelian syllogism. In the syllogism, only nouns are permitted to be substantives, each category and particular sort of self-evidently discrete thing associated with properties which are defined in a noun-like way. In the syllogism causality is nowhere permitted, except as "cause" is used in a noun-like way. One may say that something caused something, but one may not introduce an active principle of causation into the construction.

Formal algebra, like syllogistic systems, is based on the function of the middle term. This middle term has the associated significance of stating such things as "equal to," "identical with," "not part of," "part of," "greater than," "lesser than," and so forth. The objective of formal mathematics of this sort is to assemble all knowledge, or at least a great part of it, into one gigantic, continuous syllogism, such that one might trace one's way from the subject of a single syllogism, by way of middle terms, through every syllogism in that entire part of human knowledge. In other words, a syllogistic lattice-work.

All knowledge, or purported knowledge, of this syllogistic form, is either anarchistic nominalism, such as the irrationalism of William of Ockham, or is formal nominalism, like that of the neo-Aristotelian scholastics. The one is Dionysian, the other Apollonian; both are pure nominalism, *noun-ism*.

The practical issue is posed by stating that the nominalist approach chooses nouns as the data of experimental inquiry, whereas the negentropic approach chooses data of the form of verbs.

In the latter method, the verb "to be" adopts the self-reflexive transitive form of itself: "to cause itself to become." This is another way of stating the verb "to create," or to "cause to exist." Wherever the verb "to cause" is employed, the meaning of that verb is referenced "hereditarily" to the verb "to create," "to cause to exist," and to the ultimate verb, "to cause itself to become." All verbs, at least as they are employed to define data of scientific thought, must be defined by the hereditary principle of connection to "to cause itself to become."

Insofar as this pertains to the work of classical philologists, we leave the rest of that aspect of the discussion to them, to report how these principles may be located within Sanskrit writings, or at least some among them, and the form of classical Greek used by Plato. Having identified this aspect of the point, we proceed onward.

In what we have just outlined lies the kernel of the cause for the sense of eeriness which might be associated with our preceding development of the notion of hypothesis of the higher hypothesis. The mind habituated to leaning upon noun-like ideas of experience as substantial, experiences a frightening sinking feeling, like falling between the cracks of a cabin floor into a deep

chasm. One awakens, to find oneself in bed, but the echoes of the nightmare persist. The fear associated with that sort of feeling is the emotional force which deters the mind from venturing out into the domain of method we have indicated.

One will not actually fall, but, as Edgar Allan Poe observed in this connection, "soar." It is the fear of falling which prevents people from flying. The citizen looks up at the plane, and imagines it to be immoral to trust oneself to a vehicle which has obviously nothing visible to hold it up.

So, the fearful mind clings to the safe ground of simple hypothesis, like the man in this day and age who proudly insists, with projected self-righteousness, "I never fly." What holds the plane up? "Whatever it may be, I'm not interested; I don't wish to know about it." The comparison is not unfair; the comparison is based on what the writer has observed over a span perhaps as long or longer than fifty-five years, and the corroborating evidence of written reports.

The same point is better comprehended by introducing another standpoint of reference.

Plato's *Timaeus* associates the substance subject of the hypothesis of the higher hypothesis with the Logos, and defines the Logos as consubstantial with God. This view concurs with the implications of Kepler's discoveries; the universe's underlying laws are such that its characteristic features coincide with those of living processes. Is the universe therefore in some sense a living being, and the principles of lawful, creative extension of its self-development (the Logos) so to speak the expressed Will of that living being? It is not necessary to do more than to pose such a question to answer, at least implicitly, as much as we should attempt to answer.

Thus, by assimilating the Logos into our willful practice, to make that increasingly, more efficiently the governing principle of our personal will, our behavior is brought into agreement with the prescripts of the Logos, and we become efficiently an extension of the power of the Logos, acting upon the universe to further its self-development as the Logos impels us to do. It is this quality of ourselves, which sets us above the beasts on this account, which we regard as the divine spark within us, that spark which casts man in the *image of the living God*, as Cusa defines this. Man thus participates in God.

It is running ahead of this chapter of our treatise, but necessary to do briefly at this point, that submission to knowledge is not sufficient. Knowledge of the highest form might be, in some sense of that knowledge, used for good or evil. We can not divorce the matter of knowledge in the abstract from the matter of motives, goals, governing the employment of such knowledge. There must be a motive of *love* for the consubstantiality of Creator and Logos, and something very special subsumed by this.

It is the specific genius of Apostolic Christianity, underlined by the Gospel of St. John, as by St. Augustine's insertion of "filioque" into the Latin Nicene Creed, that God's expressed love of mankind, through the person of Jesus Christ, obliges the individual's love of the Creator to be directed in practice as God's love toward all mankind is directed. Without that principle of love associated with the insertion of the "filioque," there is no Christianity, but only some grim counterfeit.

The point which is directly of relevance here is that the idea of the hypothesis of the higher hypothesis is associated not only with an intellectual eeriness, relative to the habit of simple hypothesis and noun-ism. There is associated with that conception, that activity, the most powerful kind of emotion of which man is capable, the most profound quality experienced under the label of "Christian love."

The evidence is at least significantly accessible, that some approximation of this special quality of love is strongly experienced among persons who have yet no comprehension of the hypothesis of the higher hypothesis as a distinct form of human knowledge. Nor is it too difficult for one familiar with such matters to distinguish between such expression of love and common counterfeits, the latter typically an apotheosis of hedonistic qualities of "love" poorly disguised. The real emotion, as distinct from the counterfeit, is associated with very distinct social values, with a very concrete sort of practical moral commitment to the well-being of all humanity in the concrete. Hatred of injustice or oppressions, wherever it occurs, hatred of the self-degradation of other persons even more than externally imposed injustice. A hatred of evil, but a wish for redemption of the evil-doer. Rejection of emotions of vengefulness. Not a lack of desire for fulfillment of personal needs, but a hostility to desiring objects for the sake of blind impulses of desire. A preference for the pleasure of the mind over sensual gratifications whose memory is interred with one's dead body.

This recognizable higher emotion of love is feared as much as it is admired. It is feared because it denies one the pleasures of the flesh for their own sake. It is feared as the merciless oppressor of heteronomic, anarchic impulses of desire. It is feared as a "repressing" force of conscience, as that which places universality above particularity. *It is an eerie emotion.*

This emotion may be experienced by an individual who has no formal comprehension of the hypothesis of the higher hypothesis, but the quality of the emotion is not independent of such comprehension. Anyone who has been engaged in genuinely creative work, the work of higher hypothesis, cannot have overlooked the fact that a special emotional quality is associated with such work, an emotion which he or she would probably agree is of a "religious" quality. This is a point of no casual relevance. A summary description of the course

of creative work's progress corrects misapprehension on this point.

The development of the creative personality, as creative work is defined minimally by higher hypothesis, is dominated in most of its span by a lack of those kinds of social rewards demanded by the "other-directed" personality. From the standpoint of such an "other-directed" personality, the foundations of all important creative work are developed through years of labor without psychological "payment." The psychological "payment" through such preparatory years is of an inner origin; it is the motion experienced in the experience of small intellectual breakthroughs, usually discoveries of little significance to anyone else, since most of the discoveries were replicated many times over by many of the people working through the same material. One does not rush about the streets claiming the Nobel Prize each time one masters something such as the Pythagorean theorem. One must simply enjoy the progress, encouraged by inner satisfaction, and press on, since that same satisfaction will not be experienced until a new discovery is experienced.

The "other-directed" person in school wishes to have the right answer on the examination paper, and a good grade. How this was accomplished is important only as a means to that accomplishment, as a learned trick employable for replicating that sort of "other-directed" psychological "payment." The person becoming a potentially creative individual prefers the means to the immediate social gratification. The distinction between the two types of student personalities is rooted in different qualities of emotional life, at least as emotional life bears upon forming one's powers of judgment.

A successful discovery, even if trivial by social standards, even if shared only with oneself, provokes a surge of emotion, symbolically an experience like a sudden illumination of the space about one's head. If the matter is subjected to persisting reflection, one recognizes a kinship between this and a quality of emotion sometimes associated with a "religious experience."

It is the desire to experience that emotion, to experience it more strongly, which best describes the driving force impelling the future creative thinker to perhaps years of psychologically unpaid and otherwise immediately unrewarded labor. It is that emotion—that motivation—which impels the person to sustain massive labor in a single general direction over a span of years.

As one type seeks a recreational night out with the boys, or a frequent "dating experience," for sexual pleasures—innocent or otherwise—for sake of experiencing certain kind of emotional inflation, so the creative personality is driven to a certain kind of work as his preferred "recreation."

Admittedly, this intellectual activity can become distorted in direction and goal of development. It can become escapism, a sterile intellectuality for its own

sake, a world apart from the real world, a kind of fantasy life. In such cases, there is effused a certain distinguishing lack of excitement, a lack of that sort of excitement characteristic of creative personalities, the sterility of the specialist in mathematical logic, for example, the strangeness of the scholar neatly collecting, documenting, classifying, and correlating his own excrements, an emotionally constipated personality.

The genuine creative personality is very much outwardly oriented, toward very real, and usually very largely applicable real world goals. He or she is working on producing something useful for humanity, even though he may have poor foresight into exactly what that gift might prove to be. He is a sly fellow, like the clever fellow preparing a pleasant surprise gift for a friend's birthday party, and gloating in anticipation of the friend's pleasure.

Then, if the developing creative personality is fortunate, there comes the first experience of a genuine breakthrough. The greater emotional experience is the breakthrough itself; the lesser is the verification of its soundness and originality. Once such an emotional way of life has demonstrated its advantage in producing socially beneficial results not probably achievable by any other means, a transformation occurs, a transformation like a sudden leap into maturity; the "ugly duckling" has matured, and finds his awkward species nature suddenly the nature of a nobler state of development of humanity. One or two such experiences suffice to afford self-assurance to the direction of self-development of personal character which has led into and through the point of such accomplishments.

Without such personal development, even the achieving professional scientist remains predominantly a spectator with respect to the inner experience of higher hypothesis. His education and other professional training become for him crutches upon which he depends, but crutches he could not construct for himself. He tends to be relegated to the work of simple hypothesis.

The same comparison is demonstrated by reflecting upon the emotional states associated respectively with mathematical logic and synthetic geometry. If creative experience is life, then the emotion of mathematical logic is death. Although synthetic geometry demands a harsher rigor than mathematical logic, the confines of the former are experienced as soaring freedom relative to the license to arbitrary interpretations permitted by empiricism. This emotional judgment is valid: creativity is freedom, and without the strictest rigor, required for valid creativity, there can be no true freedom.

All creative work is at least of the form of the higher hypothesis, and this experience at least begs a pursuit of the hypothesis of the higher hypothesis. There is thus a *cathexis* (Freud's term) of one socially definable quality of emotion to the data of higher hypothesis, and a *cathexis* of a different kind of emotion to the data peculiar

to simple hypothesis of irrationalism. Each prefers his own choice of data between these two general classes. As to why he or she makes that choice, he or she can provide a rational justification for the preference; yet, if one reflects more deeply, the choice is habitual, an acquired instinct most immediately recognized as emotion.

For these and related reasons, it would be false to suppose that one might transform a person habituated to simple hypothesis into a person comfortable with higher hypothesis merely by some amount of formal classroom and related learning. The distinctions admit of formalistic description, but a man may describe a fish without becoming one. The essential distinction lies in a development of the whole personality, not merely convincing arguments. These involve two mutually ex-

clusive philosophical world outlooks toward nearly all aspects of life, a distinction which is on each side charged with powerful, cathexized emotion.

Hence, the eeriness. The comparison with the matter of spiritual experience is perhaps the most useful, and not accidentally so.

The elements of method we have described and situated empirically constitute not the finished components of the hypothesis of the higher hypothesis, but the best approximation of the desired components available to this date. These components describe the state of mind, the philosophical world outlook of the sort of person best fitting the term "normal adult personality" today, the norm against which the quality of mental life of other persons must be gauged, a normal adult whose chosen data are of the form of verbs, not nouns.

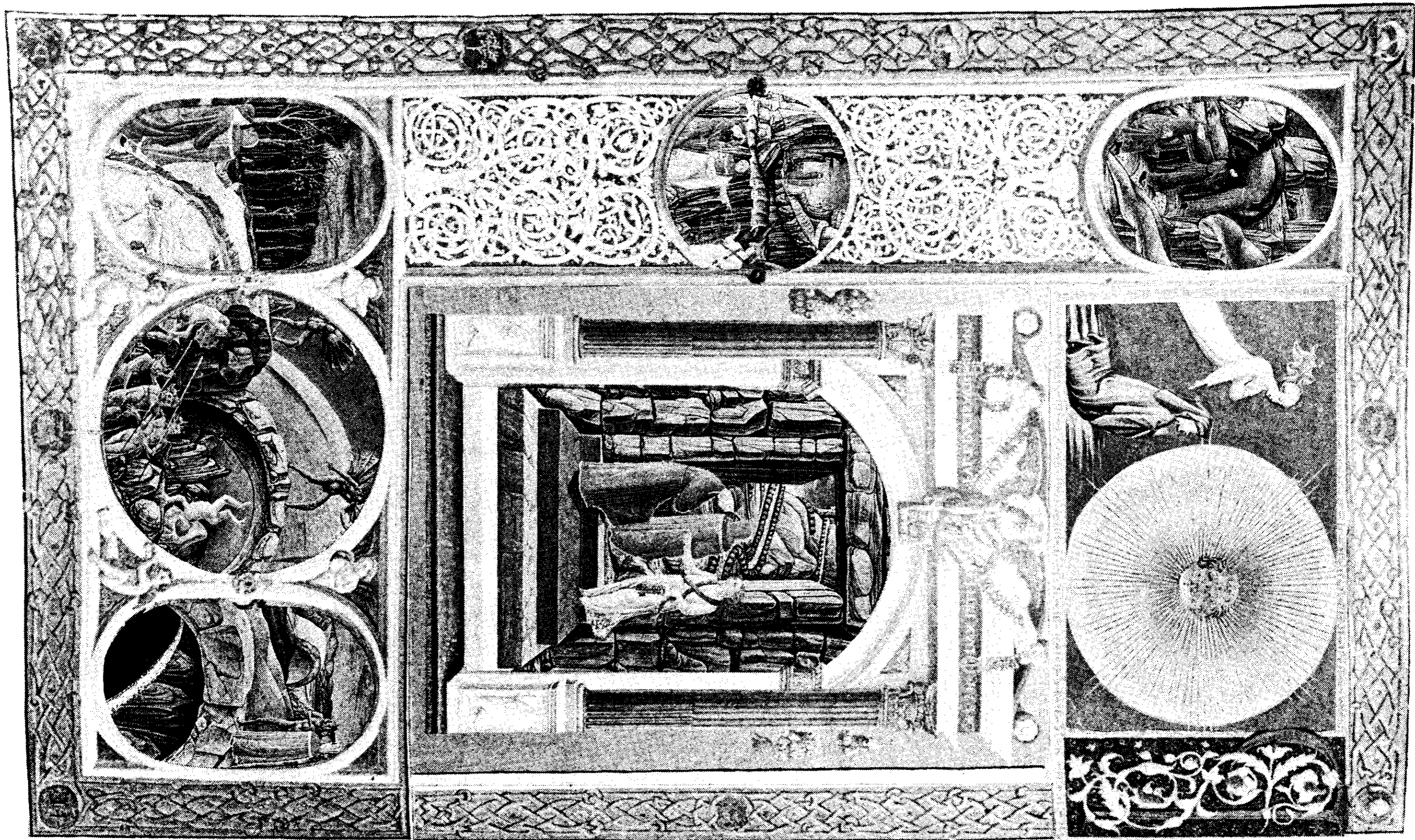
Notes

1. During 1983, Dr. Uwe Parpart-Henke coordinated the work of a team of researchers developing new parameters for the LaRouche-Riemann economic model, which enable the model to analyze economic processes in terms of functions of societies' per capita energy density and potential relative population density. Preparation of these modifications required study of the demographic and economic processes of earlier societies, including those of the hunting and gathering society of primitive man.

2. The reader is to be warned that the translations of Plato into English language are, predominantly, fraudulent. These were begun in England by Benjamin Jowett, a confederate of Oxford University's John Ruskin in forming the "hermeticist" cult of the Pre-Raphaelite Brotherhood. Jowett wildly falsified the translation of terms and phrases where Plato's argument is most offensive to "hermeticist" dogma. To make

matters worse, the standard British Greek-English lexicon relies on the putative meanings Jowett fraudulently assigns to these terms, and the British schools of Platonic studies have improved upon Jowett's translations only by substituting their own frauds for those of Jowett. A fresh translation of the *Timaeus* was prepared and published by *Campaigner* (New York, Vol. 13, No. 1, February 1980), which eliminates the frauds, providing the most faithful translation from the Greek so far available.

3. For example: Martin Howard Nieto, *The Titius-Bode Law of Planetary Distances: Its History and Theory* (New York: 1972). Such works derive from the Harvard-based History of the Applied Sciences project directed through the *Journal of the Exact Sciences* by Professors Truesdell and I. Bernard Cohen, itself an outgrowth of the late Bertrand Russell's Unification of the Sciences project.



Dante's *Commedia*

We begin with the primitive—newborn—human individual. It is predominantly an irrational hedonist, and thus predominantly an approximation of a beast. Yet, through the loving nurture of such newborn creature, mankind has demonstrated that every such newborn creature, unless biologically damaged in mental functions, is susceptible of achieving the highest condition of mankind.

It is well-established, that the levels of development possible for the human individual fall among three general categories, as those three categories are described by the three successive canticles of Dante Alighieri's *Commedia*: "Inferno," "Purgatory," and "Paradise." The first is infantile man, the irrationalistic hedonist, whose philosophical world outlook is that of David Hume, Adam Smith, Jeremy Bentham, and John Stuart Mill, among others. The second is of the philosophical world outlook best typified by Immanuel Kant, emphatically the Kant of his *Critique of Practical Reason*. To identify the third, preliminary discussion is required.

The fact of our individual mortality ought to impress each of us, at some point in our pre-adolescent or adolescent development, that those hedonistic pleasures whose memory exists chiefly in the experience of our own flesh, die in our grave with us. To live a life serving the pursuit of such individual pleasure is to die as a beast dies, leaving nothing after us better in principle than what is bequeathed to us by the beast who died yesterday in the slaughter house. The survivors consume the remains, and after that, there is nothing of importance in the matter for society. The beginning of wisdom is to reflect upon this lesson, that we not waste our brief lives living and dying like mere beasts.

To accomplish this, we must find a means to make our having once lived of durable advantage to both our contemporaries and our society's posterity in general. We must make some contribution to advancement of the human condition. We must develop our potentialities accordingly. This broad, preliminary answer to the predicament of the mortal individual immediately poses a second question, a deeper question: How can we have foreknowledge of what will be of such advantage to mankind?

Broadly, we have already answered a large part of that question in the preceding chapter. The existence of mankind depends upon increase of the potential relative population density of mankind. This indispensable increase is fostered, in turn, by a rather well-defined pathway of development of human mental life. Although the immediate benefits of such practice are purely and simply material benefits in one respect, they are not merely material benefits. We have shown that our universe is ordered in a certain way, and that by advancing man's willful practice toward increasing agreement with the Logos, man participates in the work of the Creator. The advancement of potential relative population density, because of the means by which this can be sustained as continuing practice, not only affords mankind material benefits, but obliges man to develop himself toward perfecting agreement with the Logos as the means for achieving that material progress.

Material progress becomes thus not the goal achieved by development of the mind, but the means by which we oblige ourselves to develop the mind into increasing agreement with the Logos. The aggregate work of humanity, if humanity is so governed in its practice, unquestionably contributes to some larger end in the universe itself. It is not essential that we have foreknowledge what that larger end might be; it is sufficient that we follow the pathway described by the hypothesis of the higher hypothesis. What we need to know will become evident to us at the point we are prepared to undertake each of the new tasks our increase of knowledge presents to us. Our development toward increasing agreement with the Logos is a sufficient statement of our goal, a sufficient definition of the Good.

Our immediate practical concern, in committing ourselves to developing the Good within us, is to contribute to making society Good. The individual who contributes to making society Good is worth a thousand times the individual who wanders through life scattering only individual good deeds. For, a bad society will crush the good contributed by its individual members, and will foster the pleasures of Sodom and Gomorrah. Who makes society Good thus preserves the goods contributed by thousands and millions of individuals.

◀ Renaissance illustrations of scenes from Dante's *Commedia* symbolically represent the moral development of an individual's sense of identity, from the condition of infantile hedonism (Inferno, bottom), to that of law-abiding conscience and a negative "Golden Rule" (Purgatory, center), to the condition of illumination (Paradise, top), the experience of contributing to society through creative mental breakthroughs.

This work must be governed by the principle of love, as we described that at the close of the preceding chapter.

Once we know these things, we have not yet solved the problem of mortal life; we have enabled ourselves to see that problem more clearly.

In all but the rarest cases, the noblest moral and intellectual development leaves the individual still shackled to a vestige of his or her infantile, irrationalistic, hedonist self. The instincts of the wicked Adam Smith's 1759 *Theory of Moral Sentiments*, of Bentham's and Mill's "felicific calculus," "human nature" falsely so-called, grips our will. Thus, there is imparted to the child, the adolescent, the adult, something of the same immoral self-interest predominating in the will of the infant. There predominates a governing self-interest which were better characterized as a "dog's nature"—Hume's, Smith's, Bentham's, Nietzsche's nature—than "human," something of the wretches of Dante's "Inferno."

Thus, at one level, we are able to describe the true self-interest of a human individual, a self-interest in contributing to an advancement of the human moral condition, the composition of society, and that universally. Yet, in most instances, at the same time that the individual comprehends this notion of higher self-interest as fact, the same individual operates in day-to-day life by a predominantly contrary perception of immediate self-interest. If an individual perceives this contradiction, and regrets its persistence, he reconciles himself to a tormented condition which Dante describes in his "Purgatory." The result is approximately that which Kant describes in his *Critique of Practical Reason*.

Unable to overcome entirely those vestiges of infantile personality in his adolescent or adult life, the individual in "Purgatory" compromises between the "Inferno" and "Paradise." He retains his infantile sense of self-interest, but modifies it wherever his educated conscience shows him either that a certain specific impulse or that a specific application of an infantile impulse produces a result contrary to reason. This Kant describes as "negation." Having done so, the individual rises above such "mere negation," by esteeming those "negations" as making him a moral person, of higher personal status in society because of such modifications of his impulses. He *negates* the *negativity* of negation—Kant's *negation of the negation*—remaining essentially an infantile personality, but a modified infantile personality, a *moral personality*. Like Kant, he views the *negation of the negation* as the highest approximation of the truly positive attainable by man.

The case of the individual in "Purgatory" helps to instruct us, that to realize the higher self-interest in the Good, it is not sufficient to be able to recognize the Good descriptively, or even to be inspired by the desire to achieve what he describes as Good. We must become Good; we must be governed in impulses respecting our

immediately personal self-interest by that Good. That Good must become our immediate self-interest, our immediate motivation in every aspect of personal life.

To achieve that congruence of personal, self-interested impulses and service of the Good, is the condition of "Paradise."

That condition is the true adulthood of the human individual, and the condition of "Purgatory" its moral adolescence.

To the limit surviving literary sources inform us, the study of the threefold development of the human individual began not with Dante's *Commedia*, but with Plato's dialogues. All of the dialogues bear upon this subject, but the usual point of reference on this matter is the portion of the *Republic* in which Socrates describes the relative qualities of "bronze souls" (= "Inferno"), "silver souls" (= "Purgatory"), and "golden souls" (= "Paradise," or the "beautiful souls" of Friedrich Schiller). The same subject matter is also famously treated by St. Augustine.

Since Plato, the term "science of the human mind" is better limited to those bodies of inquiry which focus upon the interdependency and coherence of the two distinguishable facets of the mental life both of human individuals and of entire nations and cultures. The one facet of this inquiry was the subject of the preceding chapter: *How is universal truth defined with certainty, and what are the human mind's potentialities for ordered progress in discovering this universal truth?* The second facet, the topic of the present chapter, is identified by the question: *What determines the development or failure to develop those moral potentialities of the human mind on which depends the willingness to subordinate the individual's perception of self-interest to efficient progress in mastering universal truth?*

Once we pose the question, *What ordering of human mental life is required to assure the long-term survival of the human species, or even merely of some sizeable part of that population, such as a nation or culture*, the use of the term "sanity" is counterproductive gibberish unless this references an analysis of the efficient connection between the ordering of individual mental life and the increase of potential relative population density. Therefore, a definition of mental life and sanity which references the simple "happiness" of the individual, or the capacity of the individual to reconcile himself to the demands placed upon him by the authorities and prevailing opinion of his society, is shown to be quackery. If a cannibal is "happy" in his profession, he is insane; if he is successfully adjusted to the culture of a cannibals' society, he is a despicable, immoral, insane creature.

The best definition of moral "insanity" as this insanity commonly occurs in modern European culture is illustrated by a passage from the famous Adam Smith's 1759 *Theory of Moral Sentiments*:

The administration of the great system of the universe
. . . the care of the universal happiness of all rational

and sensible beings, is the business of God and not of man. To man is allotted a much humbler department, but one much more suitable to the weakness of his powers, and the narrowness of his comprehension: the care of his own happiness, of that of his family, his friends, his country. . . . But though we are . . . endowed with a very strong desire of those ends, it has been entrusted to the slow and uncertain determinations of our reason to find out the proper means of bringing them about. Nature has directed us to the greater part of these by original and immediate instincts. Hunger, thirst, the passion which unites the two sexes, the love of pleasure, and the dread of pain, prompt us to apply those means for their own sakes, and *without any consideration of their tendency to those beneficent ends which the great Director of nature intended to produce by them* [emphasis added].¹

Smith prohibits mankind from either defining universal truth and progress toward it, and also from considering the matter of foreseeable consequences of one's own actions in pursuit of sensual gratification. In a single term: *irrationalistic hedonism*. In other words, a doctrine of immorality, the identical doctrine underlying Smith's later dogma of the "Invisible Hand." It is the doctrine of "free trade" argued by Smith and his successors, that society must place no checks upon morally blind, even immoral individual, irrationalistic hedonism; it is the doctrine of the function of the Invisible Hand under policies of "free trade," that blindly following irrationalistic hedonistic impulses by the many will converge—by aid of some unknowable ergodic process—upon some ultimate good which cannot be foreknown by man.

It is perhaps an act of academic elegance, to show that these immoral views were not original to Smith among Englishmen and Scots. What Smith restates, both in the cited passage from his 1759 *Theory of Moral Sentiments* and his later *Wealth of Nations*, is nothing different than what Thomas Aquinas during the thirteenth century rightly despised as the wicked doctrine of irrationalistic nominalism of William of Ockham: that man must be governed by the irrationalistic imperatives manifest as his willful desires, and avoid the judgment of reason upon such imperatives. This radical immorality was not original to Ockham, either; it appears in a wide assortment of sub-species throughout the known ancient history of mankind.

It is no luxury of academic elegance to emphasize that the views expressed by Smith were the doctrine of his patron and collaborator David Hume, as well as of Jeremy Bentham, John Stuart Mill, and modern fascists such as Friedrich Nietzsche and Fyodor Dostoevsky. This was not only the policy of practice of the Hitler regime of Nazi Germany, but earlier the policy of practice of the British government under Lord Shelburne and William Pitt the Younger, the policy of practice of

the British Empire and the Holy Alliance of the Venetian Count Capodistria's famous puppet, Prince Metternich. Insofar as the immoral Venetian influence, typified by Count Capodistria, by Giammaria Ortes, and by the notorious Volpi de Misurata, impressed its wicked influence upon the culture of Vienna, the typical results include the irrationalistic dogma of Karl Popper or the fascistic Fabianism of Friedrich von Hayek. Typical of the outcome of some immoral influences is Viennese-Swiss psychoanalysis, that of Dr. Sigmund Freud included.

The fundamental self-interest of every person is to avoid dying as a beast dies, to ensure that he or she does not die without a meaningful participation in the effort to contribute to improvement of the human condition in future generations. True individual happiness can be nothing but the joy of a life efficiently directed to such an outcome. This cannot be a withdrawal from the sensual world. The efficient individual acts more efficiently on the sensual world than does the person morally less efficient. Physical well-being, leisure circumstances for cultivating the powers of the mind, are important to the moral, happy person, not as ends in themselves, not as a source of happiness in themselves, but as enjoyable means which are indispensable to furtherance of the higher purpose to which the life as a whole is dedicated.

This happiness cannot be true happiness, unless it be true in its aim. It must be efficiently aimed at that which contributes to increase of the potential relative population density, to the work of Reason. If not, the sense of happiness is a delusion—like the delusion of a man who marries and lives faithfully and happily with a department store dummy, all the while governed by the best of intentions. It must be happiness in an activity which is efficiently an echo of the influence of the principle of hypothesis of the higher hypothesis. It must be joy in Reason, as the notion of the hypothesis of the higher hypothesis—not formal logic—defines Reason.

Yet, Reason itself cannot define sanity. Without the motive to submit one's will to Reason, the individual's will will be submitted more or less fully to the bestial ordering of impulses of wretches of the "Inferno"—or, perhaps, of "Purgatory." Without a love for Reason more powerful than the infantile hedonism to which one is born, Reason will not be attained.

In that sense, Reason and the love of Reason, and corresponding hostility toward existentialist irrationalism, are the essential characteristics of the sane adult mind. Any deviation from that standard, that "norm" if one insists, is psychopathology. The science of the human mind is a study of the methods by which that indicated psychopathology is overcome.

Relative to all contrary doctrines of psychology, the authority of the science of the human mind just described is incontestable, absolute. This is argued from the standpoint of the method of higher hypothesis; If the underlying assumptions on which a lattice-work of

professional practice is premised are proven false, the entire lattice-work tumbles for that reason. We have thus far stated broadly the case, that the fundamental assumption underlying a science of the mind must begin with the task of perpetuating human existence in the universe, and must situate the function of the outcome of a mortal life within society within the universal setting of mankind as a whole. That, as we have thus far described it, is the proper fundamental assumption of a science of the mind. Any psychology which defies that proper fundamental assumption is shown on that account to be pervasively false in any interpretation of the empirics of human mental life.

Beyond those general truths, the elaborations of a scientific psychology must study the problems of achieving sanity in a twofold way. First, before focusing upon the individual within a definite society, a definite culture, we must determine the relative sanity of that society, that culture, within which the particular individual is situated. Only when that first task is accomplished, can we proceed to study the problems of sanity of the particular individual.

The general criteria employed for assessing the relative sanity of a culture are the same as those appropriate for assessing the relative sanity of the individual within that culture. The three levels of moral development, as this case is typified by Dante's *Commedia*, are the standpoint of reference in both cases.

The Sanity of a Culture: Natural Law

On both of the leading conceptions employed in this treatise, the content of Reason and behavior shaped by love of Reason, the most efficient single body of reference materials is the work of Cardinal Nicholas of Cusa. If it were required that we limit ourselves to choice of a single writing from amid Cusa's relatively massive output, an adequate choice might be Cusa's *Docta Ignorantia*. The special distinction of Cusa is that he, in addition to being a master of theology—which serves at least to eliminate problems impinging on his work from that quarter—almost single-handedly set the development of modern European physical science into motion, and also formulated most comprehensively the doctrine of *natural law* whose hereditary influence is rather efficiently reflected in the U.S.A.'s Federal Constitution, for example. In summary, Cusa is the most recent of the celebrated thinkers of human history who treated the subject matters integral to a science of the human mind in an all-sided and coherent way. The exemplary selection of his *Docta Ignorantia* is proposed on the premises that although this is predominantly a summary of Cusa's exposition of the rudiments of a rigorous scientific method—as of a method of physical science—that writing otherwise implicitly bears on the entire application of Cusa's coherent approach in method to all subjects.

During the recent 500 years of Western European culture—including the culture of the United States and Ibero-American states—there have been only two general views on the subject of natural law. The first, that of Cusa, is derived explicitly from the foundations of Western Christendom, emphasizing Plato among pre-Christian writers on law; Cusa's predecessors are exemplified by St. Augustine, Abelard of Paris, and Dante Alighieri. The opposing doctrine has many particular versions, all varieties of a common stock, a common stock congruent with the contemporary axiomatic assumptions of "bio-ethics," as bio-ethics is taught by heterodox, nominally Catholic teaching institutions today. The first, typified by Cusa's work on this subject, is the approach thus far defined in this treatise. The second, opposing usage of the term "natural law," is that of Francis Bacon, Thomas Hobbes, John Locke, David Hume, Adam Smith, Jeremy Bentham, and John S. Mill. In this latter, the moral likeness of *infantile man* to a mere beast is the point of departure, as the cited passage from Smith's *Theory of Moral Sentiments* typifies this. Obviously, the fact that the same terms, "natural law," are used alternately to mean two directly opposite policies, signifies that the two views are respectively premised on fundamentally opposing conceptions of nature in general, and of man's nature in particular. It is "natural law" in Cusa's sense, and only that, which is employed here; the opposing view is not tolerated.

To assess the relative sanity—or insanity—of a society or culture, the standpoint of natural law is situated with respect to the progression from "Inferno," through "Purgatory," into "Paradise," exemplified by Dante's *Commedia*. This is to emphasize the progress up the ladder from a newborn infant's irrationalistic hedonism, toward the Empyrean concluding canto of the *Commedia*'s "Paradise," is treated as a progress ordered by action of higher hypothesis, action according to the common principle expressed by the notion of hypothesis of the higher hypothesis. This is treated not only as the effect of Reason in the formal sense of Reason, but as the formal features of knowledge of Reason are energized by the driving force of love of Reason.

Societies are broadly classified according to what might be adduced as their implicit constitution, as "constitution" is associated with the constitution of a state. This "constitution" governs both the response of the society as a whole, and the composition of behavior among individuals and groups within that society. The analogues of "Inferno," "Purgatory," and "Paradise," are essentially as follows.

Dionysian Society, as typified by a modern fascist society, or Lyncurgan Sparta. (See Friedrich Schiller on the subject of the contrast between the archetypes of Lyncurgan Sparta and Solon's Athens.) These are Ockhamite societies (i.e., William of Ockham), in which Force and Will displace love of Reason. The prototype for the "constitution" of such a society is the ancient

cults of Cybele (= Ishtar, = Shakti, = Astarte, = Isis) and Dionysos (= Satan, = Siva, = Osiris, et al.). This is worship of a naked or poorly-disguised mother-earth goddess and her phallus-symbolic son, in which the law is the arbitrary collective will of the people of a specific blood and soil. The Assyrian, Babylonian, Median, Persian, Roman, Byzantine, Ottoman, etc. empires are exemplary of this lowest, "infernal" variety of culture, cultures whose moral insanity and rejection of the rule of Reason accomplished the destruction of the people and social order subjected to such an immoral regime.

Constitutional Republics. This is the society of "Purgatory," best typified by the constitutional order of Athens established by Solon in 599 B.C., the "second best form of republic" recommended by Plato for the potentialities of a society and culture delimited in form by the moral underdevelopment of its population. Great lawgivers such as Solon—"philosopher kings"—provide society with a code of constitutional law reflecting the principles of natural law. Submitting to that constitutional law, as by aid of what Kant describes as a process of negation of the negation, the people will to submit the behavior of their state as a whole, and also relations within the state, to the reflected rule of Reason, and to attempt to perfect in each and all a love of Reason.

In the main, the citizens of such a republic pursue hedonistic goals of day-to-day life, what Dante terms "earthly paradise." Yet, they negate those hedonistic impulses or specific applications of such impulses which are recognized by the culture as leading to consequences contrary to Reason.

This is the genius of Solon's famous "constitutional" poem. The people of Athens had arisen under his leadership, to overthrow a wicked rule by usury, to overthrow a usurious, parasitical oligarchy. This transformation had occurred under the pressure of the gravest crisis of that society, such that the passions of the Athenians were momentarily uplifted to what the poet Shelley describes, in his "In Defence of Poetry," as an exceptional period's popular capacity for "receiving and imparting profound and impassioned conceptions respecting man and nature." In this briefly ennobled state of the popular will, the Athenians had imposed upon themselves a higher quality of ordering of their society's affairs. Yet, as Solon foresaw, this ennobled state of mind would attenuate as the immediacy of the crisis passed. It was necessary, during this moment, that the Athenians bind themselves and their posterity to rule by a body of constitutional law reflecting the same principles of natural law governing the reforms. Hence, a written body of constitutional law was required to aid this purpose.

The case of the adoption of the Federal Constitution of the United States is similar, such that that Constitution is the leading model of reference for republican constitutions to the present date.

Such a constitutional republic—the "second best

form of republic"—perseveres in this ennobled character as long as the constitutional law is affirmed repeatedly over subsequent generations. Since the majority of the citizens are, at best, characterized morally as denizens of "Purgatory," the required affirmation can be supplied only by the moral leadership of a special sort of republican elite. This is not an elite of wealth and privilege, but a moral elite, typified by what Plato describes as "philosopher kings." So, thus informed by the combination of classical studies and experience, the elite group of conspirators around Dr. Benjamin Franklin, who were the "Solons" of the establishment of the federal constitutional republic of the United States, formed the Society of Cincinnatus around generals George Washington and Gilbert Marquis de Lafayette, a body of revolutionary war officers who, with their posterity, accepted a trust of perpetual service to the republic, to live as ordinary private citizens except as peril to the republic might require them to come forward as a force of leadership.

This "second best form of republic" is the highest condition of society thus far achieved in known history or pre-history of mankind.

There is implicitly a third level of culture, higher than a constitutional republic. On that account, it might appear we have no means for representing this except by aid of abstractions disengaged from any known empirical materials. That appearance is not quite accurate; there is a feature of Western Christendom's development which has periodically surged toward such a higher state of society, an upward impulse which is best expressed by the work of republicanism's philosopher kings, and which has in that way figured, in the creation of constitutional republics, and in movements of that purpose otherwise. By focussing upon the implications of such special empirical materials of concrete history, we are able to give substance to the idea of the third, highest level of human culture.

Although the central principle of Western Christendom is expressed by the Judaism of Philo of Alexandria, and by the Greek faction of opposition to the emperor and episcopate of the Eastern Church, it is through the channels identified by the work of St. Augustine that this principle has appeared in its relatively most unfettered form of expression. To the extent that principle has periodically and otherwise succeeded in overcoming or merely checking opposing forces within Western European culture, it is this principle which has imparted to Western European culture that superior power, that superior vigor of scientific life, that superior emphasis on the political equality of all men and citizens of republics, which has been the unquestioned margin of superiority of Western European culture during recent centuries.

This fact, although incontestably a fact, is complicated by the additional fact, that the nations of Western European culture have come under the domination of

wicked and powerful forces of "special interest." By this usurpation, such forces have taken into their hands that superior technological and related power created by the republican movement, and have often used that usurped power to effects contrary to the moral principles of Western European republican culture.

On that account, only ignorant bunglers attempt to characterize Western European culture by means of purporting to strike an accountant's balance on the sum of the real or imagined good and evil the nations of European culture had supplied world affairs during recent centuries. As a collection of nations, Western Europe and the Americas have been the continuous battlefield between two irreconcilable moralities, between oligarchical and republican currents contending for power within these nations. If it should occur that the former, oligarchical, rentier-financier and allied forces prevail for a sufficiently extended period, the nations of Western European culture will be destroyed in a manner justly imposed upon the morally debased culture of Rome, or the Persian and Ottoman empires earlier. Yet it would be work of blind fools to assert that the follies which oligarchical forces have imposed upon the policies of practice of these nations are a measure of the quality of the opposing, republican currents.

The kernel of Western European culture, and the root of its relative superiority to all previous culture, is the notion of man's relationship to the Creator embedded, in exemplary fashion, in St. Augustine's insertion of the term "filioque" into the Latin text of the Nicene Creed. That Jesus Christ, by virtue of being perfected form of man born of woman, achieved perfect consubstantiality with Creator and Logos, as the Gospel of St. John demands, caused the efficient Will of the Creator, the Logos, to flow from Christ as from the Creator. Where the heathen antagonists of this view interpret "image of God" to be the image of man's mortal flesh, man's likeness to a beast, Western Christendom locates *the image of the living God* (Cusa) in that divine spark within persons which permits them potentially to walk in *imitation of Christ*, the potential of Reason achieved through love of Reason. In this way, individual man may participate in the Creator through perfecting his will as the will to supplement and thus continue the continuing work of the Creator in the universe. The Christian is thus a *citizen* of God's republic, rather than a mere *subject* of an oriental God cast in the image of an unchallengeable tyrant.

It is this feature of Western Christendom which enabled Western Europe to produce, during the recent 500 years, the greatest productions of scientific progress and cultural advancements ever accomplished by any people in the known history or pre-history of mankind. In fairness, and in hostility against all racialism, it should be said that an ancient pre-Vedic culture, provably dated from the midst of the last glaciation in the northern hemisphere of this planet, developed over an extended

period a mastery of astronomy not surpassed as to principle until the successive work of Cusa, Kepler, et al., and not exceeded in empirical precision until the nineteenth century. European culture has a debt to such predecessors which should never be obscured; yet since the Golden Age of Egypt, under the leadership of the priests of Ammon, there is nothing approximately comparable to the efflorescence of Reason which has been produced by the peoples of European culture. Every good which exists in any part of the world today is massively indebted to that work of European culture—which only a chauvinistic fanatic and fool would attempt to deny. Otherwise, during only brief periods has any known culture of the known societies of the world produced anything matching for relatively brief intervals the general upward sweep accomplished by the first 400 years of European aftermath of the fifteenth century Golden Renaissance.

The unfortunate, generally persisting decline in the culture and morality of the nations established by Western European culture during the recent hundred years—since approximately the 1870s—is to a great degree the consequence of a crushing and fragmenting of those elite bodies of republicans of Europe and the Americas who had earlier represented a continuation of the work of the networks of such figures as Gottfried Leibniz and Benjamin Franklin. Beginning the Anglo-Swiss success in bringing briefly to power the Jacobin Terror in France, and accelerated by circumstances of the 1815 Congress of Vienna, the same oligarchical forces of Europe, earlier temporarily set back by the Golden Renaissance and again by the events of 1653, had effected a creeping coup d'état among leading circles of nations of European culture, subordinating the political and cultural institutions of nations to supranational rule by a concert of oligarchical rentier-financier power over the currency, credit, and debt of nations and international commerce. This oligarchical force employed its strengthened position to throw out of power and to fragment the republican elites.

Although republican policies—notably including the ideas of political equality of the citizen, of reliance upon scientific and technological progress, of fair treatment under constitutional reflections of natural law—remained more or less deeply embedded in popular culture, these republican cultural impulses among the people have lacked that efficient expression in shaping policies of government which only the leadership of a qualified republican elite can catalyze into actuality.

This problem of European and American republics is rooted in the flaws of "Purgatory." The ordinary citizen, even though a republican in cultural outlook otherwise, is obsessed with pursuit of what for him or her appears to be some approximation of personal "earthly paradise." Accordingly, he or she lacks the energized force of comprehension required that he be efficiently concerned with the consequences of policies

of general practice within his or her nation; he is rather preoccupied with "taking care of my needs, my family, my circle of friends, neighbors, and peers." This narrowness of day-to-day preoccupations afflicts the mind and will of the citizen with a disabling sickness of "littleness." Without adequate leadership, such a citizen tends to adapt pragmatically to whatever general circumstance is imposed upon him from above. In leading matters of national interest, he or she becomes "other-directed."

By weakening the republic elite, and by playing upon the cupidity of the "little citizen" of the republic, the oligarch's vast resources of money, credit, and so forth, enable him to systematically corrupt the practice and judgment of the "little citizen." So, the great Friedrich Schiller reflected upon the lessons of the French Jacobin Terror. The individuals of France had permitted the British government of William Pitt the Younger and Swiss bankers to impose a Jacobin Terror upon France through the complicity of such figures as the Duke of Orléans. Schiller observed that the eighteenth century had created a great moment, referring to the successive work of Leibniz, and of Franklin more emphatically, but that that moment has "found a little people."

The decay of the moral power of the people of Western Europe and the Americas is therefore to be located as to cause chiefly in the corruption of churches and schools. Instead of the principle associated with the "filioque," corruption of the pulpit has cathexized to the religious passions of the church-goers—at least extensively—modifications of Christian teachings which owe the most to oriental forms of cults. The principle of love of Reason has not only vanished from numerous pulpits, but is combatted from many among them. In schools, in place of combatting infantile irrationalism of pupils through emphasis upon the rule of Reason, the rule of Reason is judged in practice (e.g., John Dewey et al.) to be "oppressive" to the "instinctive" (infantile) impulses of the pupil. This corruption of church and school combats the principle of Reason, and thus lowers the successful victims of this corruption from "Purgatory" into the dionysian "Inferno," and so into the domain of the culture of Sparta, Sodom, and Gomorrah.

The flaws of "Purgatory," and thus the flaws associated with the "second best form of republic," show *negatively* what the third, highest level of society implies. This is shown best by examining the republican impulse of Western Christendom to which we have referred. The third, highest level of society—"Paradise"—is defined as a state in which a majority of citizens are morally elevated to constitute the republican elite, such that natural law is written immediately in their conscious wills, rather than merely reflected through constitutional law.

This ennobled state of the majority of citizens is characterized, relative to "Purgatory," by a shift of the sense of personal identity, and of personal self-interest

within society; to the individual's true self-interest as a world-historical personality, a personality whose immediate motive of self-interest is the development and exercise of the powers to contribute a durable Good to his or her society over succeeding generations to come. It is that shift of the cathexis of sense of personal identity and self-interest within the personality, which defines "Paradise."

Morality and Ruling Ideas

In the preceding chapter, we stressed that the lattice-work of prevailing specific ideas, as illustrated by the case of prevailing doctrines of physical science, are to be treated as elaborations of underlying assumptions. This principle is of crucial importance for any effort at practical assessment of the ruling ideas which characterize each culture. It is by aid of the principle that we are able to rigorously compare the moral qualities of two different cultures, to the effect of rightly judging the one higher than the other. It is by aid of this same principle, that we become able to change a poorer moral quality of culture into a higher moral quality of culture, a *saner* culture.

In this, as in the work of effecting scientific revolutions, our analysis and practical efforts at inducing change are governed by the method of higher hypothesis. First, we must adduce those underlying, "axiomatic," assumptions which "hereditarily" govern the relative consistency of a prevailing body of particular ideas. The study of these "axiomatic" assumptions is the basis for showing one culture to be morally superior to another. To transform a culture, to raise it to a higher moral level, we must concentrate our efforts on inducing the population to accept a transformation of such "axiomatic" assumptions. Otherwise, it is impossible to effect any durable sort of useful amendment in the prevailing, and characteristic social practice of that population.

During the recent decades, the same principle has been more or less efficiently employed to opposite effect. To simplify the account, since our purpose here is merely illustration, we note the connection between the activities of two influential Malthusian institutions, the Club of Rome and International Institute for Applied Systems Analysis (IIASA), and the Venice-based Cini Foundation. The case is far more complex than the facts reported here would suggest, but our simplified account of the matter here does not introduce any error of oversimplification respecting the judgment offered.

The Club of Rome and Anglo-Soviet IIASA are part of the implementation of agreements reached between the Soviet government and Western accomplices of the late Bertrand Russell under auspices exemplified by the Pugwash Conference series. The relevant feature of those agreements for the point at hand, was the commitment to induce the governments and populations of the na-

tions and populations of Western Europe and North America to weaken their economies and military potentials greatly from within, by collapsing those economies into what are called today "post-industrial society" or "technetronic society." In other words, to impose a global Malthusian policy upon the governments and populations of those targeted nations. In service of that agreement, the "Great Society" program of U.S. President Johnson was launched during the mid-1960s, as the first significant phase of destroying the U.S. economy from within. As a continuation of the same policy, Britain's Lord Solly Zuckerman and OECD Director Dr. Alexander King played a leading role, in collaboration with Venetian oligarchical circles, in creating the Club of Rome. King, Zuckerman, the U.S.'s McGeorge Bundy, Soviet KGB official Dzerhman Gvishiani, and others of both East and West created IIASA as an institution overlapping the Club of Rome.

The key to the work centered around the Club of Rome and IIASA, was the fact that the activities of these institutions and their accomplices were concentrated on inducing a widespread change in the axiomatic assumptions of Western European culture, a change sometimes identified by the term "paradigm shift." The two axioms which these subversive institutions aimed to eradicate from the majority of the populations of those targeted nations were, first, the injunction of the Judeo-Christian Book of Genesis, that mankind must "Be fruitful and multiply, and fill the earth and subdue it," and, second, the idea of technological progress which serves as a practical extension of the injunction of Genesis. Within the churches, the accomplices of this effort directed their venom not only against these two cited "axioms," but also the implications of the "filioque." To aid this subversion, according to Dr. Alexander Kings's own version of the matter, he, as OECD Director, formulated the policy for destroying education, implemented in France beginning approximately 1963 and consolidated in West Germany with the 1970 enactment of the educational reforms implemented initially under the chancellorship of Social Democrat Willy Brandt. This destruction of education, and increasing corruption of teachers in Western Europe and the United States, was indispensable for the dionysian tactic of transforming large portions of youth into terrorist and anti-technology forces committed to the destruction of urban life and culture.

Although this undertaking has deep roots in pre-World War II, and pre-World War I campaigns, the center of the shift in cultural paradigm lately effected has been the Cini Foundation, based on the old Benedictine island of St. George Major in Venice, and the European cultural federations spun out of the Cini Foundation's work, which have operated chiefly out of Geneva, Switzerland. The religious figures and other forces whose learning and skills afford such culture-destroying institutions their efficient expertise, have

understood that to cause a society to destroy itself, it is sufficient to replace certain of its existing axiomatic cultural assumptions with new axiomatic assumptions whose "hereditary" effect will be the adoption of policies which directly accomplish the society's willful self-destruction.

The two contending forces, typified by the opposition in essential character between Lycurgus's Sparta and Solon's Athens, whose conflict has dominated all of European civilization's history to the present date, is most efficiently analyzed by reducing the respective, oligarchical versus republican, cultures to their respective underlying "axiomatic" assumptions. Once those assumptions are accurately adduced, every other idea characteristic of the superstructural lattice-work based on those assumptions is shown to be "hereditarily" determined by such axioms.

The implication of this, an implication fully verified by the empirics of history, is that a culture behaves overall as its underlying axiomatic assumptions more or less directly imply it will behave. The general course of behavior of a culture is fully defined by considering merely such axioms, without necessarily considering any of the superstructure of particular ideas otherwise.

The elaboration of the superstructure is not without practical interest, of course. This elaboration must be examined in two principled respects.

First, given a fixed set of underlying assumptions, the elaboration of superstructural ideas is effected as the application of the assumptions both to the concrete complexities of human practice, and to effect some degree of consistency among the various ideas so developed. A few illustrative remarks make this clearer.

Is mankind superior to all of the beasts in nature? This is an aspect of an axiomatic assumption, as is the contrary assumption, that *man is merely a talking beast in competition with non-talking beasts in a struggle for domination.* The latter version is coherent with the racist "blood and soil" doctrines, by which some uncivilized body of people asserts that the "collective will" of its people coheres with the assertion that that people is a "Holy Race" associated with some designated patch of land as "Holy Soil." Granted, such immoral barbarism persists as a relic in various languages, such as Russian; if the people actually believe in what such vocabulary implies, they are in fact bestial in their culturally determined nature. The application of either of the opposing underlying principles, opposing conceptions of man's identity and self-interest, subsumes a coherent sort of elaboration of a superstructure of particular ideas, an elaboration which adapts that principle to each of a wide variety of experiences.

If the culture assumes that only simple hypothesis is possible, creative scientific progress can occur in that culture only almost accidentally, and will not be a characteristic feature of belief and behavior in the elaboration of a culture based on this underlying, "axiomatic"

assumption. Every experience will be catalogued and the idea of such experience "algebraically" formulated in consistency with that assumption.

Consider the case in which two opposing but more or less co-extensive cultures interact in terms of the same general body of experience. The two cultures will appear similar to the degree that the elaboration of ideas among representatives of the otherwise mutually exclusive cultures will overlap in respect to subject matters described in the elaborated body of ideas associated with each culture. As a matter of counting isolable descriptions of kinds of experience, there will be a name for such experiences in one culture which will be more or less the same name used, as the same word or a dictionary translation, by the other. Only a small portion of the total count of ideas in each culture will be omitted from the vocabulary of the other. The "algebraic" descriptions associated with equatable names will vary significantly; in many cases, the descriptions will be "logically" incompatible. The "set of names" for concepts present in the one and omitted in the other will be limited to the smaller quotient of total named kinds of experiences, which alludes more or less directly to the underlying axiomatic assumptions exclusive to each in the comparison of the two.

As a point of further illustration, both cultures may designate food and nourishment as "good." This nominal agreement may be in large part deceptive. The gluttonous gourmand, who has passed his entire waking day in gorging himself on food and wine, is not to be so simply compared with the monk who enjoys a necessary meal at sunset. To the former, the hedonist, eating is a pleasure in its own right, and nothing else need be considered. To another person, who has risen above the typically infantile neurosis of the "compulsive eater," food is to be enjoyed as awareness of the fact that this nourishment is necessary for accomplishing that mortal work of good which surpasses one's mere mortal existence.

The latter is not necessarily disposed toward an unvaried diet of a bit of meat and fat in coarse porridge. The mind which has comprehended the principles of harmony of the universe's ordering seeks to imbue each of his acts with some artistic reflection of that same harmony. So, the latter might be observed dining upon an elegantly contrived dish; to careless observers, this behavior is no different than the hedonistic gourmet's dining. We must examine the behavior more closely; what principles are celebrated in the composition and manner of consumption in each case? Such distinctions, which may sometimes appear obscure or nonexistent in examination of isolated detail, are undeniable distinctions when the behaviors of individuals of different cultures within the same society are examined in terms of all the leading details of the respective practices. The point becomes clear as we examine the totality of behavior of persons in search of some characteristic prin-

ciple which expresses an underlying difference of world outlook permeating their behavior as a whole.

The foregoing, illustrative remarks pertain to the first approximation case, in which we examine the differences between two cultures only in terms of assuming that the respective, underlying set of assumptions are fixed. In the second case, our attention is drawn to the fact that the set of underlying assumptions within a continuous culture of a definite species undergoes modification in the sense that the notion of the hypothesis of the higher hypothesis, a common principle of discovery of new higher hypotheses, implies scientific progress. The notion of the common principles is perfected, to the effect that the earlier set of assumptions involved are seen to be inadequate, but never as wrong in any other sense. This evolutionary development, as a process of self-perfection of underlying assumptions as to common principles of discovery, not only modifies the assumptions bearing on those principles, but, as in scientific progress, this progress prompts change in the superstructure of elaborated particular ideas.

Thus, we compare cultures in a twofold way. First, we distinguish cultures which are morally good in underlying assumptions from those which are morally bad from the same vantage point. Therefore, we compare good cultures with one another as relatively superior or inferior by comparison of the relative degree of perfection of the set of underlying assumptions which perform the function of common principles of discovery for that culture as a whole.

The same principle, expressed as reflection of the hypothesis of the higher hypothesis for good cultures, may be encountered in an opposite character in a bad society. As good cultures may become better, bad cultures may become progressively worse, and usually do. This "worsening process," the direct opposite of the hypothesis of the higher hypothesis, can be adduced as a common principle of "worsening," a limitless process of aggravated self-criminalization, such that one criminality fosters the plunge into a baser sort of criminality. So cultures behave, and so individuals behave.

For this reason, it is inadequate to classify either cultures or individual persons as morally good or bad merely on grounds of comparing their behavior at some moment of their histories. For illustration, consider the instance in which one individual is morally superior to the second in respect of the level of culture his present behavior expresses. However, the first has begun to "go bad," and the second to improve. The one who has chosen to "go bad" will usually deteriorate at an accelerating rate; the one improving will improve more slowly than the first will plunge into depths of badness, but the improvement will soon take the second way above the moral level reached by the first.

It is arguably the case that the same Germany which was later associated with Adolf Hitler's Nazi regime, earlier reached what is at least arguably the highest mor-

al condition ever achieved by any population, during the Liberation Wars against Bonaparte's tyranny. This elevation was immediately largely the work of Leibniz and his direct political successors, a benefit accelerated by Friedrich Schiller and the circle around Schiller's intellectual leadership at the beginning of the nineteenth century. The betrayal of Germany by the Hohenzollerns during the 1815 Congress of Vienna, and the anti-Schiller persecution launched with the support of the Hohenzollerns immediately afterward, crushed the earlier moral uplifting of the German people, creating the circumstances for flooding Germany with the venereal disease of Madame de Stael's Rousseauvian Romanticism. This later led lawfully into Hitler's regime.

This is manifest in comparing the German music produced by the great figures educated during the pre-1789 and pre-1815 periods, respectively, with the poorer relative level of progress in the generation born after 1815, and the poverty and significant retrogression of German musical composition by the youth generation of the 1848-1849 radical upsurge during the second half of the nineteenth century. Giuseppe Verdi in Italy, and Brahms in Germany, represented in the post-1848 period the last vitality of musical power of composition left over from the processes of cultural maturation of the earlier period.

The case of German science is parallel. After Leibniz, the greatest efflorescence in European scientific discovery was set into motion around the 1794-1815 Ecole Polytechnique of France, and continued in Germany by merging the continuation of the work of that Ecole Polytechnique with the coordinating genius of Karl Gauss and the German school of early nineteenth century German classical Indo-European philology. With the passing of Riemann and Karl Weierstrass, the level of German science collapsed. Relative to their successors, Felix Klein, Hilbert, and so forth were giants; relative to Gauss and his immediate successors, Klein's great distinction was his keen if inadequately elaborated sense that he and his associates had lost connection to the principles of scientific creative work epitomized by Gauss. After the mid-1920s, the elaboration of scientific progress did not halt, but the next generations were qualitatively inferior to Felix Klein et al. as Klein was a Lilliputian relative to Gauss, Dirichlet, Riemann, et al.

Over the recent hundred years, European culture has decayed in moral force although the technological progress made possible by work of the preceding centuries was continued with significant results as to scope and benefit of its elaboration, on the basis previously established. The same pattern is shown by examining every feature of the culture of Europe and North America in this framework of reference. A reading of the scholarly, scientific, and popular books, leading newspapers and other periodicals, shows a worsening erosion of what Shelley describes as the power for impart-

ing and receiving profound and impassioned conceptions respecting man and nature. This prevails as a trend among the educated strata of populations generally, and also among the leading circles of science and scholarship, as well as music, painting, and literature.

It was not merely the erosion of Germany's culture over this span through World War I which created the conditions of Nazi Germany. As the fascist philosopher and historian Dr. Armin Mohler more or less accurately documents the matter from his pro-Nazi point of view, in his *The Conservative Revolution*, the possibility of imposing Hitler upon Germany—largely from outside Germany, in London, New York, and Switzerland—was produced by the spread of cultural pessimism throughout the German population by the conditions imposed under the Versailles Treaty. This spread of cultural pessimism, accelerated by the collapse of the Young Plan and the 1931 international financial collapse, seized upon the rotted side of German culture, romanticism, to bring to power a declassé bohemian dauber from Vienna, Hitler, a fanatical dionysian steeped in anti-Christian cultism.

As terms of broad description, *cultural optimism* and *cultural pessimism* are descriptive terms which loosely identify axiomatic moral principles whose efficient role is respectively that of the hypothesis of the higher hypothesis, in the first instance, and the directly opposing principle of self-worsening moral depravity, in the second. Romanticism was already cultural pessimism, which, into the close of World War I, caused a growing depravity of German culture morally. However, up to that point, technological progress and related benefits acted as an opposing force in support of optimism, which held the forces of cultural pessimism in check. Once that external prop of optimism was removed, and replaced with an accelerating increase in pessimistic circumstances, the principle of cultural depravity, German romanticism, was unleashed with more or less full force—although with not so great, or depraved a force as is shown by the Malthusian counter-culture movements of Germany, and most of Western Europe and North America today.

According, we must view such principles as expressing potential, and in the most rigorous sense of potential. By that, we mean this. Earlier, in the preceding chapter, we stated the case, that self-similar conic form of spiral action symbolizes mathematically the irreducible form of a universal principle of action, by means of which an entire universe can be elaborated without introducing any other principle not derived from this. We indicated this notion of a *principle of least action* to be congruent with the verb "to create," "to cause to exist." We indicated that "to create" is to be restated as "to cause itself to become." The notion of "to create," so situated, is the proper definition of *potential*. The definition of potential is rigorous and conclu-

sive; yet, not only is such a correct notion usually rejected for physical science, but most emphatically rejected for "social science."

There is today a strong reaction against propositions which appear to place social processes under the same conceptual framework as physical science matters. This resistance is a recently developed aberration among educated persons of European culture. Although the aberration can be traced to the work of the followers of Bacon and Fludd's empiricism in Britain from about 1660 onward, and the neo-Aristotelian materialist Enlightenment in eighteenth century France, the assumption that there must be a watertight separation of the physical sciences from the social sciences and arts was not established until the latter half of the nineteenth century. This was largely the work of Karl Savigny and his school of irrationalistic neo-Roman law, which insisted upon "freedom" of the social sciences (*Geisteswissenschaft*) from the rationality of the physical sciences (*Naturwissenschaft*). The desirability of maintaining such a separation has been encouraged by the unwholesome spectacles of logical positivists and statisticians proposing to unite the physical and social sciences under a common rule of mathematical logic.

The formal problem associated with such divisions is that all formal-logical constructions based on an axiomatic postulational basis analogous to the Egyptian version of Euclidean geometry describe a universe which nowhere escapes the bounds of simple hypothesis. The classical paradigm for this problematic assumption in modern European practice is the anti-Kepler dogmas of René Descartes: that the physical universe is knowable only by assuming the visible (Euclidean) domain to be self-evidently the totality of the physical universe, and that therefore the physical universe is point-particles in motion in empty space. Anything not subsumed by such assumptions is treated, in the Cartesian schema, as a force acting upon the universe, but external to it, such as a *deus ex machina*. This fallacy of Descartes, first systematically identified by Blaise Pascal, was later thoroughly explored in the attacks upon Descartes' schema by Gottfried Leibniz; the Ecole Polytechnique under Carnot and Monge, also recognized Descartes' influence as the leading influence working to destroy science at that time.

Although British empiricism and Cartesianism have the exact same common French mother, as the case of Fludd, the actual spiritual author of the London Royal Society, brings to the fore, empiricism is a superficial doctrine, in the sense that Kant, in the preface to the first edition of his *Critique of Pure Reason*, describes it as premised upon "philosophical indifferentism." It deals with the difficult and fundamental questions of science and scientific method by the simple expedient of professing to ignore them, as Adam Smith states such a policy in the cited passage from his *Theory of Moral*

Sentiments. For those whose intelligence shows them such questions cannot be ignored, Descartes' approach and its derivatives is the preferred form of opposition to science as we have defined its outlines here. It is also, coherently, the premise in what is called physical science, for attacks against the Christian doctrines of consubstantiality and "filioque," a Cartesian form of anti-Logos doctrine.

By axiomatic assumption, the Cartesian method and its derivatives exclude consideration of all issues bearing upon higher hypothesis, or, in other words, that creative mental activity which uniquely and absolutely distinguishes man from the beasts. The only qualified exception to this, in the case of Descartes, for example, is in the domain of *deus ex machina*. Descartes is willing to permit the existence of creative mental life, as the quality of a *deus ex machina*, and as individual man's participation in such a quality; but for him, this quality in individual man, as in God, is *ex machina*, not locatable within the universe.

This Cartesian method of assumption, minus Descartes' reflections on matters of *deus ex machina*, is the characteristic feature of the French eighteenth century materialist Enlightenment. It is this feature which makes that Enlightenment relatively superior as an intellectual system to British empiricism, more persuasive among dupes of the sort who take pride in thinking their logical constructions through consistently. (The British empiricists view consistency as "the hobgoblin of small minds," and thus pride themselves in their inconsistencies.) Following the 1815 Congress of Vienna, after which Lazare Carnot and his circle were ejected from control over the Ecole Polytechnique, the destruction of French science was begun by Laplace, who rid the curriculum of Monge's program in geometry, and introduced a doctrine of statistical mechanics consistent with the Cartesian method. Laplace's function as the Genghis Khan of France's science, was superseded by the more extensive destruction directed by Augustin Cauchy working under the foreign direction of the Rome-based Venetian agent, Abbot Moigno. By the 1860s, this campaign had virtually taken control of leading scientific institutions and science journals throughout continental Europe. Since then, that usurping view and its offshoots has become entrenched in the universities and professions.

Hence, the mechanistic quality of what is generally accepted as scientific thinking today. Hence, the proposal to place all human experience and knowledge under a common roof, as permeated by a common set of fundamental assumptions, is seen as an attempt to impose a method upon the social sciences and art.

Therefore, as we propose that the same principal of *potential* we recognize from the internal history of physical science, is equally the most fundamental principle of individual and social mental life and consequences of

social behavior, it must tend to be assumed, however wrongly, that we are identifying the notions of "potential" associated with an axiomatic-algebra interpretation of mathematical physics. It is assumed that we are projecting the probability that a system in a state ultimately equivalent to some scalar measure will become an altered system whose state is equivalent to some other value of the same scalar measure. In other words, it is assumed wrongly that we locate the definition of "potential" within the bounds of simple hypothesis.

The characteristic of potential functions, as the work of Riemann, Weierstrass, and Cantor aids us most notably in conceptualizing such features of physical processes, is that in the case the ontological basis for potential is properly defined mathematically, "potential" corresponds to a continuously acting principle of causation whose effect is to process that on which it acts through successive phase shifts. Such a phase shift is distinguished mathematically by the emergence of a new singularity in the continuing process, with the accompanying result that a discontinuity appears, and that this discontinuity defines the mathematical impossibility of describing the new local laws of the universe with the same formulations which seemed adequate for describing the effects of the previously prevailing local laws of the universe. In other words, the array of physical principles immediately underlying the behavior of the process has been altered as if in some of its fundamental assumptions. This alteration is comprehended by means of mental behavior congruent with the principle of higher hypothesis. Moreover, such successive phase shifts represent an ordered series of transformations all determined by efficient action of a single principle of action subsuming each and all of these successive phase shifts, a principle of action congruent with the notion of hypothesis of the higher hypothesis.

Such a principle, congruent with the notion of hypothesis of the higher hypothesis, is the *ontological* principle underlying proper notions of *potential*.

The apparent difficulty becomes a practical difficulty whenever a person whose mental life excludes anything but simple hypothesis, demands that potential be explained entirely "in my terms of reference." *He is demanding a definition of notion of hypothesis of higher hypothesis which does not violate any of the assumptions of simple hypothesis!*

Therefore, a science of mind cannot exist unless we begin with proof that the standpoint of simple hypothesis itself must be rejected before any crucial features of mental life could be intelligently discussed.

In the science of mind, the potential to be associated with the most characteristic features of a particular culture is rightly described in first approximation as a relative potential to do good or to do evil. Additionally, we must consider the rate of development of the power to do good (or evil), and the level of practice from which that process of self-elaboration of the potential pro-

ceeds. We begin with a principle which either converges in direction upon the Logos, or proceeds in the opposite direction, an anti-Logos. We consider the *method* by which that unfolding is determined, as one method may be more adequate than another in determining the rate of progress. We consider the level of development from which projection of that progress is studied.

We also consider the means by which a society's potential may be transformed from one quality to another. We consider, first, the principles governing the conversion of a culture from an anti-Logos direction to a Logos direction. We consider improvement of the common principles of discovery embedded in social practice, by which the rate of progress may be increased. We consider the levels of moral practice and scientific knowledge associated with arrival at some point of development. We also consider changes in the opposite direction and quality. This is the bare outline of the principles of a *science of culture*.

Culture in Pre-History

Study of Vedic and pre-Vedic calendars, begun essentially by Johannes Kepler and continued through, essentially, the lifetime of Karl Gauss, was the broad basis of reference upon which India's Tilak wrote his *Orion and Arctic Home in the Vedas* at the turn of this century. The astronomical observations and numerical calendar values given for those observations, date Vedic culture and astronomy to between 6,000 and 4,000 B.C.—referred to the period the equinox was in Orion—and also shows conclusively that other features of the calendar could have been constructed only by a population conducting these observations of the indicated polar constellations during part of the period of the last great glaciation of the northern hemisphere. Tilak suggests a dating prior to 8,000 B.C. Later knowledge developed on the causes for and patterns of glaciation provide a much earlier dating for the possibility of such polar observations. Moreover, the calendars in question include rather accurate determination of verifiable cycles longer than 1,000 years, plus one very long, verifiable galactic cycle. This is a very, very sophisticated accomplishment for a human culture so ancient. Moreover, among the long cycles studied is one, astonishingly accurate long cycle for the migration of the earth's magnetic North Pole!

Forget the mystical, racist hogwash which cultists such as the Thule mythologists have constructed by reference to mere aspects of that evidence. This evidence is central to the most important empirical evidence we have concerning the principles of rise and collapse of human cultures.

The evidence of polar calendars is conclusive to the effect of showing that an urban culture of considerable duration existed in the polar regions during the intragalactic period indicated, and that this urban culture was

a maritime culture using the magnetic compass as supplement to astronomical observations in navigation. Many kinds of evidence could be confused; the known ordering of astronomical processes has served to prove that Claudius Ptolemy was an outright faker, who simply plagiarized and widely distorted an earlier Greek astronomy without any of the assumptions which characterized his own system. Astronomical development is accurately reconstructable well within the range of the mere few decimillennia involved, and reasonably accurate astronomical calendar observations by ancient cultures are the most reliable sort of evidence we could ever obtain concerning such ancient cultures. Those conclusions about such cultures which we are obliged to adduce from such evidence are conclusions of greater authority than might be adduced by any ordinary physical experiment today. This is evidence of a *universal* import.

Into about 4,000 B.C. therefore, there was a continuous succession of cultures, traceable from the polar region into central Asia, which based the organization of social life upon the central principle that the universe as a whole was ordered by regular principles, and that improvement of social behavior depended upon continued discovery bearing upon knowledge of such regular principles. For more than 10,000 years before 4,000 B.C., there had existed a form of (originally) urban maritime society (originally) employing both astronomical observations and the magnetic compass for navigation.

Economic science today permits us to adduce certain other features of this ancient development, and to adduce those with certainty. At the outset of the preceding chapter, we mentioned Dr. Parpart's estimations for the potential relative population density of primitive society: between ten to fifteen square kilometers per average individual, defining a maximum human population of our planet of not more than approximately ten millions persons. We mentioned also, the determinable life expectancy for such a primitive culture as significantly less than twenty years, a culture whose level could not be favorably compared with that of troops of stronger and faster baboons. The question posed thus: *How is it possible for mankind in such a state to rise above that state by means of any development occurring within such a culture?*

In all ancient sources bearing upon this question in the history and pre-history of mankind, there is only one report which suggests an answer acceptable to economic science. This is the account which the Roman historian Diodorus Siculus gives of the oral history of the inhabitants of present-day Morocco during the first century B.C. This oral history, as given by Diodorus, states that during the eleventh millennium B.C. (according to Egyptian datings supplied by Plato in his *Timaeus*, etc.), a party of colonists arrived in that region by sea, and established an urban colony in an area then inhabited by a primitive people living at about the level

indicated by Dr. Parpart's estimates. These people of the sea introduced agriculture to the primitive people.

This account is corroborated in key features by other fragmentary evidence. For example, classical Greek food names frequently allude to the region of the straits of Gibraltar. The dynastic lists for Egypt given by the Egyptian priest Manetho give a matching account, even to the names of the earliest dynasties, tracing the introduction of the agricultural revolution into Egypt to about 8,000 B.C., a dating which overlaps the earliest dating for the agricultural revolution we have presently from dating age of fossil seeds. Whence could such arriving colonists have acquired knowledge of the agricultural revolution? Here, the pre-Vedic calendar evidence assists us, by showing that advanced maritime urban cultures existed long prior to the Egyptian datings for the events described in the account of Diodorus Siculus. Economic science provides us the general solution to the stated and implied questions.

The key is the measurement of usable energy available per square kilometer. The level of biological reproduction potential is determined by the minimum value reached by a continuous supply of usable energy per capita. In what aspect of food gathering culture at the most primitive level is the supply of usable energy for human existence sufficiently concentrated to permit qualitative increase in population density? The answer is *fishing*, especially fishing near the mouths of important river systems.

The sequence of human development commonly given by anthropologists is: (1) hunting and gathering society (primitive society), (2) animal husbandry, (3) small garden patches supplementing animal husbandry, (4) agricultural revolution, (5) "hydraulic" society—urban culture based on water management near the mouths of large river systems. The Diodorus account and other evidence already cited give a different sequence: (1) fishing, (2) maritime culture leading into fixed urban settlements based on development of navigation through aid of astronomy, (3) development of the agricultural revolution by urbanized maritime society, (4) collapse of wide-ranging maritime culture shifting the center of culture to a culturally lower level based on development of "hydraulic" societies around colonies of the collapsed maritime culture.

This, together with massive accumulations of correlated evidence, refutes crushingly the delphic falsification of the principle of progress associated with Professor G. W. F. Hegel, and to a large degree also with Karl Marx and the "classical Marxists." In human existence, there is no automatic progress, such that a successor form of society is necessarily of a higher state of development than its predecessor. Relative to the classical culture of Athens, the "spartan" Roman republic and empire were a disaster to mankind from the beginning. The characteristic feature of most of known history of politically powerful cultures is their self-induced

moral and physical collapse. The evidence is, that what anthropologists have attempted to classify as primitive cultures, in the Americas' "pre-Columbian" forms for example, are usually nothing but a few scattered, decayed relics of the internal moral and physical collapse of an earlier, far more advanced level of culture.

There is a *principle of progress* in human existence, not any automatic certainty that the most recent is the best. The principle of progress is of the form of hypothesis of the higher hypothesis. If the ordering of development of culture coheres with that principle, then "automatic" progress does ensue and persist for as long as that ordering persists as the dominant feature of the culture. If the contrary ordering dominates, the self-destruction of that culture and every people ruled by it, is more or less "automatically" assured.

The evidence of both transpacific and transatlantic cultures long predating 1,000 B.C. is conclusively established. Although the cultures of the indigenous populations of Peru and Mexico were at a much higher level at the beginning of the sixteenth century than they were after a century of Genoese looting under the Hapsburgs, it is conclusively demonstrated that the culture of the region of Mexico during and earlier than the Christian era is broadly a process of cultural degeneration from a much higher level of leading culture before 1,000 B.C. The ancient Mayan culture could not have been produced by a population practicing the culture which the Mayans attributed to themselves over the indicated recent millennia. The culture of the Indian tribes of North America is essentially a product of degeneracy, not the representation of some original state. Satellite views of Peru show that the Incas were a long way down the cultural-evolutionary ladder from what had been achieved by their ancient predecessors.

Interesting in this connection is the case of the *Odyssey*, which records with verifiable precision of detail for reconstruction a voyage in a craft much resembling a Viking longboat, through the Straits of Gibraltar, across the Atlantic, into the Caribbean. Later, this party moves up along the coast of North America, across to northern Europe, with Ulysses proceeding chiefly overland to his home at the southern extreme of the Adriatic Sea. From archeological sources, we know that such ocean craft were characteristic of a period into the "dark age" at the beginning of the last millennium B.C. The content of the *Odyssey*, the reconstructable features of the voyage in particular, show knowledge of the nature of such a journey existing approximately 2,000 years before the Viking explorations and colonizations of North America.

It has been recently discovered that a set of Chinese bells dating to about 1,000 B.C. is well-tempered, signifying a more advanced musical culture existing in that region then than is known to records of Chinese musical culture since. Although well-tempering is associated with the work of al-Farrabi during the tenth century

A.D., and Bishop Zarlino (1517–1590) in Italy, al-Farrabi asserts that this knowledge was already very ancient during his time. The existence of well-tempering knowledge among the opponents of Aristotle is verified. Al-Farrabi based his work on such sources, and Bishop Zarlino's work was prompted partially by the wide influence of al-Farrabi's own work on European musical thought and practice into the thirteenth century, as well as the work of such fifteenth century figures as Cusa and da Vinci—possibly in part directly da Vinci's lost book on music.

The relevance of the subject of well-tempered scales to our general sub-topic here is that the author and his collaborators have demonstrated that the discovery of the well-tempered principle depends upon the point of departure of a conception equivalent to the isoperimetric principle, and is determined precisely by projection of a self-similar conic spiral onto the circular base of the cone. The implication of this demonstration is that such notions arise "naturally" from applying the verb "to create" to a rigorous study of astronomical evidence. Although we can merely infer, if rigorously so, that ideas in this direction were implicit in the pre-Vedic arctic culture, we have more precise indications to related effect from the interaction of the Egyptian temple of Ammon with classical Greek culture, as well as leading internal features of Mosaic Judaism. The specific kind of monotheism of both the temple of Ammon and Moses converges, at least, upon the consubstantial doctrine of monotheism of Plato's *Timaeus*. The essential part which the notion of hypothesis of the higher hypothesis performs in the *Timaeus*, and the interdependence of that with geometrical notions rooted in a version of the isoperimetric principle is rigorously demonstrated.

It is only necessary, if we are to make such argument conclusive, to show that in Plato's classical Greek, for example, the verb "to be" is sometimes employed in the self-reflexive form of "It causes itself to become." If physical geometry is defined by a notion equivalent to the isoperimetric principle, and if the evidence so ordered is defined as data from the standpoint of the verbal, rather than the nominative form, the rigorous development of astronomy for aid of wide-ranging navigation is adequate empirical basis for discovering the existence of a monotheism like Plato's from the evidence of nature.

This is not to project such an advanced form of monotheism upon the pre-Vedic arctic civilization of interest to Tilak. It is only to indicate that such an urban maritime culture was on the track leading toward such advanced notions. Otherwise, it indicates the reasons why the development of the well-tempered system in music tends to reflect the course of development in such directions.

In the same vein, we must compare the degraded conception of man and nature embedded in the writing

of Hesiod with the heroic conception of man of the *Iliad* and *Odyssey*, the latter conception better, more clearly defined by Aeschylus. Aeschylus's *Prometheus* rejects the evil gods of Hesiod's pantheon as usurpers, and references a higher power, implicitly the Composer of Plato's *Timaeus*. It is provocative to read what Diodorus Siculus reports the ancient Atlas people to say of the Hesiodic pantheon, that all these supposed gods were nothing more than a principally rascally collection of fellows whose civil strife destroyed the culture of the urban maritime colonization of their region. As corroborated by Manetho's king lists for Egypt, the victorious scalawags of that ancient Moroccan strife employed their maritime culture to colonize regions of the Mediterranean, imposing the worship of their ancestors and associated mythologies upon the credulous subjects of these colonies.

The Hesiodic pantheon was evil enough. The substratum upon which that pantheon is superimposed embodies the essential evil, the anti-Logos principle. This substratum is the Chaldean-Philistine system associated with worship of the earth goddess (Shakti, Ishtar, Astarte, Isis, Cybele) and her phallic-symbol son (Siva, Osiris, Satan, Dionysos) and also with a third male figure (Horus, Lucifer, Apollo, etc.). This substratum is the irrationalistic, hedonistic doctrine of "blood and soil." Together, the Hesiodic sort of pantheon and the substratum, define the characteristic theology of oligarchical culture. The Hesiodic pantheon symbolizes the capricious tyrannies of a degraded, squabbling collection of families of an ancient "jet set." The philosophical world outlook congruent with such ordering of society is the degraded belief-structure exemplified by the cult of Isis-Osiris-Horus.

The contrast between the Promethean man of Judeo-Christian monotheism and the degraded man in the alternating images of Apollo and Dionysos, is paradigmatic for the deeper study of cultures. The first approximates a culture based on the principle of the Good, the latter cultures based on the principle of Evil. The development of mankind according to the ordering principle provided by the first coincides with the cited injunction of the Book of Genesis: mankind must "Be fruitful and multiply, and fill the earth and subdue it." The fulfillment of this injunction is measured as increase of potential relative population density. The study of advances in technology, by means of which this injunction is fulfilled, compels us to probe the principles of discovery common to successive advances in technology. This obliges us to advance toward discovery and mastery of the notion of hypothesis of the higher hypothesis.

Good is the principle of beauty and love, akin to the joy of a child in discovering new knowledge to replace earlier beliefs. Joy and beauty are a world of such surprises, a world of ironies which are beautiful because they are lawful. This beauty is a sense of *freedom*. Not freedom to violate the law, but freedom to discover the

limitless advancement of human knowledge and of the human condition available to mankind through mastery of the law.

Evil is the principle of the wicked child's rage against the parents who threaten to "interfere" with the impulses of infantile, irrationalistic hedonism. Evil is therefore essentially hateful against Reason and all that Reason implies; it is the dionysian terrorist's hatred against Reason and against the urban culture which destroys the bestial freedom of fang and claw of the wilderness. Evil is Friedrich Nietzsche and Fyodor Dostoevsky.

Good in culture is the rule of prometheans over the apollonians and dionysians. Good in the individual is the subjugation of the evil of infantilism within himself—the enslavement of the Apollo and Dionysos within himself. On this account, the Good culture is "authoritarian" in the hate-filled eyes of the Nazi follower of Nietzsche or Dostoevsky, "authoritarian" because it represents Reason's "suppression" of infantile bestiality, irrationalism, by Reason. To all good men, a society according to the model of Sparta—the freedom of the beast unleashed in the form of man—is an evil tyranny, from which mankind must be liberated. So evil modern men, like Nietzsche, hate Friedrich Schiller, hate Socrates, and are determined to eradicate from culture the image of Jesus Christ, as Adolf Hitler was so determined.

Human culture is primarily the struggle of Good to eradicate Evil from this world. It is not a Manichean struggle, to be foreseen as alternate periods of rule by Apollo and Dionysos over endless eras. It is a struggle to eradicate Evil from culture, and to eradicate therefore cultures which are evil. It is at the same time, a struggle to define the process by which the evil of the newborn infant, that infant's irrationalistic hedonism, is brought under the control of and ultimately destroyed by the spark of the divine, the potential for Reason in that same infant.

It is in that latter respect that the principles of culture, as we have thus far described those principles, determine what is more or less conventionally identified by the term culture in scholarly opinion. Culture is the elaboration of a principle, which principle is more or less Good or Evil, to shape both the education of the infant, child, and adolescent in society, and to shape also the body of ideas of practice which the adults employ to educate the young. Culture is essentially the development of the potentialities of the new individual, essentially through his or her sixteenth to eighteenth birthday, as Wilhelm von Humboldt's program for primary and secondary education addresses this principle. Otherwise, culture is the developing body of ruling ideas, according to this principle, which governs the aggregate practice of a society composed of individuals whose potentials have been developed in that way.

The general approach required for a science of culture applies the conceptions we have thus far developed

to the outline afforded by Dante's *Commedia*, together with other writings focussed upon the same issues. What culture is, is measured first by finding the place on the "ladder" of the *Commedia* on which that culture is located, and at the same time, determining whether the motion of that culture is up or down the ladder.

The Individual Within Society

As we have suggested so far, the issues of development and dysfunction of individual psychology are broadly the same as those we have considered for societies taken in their entirety. However, it should not be taken as implied by this that an individual is in some sense merely an average quantity of his or her society. The individual within society is in each instance to be examined as we examine a *singularity* in a physical process. First, each newborn individual begins at the lowest level of human existence, no matter what the average level of development of the society in which that individual is born. The individual is born the most primitive of human beings. Second, all creative discoveries, on which the continuance of society as a whole depends, are produced by individuals, "within" individual minds. It is the development of the new individual, and the function of those individual creative mental potentialities, which prompts us to view the individual as a singularity.

These two considerations are not yet sufficient to define the elementary issues of individual psychology. The immediately controlling feature of individual behavior is a feature of mental life best described as the individual's *sense of personal identity* within society. It is necessary to combine the development of the newborn individual out of bestiality, and the function of individual potentials for mental creative powers within society, with functions of *shifting senses of personal identity*.

Thus, we distinguish the individual's psychology from the development of the culture of the society of which that individual is a member.

As in the case of society as a whole, the desired progress of the newborn individual is out of the "Inferno" into which the individual is born, through the "Purgatory" of childhood and adolescence, into the "Paradise" of that rarest of exceptions in society today, the true human adult, the citizen of "Paradise." Just as such an upward development of the moral composition of the individual mind represents sanity, so abortion of that development, or retrogression to or toward the infantile state is insanity.

From the standpoint of society's fundamental self-interest, the function fulfilled by the individual is located within the individual's potential to become or to approximate the work of a scientific discoverer. In the latter instance, the greater the number of practicing such scientists in a society, the greater the rate of scientific discovery of the society as a whole. The existence of

kindred qualities of problem solving powers by individual laborers at each point within the social division of productive labor works to similar effect. The more individuals who have each developed such creative mental powers to some significant degree, the greater the progress of society in respect to increase of potential relative population density.

The healthy, sane sense of personal identity within the individual is a sense that he or she is needed by society on account of such creative mental potentials, and that therefore his or her needs according to the requirements for performance of that function, are a right fulfilled by virtue of society's self-interest in his or her performance of such functions. Not simply "I am useful," but "I am useful because of the contribution my development of my creative mental powers makes to advancement of society's potential."

The sense of personal identity, except in personalities crippled by psychological dissociation, is broadly defined as occurring in three distinct general forms. First, there is the sense of social usefulness which may appear in a denizen of the "Inferno," the beast-man of Thomas Hobbes's "each in war against all," the philosophical anarchist, irrationalistic existentialist. To him, he is a "self-made" individual, possessing what is to be credited only to his own activity. For him, society is never more than a more or less indispensable referee of the "war of each against all," a referee who, hopefully, might be bribed or misled. Second, there is the individual in "Purgatory," who has a sense of social interdependence. He does not count all he has as the gains of a "self-made man," but as his rightful share of the goods a society awards to moral individuals doing their duty. Finally, there is the citizen of "Paradise," whose sense of identity and self-interest are focussed upon improving society itself, and who gauges his individual tasks and contributions as implicit benefits to society according to that principle.

In all categories of self-interest and identity so defined, there is generally a continuing conflict with the infantile residue. This is associated with the Seven Deadly Sins. However, it is wrong to regard the goal-seeking impulses associated with such categories of behavior as fundamental. Fundamental is the state of anxiety, bordering upon rage, which is associated with the denial of such impulses. Corrupted persons are not corrupted by money, sex, awarded social status, and so forth. The essence of the corruption is offering money, sex, social status, revenge for real or imagined grievances, and so forth, not as something given, but as something promised, as temptation. To satisfy the lust is to quell it. To manipulate corruptible persons by their infantile impulses, one must not quench the infantile appetite addressed; one must *tempt* them. A nibble of the apple, not the entire apple, is exemplary of the point—just enough taste of satisfaction to tempt, but not to satisfy, enough to quicken the appetite, not to quench it. One must

intensify the anxiety, and turn the rage associated with anxiety—financial anxiety, sexual anxiety, status-anxiety, and so forth—against what one is tempting them to betray. To control corruptible persons, one must never satisfy a lust until the temptation of a greater lust commands them. One must not pay the corrupted dupe \$10,000 until nothing will satisfy him but \$100,000. If his anxiety demands \$1,000, give him an initial \$50 or \$100, thus intensifying his anxiety for the \$1,000. "Promise him everything, but give him Arpège."

People are cheaply purchased by such tricks. Many people explicitly, most people implicitly. We live in a very infantile society.

In such instances, moral behavior becomes a perceived impediment to relieving the infantile anxiety. Rage is turned against the impediment. This rage has the force of *negation*, in Kant's sense of negation, but to opposite effect. By negation of the negativity of negation, through rage, willful criminality becomes the state of the personality, replacing the imperative to be a moral personality. So, thirty pieces of silver turned Judas into a criminal.

The only *potential*—as we have defined potential here—for combatting that infantile anxiety rage within the person is a force illustrated by a child's delight in discovery. The joy of discovery is not the object discovered, but the discovery of a power of one's mental processes to effect such discovery. It is the childlike joy of illumination of one's state of mind with experience of one's creative mental powers, a passion akin to love in the deepest meaning of love, which becomes preferred to infantile rage. The desire to experience this state of illumination, by means of developing that creative mental power, is the source of energy by which the individual in society is civilized.

Negativity, fear of lawful authority's powers, may induce moral behavior, and may serve as the major part of the "conditioning process" of negation of the negation by which members of society are induced to adopt the identity of moral persons. This is perhaps useful and necessary, if nothing better is supplied, and yet it reinforces the individual's susceptibility to infantile regressions, since the principle of negativity can be applied to reverse the process of moralization of the individual. It is only a moral sense of identity based principally upon the excitement of illumination by successive mental creative breakthroughs which can produce a more durable result. Only such illumination can carry the individual into the precincts of "Paradise."

The essential objective of education and cohering aspects of impact of culture upon the individual is to make the individual predominantly a creative personality, and also to cause that individual to become conscious of those qualities of mental life within himself which are associated efficiently with successful mental creative actions.

A case in point. During the middle 1960s, there was

a program in full swing among black ghetto victims in the United States, seeking "affirmative action" in seeking employment in construction jobs. The objectionable feature of this "organizing activity" project was not, of course, the effort to secure employment for unemployed. The wicked twist within the organizing activity was the slogan to the effect that "white people rely on brains" in employment, whereas "black people are useful for their muscle." This particular project was merely typical of a wide-ranging approach to "community organizing" during that period, otherwise typified by the mythos of "black soul." The fact that individuals of African extraction happen to possess equal potentialities for development of creative mental powers was denied. An emphasis upon physique, combined with a "blood and soil" mythology, was willfully substituted by the brainwashers for the human qualities of people. A degraded sense of individual identity was externally cultivated among the targets of this brainwashing activity.

It is a grave, fundamental error, to propose that human mental behavior can be divided into compartments, such that rational (e.g., "logical") behavior can be separated from emotional behavior. Most professional judgment, business executive decisions, and so forth—the assumedly rational, professional activities of mind—are anything but dominated by emotional life. It is only an equal error of a different sort, to view evidence on this point as representing an "intrusion" of the emotional into the rational domain. All intellectual behavior is essentially "emotional." The emotions associated with the individual's adopted sense of personal identity in society, as each situation for decision represents an aspect of society as a whole, are the source of the "energy" of thought, to the effect that some potential lines of thought, conceptions, and so forth, are "energized," and other possibilities either rejected or left relatively inert. It is "emotion" which selects what will be thought, and how the process of thinking in such terms is sustained. That "emotion," in turn, is controlled by the individual's sense of personal identity in society.

The seeming paradox in that report is the implied attempt to portray scientific behavior, for example, as composed of "emotion," and therefore "essentially irrational," at least in the sense we associate "emotion" with blindness to logic, as something of a quality alien to logic. The paradox is caused to vanish by referring the issues involved to our definitions of potential.

The individual's sense of identity is at first inspection a complex of ontological assumptions of the most generalized sort. The center of these assumptions is the ontological problem which situates the individual within society. This is amplified by the ontological problem of mortality. This is amplified by ontological assumptions underlying general notions of cause and effect in the universe. As noted earlier, the latter is amplified by a choice between the nominative and verbal form of

elementary datum. All this is intermingled as one conception, a potential for thinking—in the most generalized way—about that individual's actions within society. It is this potential which acts upon each decision. All emotion is cathexized to this potential, this governing sense of personal identity.

This does not render scientific judgments less scientific, less "objective." Rather, it locates the possibility of Reason in judgment in the scientist's choice of sense of personal identity.

In light of our earlier discussions of this general principle, our point here is made clearer by restating it: all significant thought is implicitly of the form of hypothesis, the conditional subjunctive. Thought is therefore assorted among four general categories: (1) Irrationalistic, (2) Simple Hypothesis, (3) Higher Hypothesis, (4) Hypothesis of the Higher Hypothesis. In the latter two cases, the action of thought is most essentially action upon the assumptions associated with the thinker's sense of personal identity. The thinker does not act against his sense of personal identity, in such cases; rather, it is his sense of identity that he must continuously seek to improve the specific assumptions underlying his philosophical world outlook by these means. In other words, the location of his sense of identity is verbal, rather than nominative. In the instance the thinking is of the form of simple hypothesis, the assumptions in their fixed form are affirmed. Decisions about detailed features of the social universe are brought into approximations of consistency with those fixed assumptions. In irrationalistic thinking, the sense of identity is located in the infantile impulses, augmented only by sly assumptions respecting the manipulation of the social universe according to the requirements of those impulses; decision's purpose is to realize those impulses while also acting to bring the social universe into agreement with the manipulative assumptions. It is in the axiomatic assumptions associated with the controlling sense of personal identity that the question of the rationality of the decision lies.

Individual psychology is therefore properly situated within a preliminary inquiry into the connection between scientific thinking and the impact upon the attempt to form scientific judgments of elaboration of the assumptions embedded in an individual's controlling sense of social identity. To accomplish this, scientific thinking must first be reduced to its underlying, ontological assumptions, and these compared with the ontological assumptions associated with a sense of personal identity. If the two sets of assumption are congruent, the elaboration of personal decisions will to that degree be congruent with the lattice-work of theorems derived from the scientific assumptions.

Thus, to corrupt a scientist, try first corrupting his wife and family. By wrecking his sense of personal moral identity, you will destroy his scientific productivity. Degrade him as a man, and you degrade him as a sci-

entist. Accordingly, it is not unusual that a scientist seeks to secure his scientific identity by erecting barriers to protect his personal flanks, to neutralize those channels of social influence by which he might become personally corrupted and thus cease to be effectively a scientist. The same applies to the individual in every profession, in elected and other political office, in the military profession, and every other case.

These indicated general features of the problem of the individual within society lead our attention to the crux of the practical matter here: the individual represents a potential which is interacting with the different value of potential expressed by immediate peer groups, family, society in general, and so forth. Each social grouping with which the individual interacts has approximately a distinct potential of the varieties we have listed. So does the individual. At the same time the intellectual development of the individual and the reference group are unequal. Not only does the behavior of the group converge with or conflict with the imperatives of the individual's sense of personal identity, the individual's personal sense of identity implies a kind of society coherent with that identity, which the group's potential as a whole may or may not fit.

Without considering the permutations of alternate kinds of interactions of individual with groups which this implies, the leading point to be offered at this juncture is located by posing the question: What is the significance of the individual's being higher or lower in moral quality of potential than the group of reference? All of the most interesting permutations which might be considered are implicit in such a question. The question is also posed in the form: What are the implications of the conflict between the individual's present choice of moral identity and a different choice by the individual implicitly required by the group?

The most interesting of the set of permutations implied by the two forms of the question just given is the nature of the changes in such interrelationships as the group itself rises higher or lower on the ladder of Dante's *Commedia*, or as the individual rises and falls relative to the movement of the group's potential. We consider only some indicative cases from among the range of permutations.

From the standpoint of the developing individual, the most oppressive kind of society in which to be born is a society of rigidly fixed culture. By their nature, all such forms of society are either within the "Inferno" or on one of the lower rungs of "Purgatory." Such societies resist development, and therefore impose a more or less characteristic "other-directedness" on their members. It is as if no one in such a society is permitted to have an individual soul, but only to participate in a shared collective soul. It is a dull, monotonous society, a pressure cooker society seething with potential axe-murdering berzerkers, a society of quiet men and women who butcher their entire families one night, a society

of families prone to incest, to periodic, more or less ritual eruptions of "letting the inner sow run loose." The paradigm is the technologically stagnant form of rural life under feudal or quasi-feudal circumstances of land tenure and village social hierarchy. On the lower level, this is the culture of the rural Sicilian Mafia and the notorious Old Believers (*Raskolniki*) of Russia.

A fixed culture is at once characterized by codes of conduct which are on relatively higher or lower rungs of the ladder as codes of conduct by the group within society, such that a group within the lower rungs of "Purgatory" of this sort is to be preferred to such a group on the rungs of the "Inferno." Yet, the relatively moral grouping of such fixedness is at best deceptively moral; it is incapable of true love, as a cultural type, and is moral only by means of negativity—Kant's negation of the negation—and is therefore a society which often uses its morality as a license for great, immoral acts of cruelty in the name of punishing offenders who breach the code. It is a society which keeps order by keeping its members in pigpens, moral pigstys called "homes" usually. It is either a dionysian society, as a society of *Raskolniki* must be, or an apollonian society of bestial Cadmuses wearing their Sunday clothes on way to church meeting. It is English Victorian society, which butchers and loots entire colonial nations, but which renders outcast a woman who shows an ankle in public, or a man who speaks publicly of the fact that ladies also walk on legs. It is like the society of Lady Chatterly, a respectable British lady with certain habits which are not made public by gentlemen. It is an apollonian sort of Victorian society whose characteristic collective productions are the sodomic Pre-Raphaelite Brotherhood, theosophical Lucifer-worshipping cults, John Stuart Mill's doctrine of irrationalist hedonism (utilitarianism), and the dionysiac Fabian Society of philosophical mass-murderers H.G. Wells, Bertrand Russell, and so forth.

The divine spark of humanity is development congruent with the principle of hypothesis of the higher hypothesis. The moral potential so expressed, moral as it is adopted as the central principle of social identity by societies, by cultural currents within society, or by individuals, is the characteristic feature of the sense of personal identity—to greater or lesser degree. It is the absence, or suppression of that spark which is evil.

The individual's moral conflict with his peers presents us, in the extreme, with two opposite moral types, the potential martyr and the criminal personality. An individual who rises morally above the potential of an "infernal" or lower rung "purgatorian" society or peer group, is much like the legendary "ugly duckling," as if a creature of a higher moral species than those among whom he or she is immediately situated, an "eccentric," whose supposed "eccentricity" is feared as an alien thing among the peers. Without a social mooring in a peer group appropriate to his or her moral nature, the "ugly

duckling" will become "eccentric" in fact; lacking a peer group of reference, corresponding to his or her moral sense of identity, the "ugly duckling" will tend to construct an arbitrary culture as an individual, a culture which is for the "ugly duckling" the establishment of a culture superior to that of the immediate peers. The individual dionysian—the anarchist or existentialist personality—will also tend to create a "sub-culture" with reference to the peer group, by negating the authority of whatever morality happily characterizes the peer group; he acts against morality because it is morality, out of rage and hatred.

The second principal class of conflicts between individual and peer group are of the form of conflicts between the individual's family household and society. This may be rooted in the differentiated morality among the households of a social stratum which otherwise participates in a common ethic. The most notable problematic features of such conflict are those rooted in the infantile personality's attachment to the "oedipal" image of the mother, either an actual mother or a transference of the idea of "mother" to an adopted surrogate, assigning this surrogate value either to a personality or a mere fantasy construct. To the infantile mind, "mother" protects the infantile ego from the obligation to be weaned socially. As long as the individual's sense of identity is "I am my mother's child," the authority of the infantile ego, the rejection of the social responsibilities of the weaned adult, is sustained. Most psychotic and neurotic behavior has, of course, this characteristic pathogenic core. This latter is the root of anarchism, existentialism, and so forth, as the autobiographical writings of the late Jean-Paul Sartre rather obscenely illustrate the point of connection. The pathological droolings of Jean Jacques Rousseau, or of Voltaire, exhibit the same pathology most shamelessly. The reek of incest in the writings of Friedrich Nietzsche and Fyodor Dostoevsky, is also illustrative.

A special case of this pathological influence of the idea of family is provided by the oligarchical family's rearing of its offspring. The idea that such families are "the best people," destined to rule over their inferiors, and the placing of the capricious will of such family as a matter of imagined right over society, is nakedly Hesiodic. This applies not only to nominally aristocratic families of such dispositions, but also large strata of the U.S. rentier-financier patrician class, the so-called blue bloods.

The republican principle, that all persons qualified to be citizens are politically equal as persons, members of the highest social rank tolerated in society, is not a "democratic" principle, but a political principle rooted in the harshest requirements of morality. Granted, societies require elites, but this only to the degree that someone must take efficiently leading responsibility for uplifting the majority of society not only to the moral qualifications of true citizens, but to assume the rights

and responsibilities of true citizens. The republican elite never considers itself biologically superior to the rest of society, but only as the most dedicated servants of the betterment of society as a whole. In the families of such republican elites, the rearing of the child is directed toward successful weanings, as John Adams prudently entrusted the adolescent education of his son, John Quincy Adams, to the greatest republican figure of that time, Dr. Benjamin Franklin, this to the great benefit of the United States at a later point. By contrast, the oligarchical individual is a permanently infantile individual, by virtue of the idea associated with the "family." The similarities of the typical oligarchical mind to the criminal mind are functionally determined.

In the promotion of sanity in individuals, the association of the principle of the citizen's duty and of fostering of technological progress in society with the induced goal of successful weaning, become thus the benchmarks of individual mental health. It is the development of a personality, a sense of personal social identity coherent with those benchmarks, which is individual mental health. The degree of individual mental health is the degree to which the elaborated sense of personal identity fulfills that requirement in all facets of mental life.

The paradigm for the production of mental health in the new member of society is republican education, approximately as Wilhelm von Humboldt and his brother Alexander defined this. The individual must situate his or her sense of social identity within a republican philosophical world outlook referenced to history, especially to the efficient connection between the internal history of ideas and the policies of societies and political movements. On this account, an education in classics beginning with and modelled upon the Greek classics is more or less indispensable to the development of a healthy personality. The rigorous treatment of ideas is developed within the new individual by correlating such approaches to history and history of ideas with a rigorous pre-science education, emphasizing a rigorous approach to geometrical, rather than arithmetic thinking.

Such education affords the developing individual a

reference point for comprehending and resolving sanely the conflicts which must arise to greater or lesser degree between the individual and society. The individual adequately so educated, instead of letting those conflicts set him or her apart from society, locates the idea of society in a republican comprehension of world history. It is man's struggle to develop civilization in a republican way, a struggle which continues through the present generations into the future, which becomes the individual's idea of the society to which he or she is personally accountable. The new individuals who develop such a sense of their place in history provide society its republican elite, the standard of reference for mental health in that society.

Mental health is reflected most efficiently in observing the individual's preferences in recreation. This is typified by the cases of music, drama, painting, and so forth. What the individual enjoys attests those states of mental life which afford that individual pleasure, which are closest to the individual's sense of moral personal identity within the constraints afforded by peer group practices. Irrationalism, dionysiac forms of dance, the infantilism of soap opera, and so forth bespeak the infantile mind, the non-sane individual. Whereas art which is premised on rigorous freedom, discovery according to the principle of higher hypothesis, bespeaks relative mental health. "Normal" can be a term to describe insanity.

From this vantage point—that of Plato, St. Augustine, Dante, Cusa, and so forth—mental health has always expressed itself as a political movement, a republican philosophical movement which is political in implications of its practice, a movement such as the Academy at Athens, or the design for a network of academies outlined by Leibniz. Mental health and the means by which it is produced as a cultural standard of reference by society, or by groups within society, are one and the same thing. A passive—politically passive—state of mental health cannot, by definition, exist. Mental health is Good, and Good must define itself by combat against Evil. Mental health is, like scientific discovery, always polemical in character. *Truth exists only in the form of polemics against Evil and falsehood.*

Note

1. Adam Smith, *The Theory of Moral Sentiments* (1759).