The truth of art consists in its power to break the monopoly which those in power exercise by defining what is real. The supreme merit of art is that it contradicts the version of reality that obtains in social and economic life.

Denis Donaghue.

In spite of the help that some celebrated pedants have brought to the natural stupidity of man, I would never have believed that our country could march with such velocity along the way of progress. This world has acquired a thick layer of vulgarity that gives the contempt of a man of the spirit all the violence of a passion.

Charles Baudelaire

Herein we propose to follow a thread that leads from the death of Newton to the philosophical, literary and artistic scene as it was at the end of World War I. It is impossible to do justice to 200 years of history in the scope of a single chapter; but this was a time when the Myth of Modern Civilization was taking form. So, follow that thread we must. We shall to confine ourselves rigorously to certain themes relevant to the changing mental landscape of the time in Europe and North America--to nibble at those parts most germane to our themes of mythology, to stress the essential mindlessness of Modern Civilization, and the manner in which it molds the minds of its inmates. Our primary topics are:

• How Newton's Myth underwent a sea-change as it crossed the Channel to Mainland Europe.
• How Newtonianism gave rise to the idea of Progress, a new ingredient added to the Myth. This package has been called: The Enlightenment.
• How we can understand the rise and fall of nation-states, and even of civilizations, in terms of simple concepts of Thermodynamics.
• How Newton's theory of light was overthrown, in what is arguably the most important experiment in the history of science--certainly an event of tremendous importance.
• The struggle between the rationalists and the empiricists; why did the former elect to ignore the phenomenon of hypnotism?
• How artists, composers and poets reacted against the Newtonian Cosmopolis.
• The Great War: its causes and its impact on Modern Civilization.

The Great Sea Change

We have seen that the Newtonian Cosmopolis was the subject of a kind of self-justifying Myth, having its origins in the English politico-religious Establishment. It was basically a story-line, concocted for the purpose of insuring the stability of the English class-structure after the collapse of the medieval world-view. This story-line captured the mind of Isaac Newton himself. By the time Newton died, his Myth, his Cosmopolis had become a software program for navigating through the humdrum of daily life, without asking any embarrassing questions. But across the
Channel there was another kind of nation-state, with its own Cosmopolis: France. In the 17th century Cardinal Richelieu had bequeathed to his countrymen a powerful, centralized monarchy, one that went on to exercise intellectual hegemony over much of continental Europe, even into the 19th Century. However, decades of despotism, carried out in the name of the Divine Right Of Kings had produced a tight censorship over art, drama, poetry and music, one that had a paralyzing effect upon the intellect of that country. After the end of the sixty-five year reign of Louis XIV in 1715, people began to speak up, furtively at first, in coffee houses--institutions which were multiplying wildly, and which were correctly regarded as dens of subversion and drugs (namely, caffeine). Books and pamphlets were beginning to appear, whose authors wisely published under assumed names. And of these authors, the most famous, was François Marie Arouet, who wrote under the pen-name of Voltaire. It was in the 1720's that Voltaire made a pilgrimage to London, specifically to visit Isaac Newton, and to ascertain the degree to which the Old Man's view was correct. Since early in the career of Newton there had been a split between him and the Cartesians over the proper explanation of the motions of the solar system. By the time of Voltaire's visit, some of the French had come to suspect that Descartes' view of the solar system had been wrong. But others, in their nationalistic pride, could not easily admit this; therefore a fact-finding expedition was in order. Hence Voltaire's mission to London, from which he returned to France as a convert to Newtonianism. "All you have to do is to divide the force by the mass, in order to get the acceleration," was all he had to say. Newtonianism promptly ignited a firestorm of interest in the French intellectual underground. However, this time it was Newtonianism with a difference, for its program did not include support for the Church and the Monarchy. It had even been said that progress would not be made until the last king had been strangled with the entrails of the last priest. (It was Denis Diderot who said this). Truly, the French Newtonians were there to destroy Cosmopolis, not to praise it; and there would be no Samuel Clarkes and Richard Bentleys on hand to save it from its fate. It was the French philosophers who had removed God, the absentee Cartesian monarch, from his throne on the rim of the world; and after the French Revolution of 1789, the little wheels of the human being and the automatism of the beasts would be left to tick over on their own, without Divine intervention.

By the time of Napoleon's empire, (1799-1815) the mechanistic world-view, the metaphor of the clockwork universe, had become entrenched as the dominant paradigm in France, from whence it swiftly spread to the rest of Europe. Pierre Simon de Laplace, the leading mathematician and astronomer of Napoleon’s time, was able to claim that, given enough information, we could predict the entire future--and for that matter, retrodict the past--of every particle in the universe, including those that comprise people. This myth, of a completely deterministic, mechanical universe, (a radical mutation of the Newtonian Paradigm), became incredibly contagious. In its earlier, Newtonian-Lockean version, it had had a profound influence upon the framers of the American Constitution, creating a machine for governing, its checks and balances ticking like the parts of a clock. Here in the United States it can be claimed that we live in the first mechanically-run country in history—the mind boggles at the intellectual daring of that idea, and its fragility, (especially now, at this writing, during the reign of Mr. Obama).

What Seemed to be Self-Evident at the End of the Eighteenth Century

As a result of the efforts of French philosophers and scientists, certain mutations had occurred in
the structure of the Newtonian Cosmopolis, giving it a new shape. Of particular interest to us again are the mythical ingredients—the unexamined assumptions, the things that “stood to reason” at the turn of the century.

- The Cartesian Theater. Following Descartes it became convenient to think of what is “together” in the Mind as having been brought together in a single place in the Brain—a place where the CinemaScope screen is located. And “you” are a tiny homunculus, who watches and directs the show on that screen.
- The Real World is what "you" are seeing in the Theater. The Theater Inside gives a completely faithful replica of the World Outside.
- Nothing Is In The Mind That Was Not Previously In The Senses. Thinking is merely the act of comparing new pictures with old ones that we have stored in our brains.
- The events in the Universe are like those which are seen by an omniscient Observer, looking in at the world from the outside.
- The world is constructed of atoms, carrying fixed properties, independent of the methods chosen to measure them. This is called "radical atomism."
- The Mirror Of Nature. A valid scientific theory is a faithful replica of nature. We "speak" the language of nature. Nature will not let us down.

**Le Progrès: A Dynamic Addition To The Myth Of Modern Civilization.**

During two muggy July days in Paris in the year 1750, a nervous young man named A. R. J. Turgot spoke at the Sorbonne, delivering lectures which he entitled: *Discourses On Universal History*. In reality, the topic was a concept he called *Progress*. Turgot conceived Universal History as the progress of the human race as it advanced, steadily though slowly, through alternating periods of calm and disturbance towards greater and greater perfection. Six years later, Voltaire was to write his *Age Of Louis XIV*, in which he claimed that wars and religions have been the great obstacles to the “progress” of humanity; and if these were to be abolished, together with the prejudices that engender them, the world would rapidly improve. Although the notion of “universal progress” is not something that can be verified in a laboratory, (and indeed, it is almost certainly delusionary), it became a vital part of the Great Myth of Modern Civilization. It even lent to Civilization the appearance of a certain rightness and inevitability. It is both of these last items that we need to call into question.

In retrospect, the notion of Progress seems to have played the same role in the subjugation of the indigenous peoples by Western Civilization that the slogan “God wills it” played in the Crusades: a magic word used to justify wholesale slaughter. Indeed, it is impossible to exaggerate the importance of the myth of Progress as the software of Euro-American imperialism—attempting to justify the deaths of perhaps 50,000,000 indigenous people in Africa and the Americas. And it has continued to play a vital religious role in the structure of Modernism, the Modern Cosmopolis. Of course, we have been hearing rather less of this mantra of late --and for good reason.

**The Thermodynamics of Greed**

After the Treaty of Westphalia in 1648 signaled the end of the 30 years’ War, the first two powerful nation-states that emerged were England and France. During the following 165 years it
is a documented fact that these two nations were almost continually at each other’s throats. The warfare was not a result of religious misunderstanding as Voltaire had claimed; instead it was a question of world dominion. It must be pointed out that in human affairs, Religion and Monarchy are secondary; Power and Control are primary. In the second half of the 18th century England had been the beneficiary of that major technological breakthrough which we call the Industrial Revolution,\(^8\) and became for a long while the most powerful nation in the world. England's rise was ultimately the result of the invention of an improved steam engine by the Scottish engineer, James Watt, making it possible to mine coal at depths below the water table. It was the Industrial Revolution, combined with an extensive colonial system as a source of raw materials, which made it possible for The British Empire to dominate the globe for more than 150 years. What was not apparent, was that the Empire itself was operating according to the same Thermodynamic laws as Watt's Steam Engine.

Napoleon's defeat in 1815 caused a great deal of soul-searching on the part of a disconsolate young French officer, Nicolas Sadi Carnot. Carnot realized that England had won as a result of its superior industrial power--a power that in turn rested upon mastery of the steam engine. Therefore he set himself to the task of understanding the basic principle of the heat engine\(^9\), of which the steam engine is but one example. When looked at from the proper angle, the heat engine is quite simple; and Carnot was able to formulate its basic law without even understanding that heat is really a form of energy! His results were quite revolutionary, and in a short period of time he was able to invent the essentials of the science of thermodynamics.\(^10\) What Carnot had discovered was that all heat engines are basically the same. Any system which takes in fuel and does work, must function in accord with the Carnot paradigm: steamships and autos, as well as houseflies and humans, cities and nation-states and even stars—they, and we also, partake to some extent of the nature of the humble heat engine. Carnot started by using a simple analogy: that of water flowing through a mill. Since this line of thought is such a simple one, let us follow it, and see where it leads us. To operate a water mill, it is necessary for some water to start out at a higher level in the mill-pond and fall down, through the mill race, in the process giving its energy to a wheel. As the mill wheel turns, it thereby does mechanical work, while the water finally ends up below the mill, unable to do any further work—at least at that particular mill.

Carnot's argument took a straight path, using the following analogies:

\[
\text{water} \leftrightarrow \text{heat} \\
\text{height} \leftrightarrow \text{temperature}
\]

All heat engines accept heat at a higher temperature, use the heat to do work, and then reject heat at a lower temperature. The only difference between a heat engine and a water mill is that a considerable amount of heat is transferred in the process. Where does the heat go? Into mechanical work.\(^11\) Think of the exhaust from your automobile; this is the final, rejected energy from the gasoline that has been burned. The exhaust temperature is simply not high enough for it to produce any further useful work, and so it is mostly wasted. In fact, most of the energy in the gasoline goes to waste—around 90%.

Now that we understand the principle of the heat engine, we are in a position to apply it to ourselves. Let us start with an agrarian civilization, such as Ur, the Anasazi, or any of the Mayan
cities. These were instruments for providing food for people, (the fuel for the human engine). Plant life lies at the base of the human food chain, and the plants depend upon energy from the sun. Once the population had exhausted its plant resources, the Civilization simply collapsed. Whether or not the proximate cause of this had been a change in climate is irrelevant, since the end-point of the process is always determined by the amount of available fuel. This understood, we are now in a position to understand what had happened to Europe after the beginning of the 14th century; it was the same thing all over again, but on a larger scale. But three events had intervened, to keep Europe from total disaster.

• First, in 1348 came the Black Death, which cut back the population by one-third.
• Second, came the "discovery" of the New World, supplying a kind of dumping ground for surplus people, as well as a source of raw material.
• But the third event had the most powerful and lasting effect of all: the vanishing of the forests, which drove the Europeans to substitute coal for wood as a fuel.

Before humans were forced to use coal, what the earlier civilizations had used as their own principal "resource" was wood. On the average, the early peoples were not sucking energy from the planet any faster than the sun replaced it. Thereby, for centuries the human race was able to remain more or less in equilibrium with its environment. Occasional transgressions occurred, of course, but they were swiftly punished by collapse and extinction of civilizations. In the year 1297, as a result of widespread deforestation in England, the freemen of Newcastle were licensed by the Crown to burn coal -- coal, which had lain under-ground for millions of years, and which was originally derived from the sun's energy. After that time the use of coal grew exponentially, pushing Civilization farther and farther into the present dilemma--one whereby every year, more and more non-renewable energy must be used, thus driving the remaining energy "resources" to exhaustion. However, there was one more possibility for the nation states of Europe--that of obtaining colonies, and then bleeding them dry of all their "resources." This, of course, is precisely what happened.

By the middle of the 19th century, countries such as Britain and France (the latter, tardily) had established a rickety structure of empire over distant domains on the surface of the planet. So large were Britain's holdings, that until the Second World War it was said that the sun never set upon the ‘Union Jack.’ France had gobbled up much of North Africa, and one of the very richest prizes, The Congo, had become the private reserve of the King of Belgium. Helpless before the guns of the Europeans, the inhabitants of the colonies were forced under inhuman working conditions, to mine their own lands, for raw materials to supply the insatiable greed of Europe. But after the year 1870, another powerful consumer appeared at the banquet: it was Germany, hungry for its “rightful share" of colonial plunder. Ultimately the instabilities caused by too many hogs feeding at the same trough would produce two horrendous world wars, thus serving to demonstrate the non-viability of the modern Nation State as a system. We shall touch briefly on this subject once more in one of the following sections.

Pursuing this argument to its conclusion, we can see that, hidden in the abstractions of thermodynamics is a death-sentence upon that heat engine called Civilization. Civilizations have an insatiable appetite for raw materials and fuels, which they extract from their surroundings in order to do more or less useful work. With the passage of time, each incremental extraction becomes successively more expensive than the previous one, until breakdown finally occurs. For
that is their destiny. An invariable pattern occurs in the history of the *Collapse of Complex Societies*\(^ {13}\): the resources become depleted; a catastrophe occurs, and the surrounding environment gets an opportunity to rebound. But what if the Collapse of last of the Complex Societies is going to be a worldwide affair? At present we can only say that binges cannot go on forever—but any surviving children of ours will be able to tell their children what happened.

Already at the beginning of the 19th century, the intellectual floor joists of the Newtonian Cosmopolis received a rude shaking. Here is the story of how a medical doctor, (who also had deciphered much of the Rosetta Stone), up-ended Isaac Newton and forever changed the way people look at the world.

**The Celebrated Double Slit Experiment of Thomas Young.**

One of the great triumphs of Newton’s career had been his researches in the field of optics. In the course of this work he had arrived at the view that light travels in the form of tiny corpuscles, and after his death and apotheosis this opinion had quickly become ossified into dogma. Following the mythology of his time, it was only natural that light should be made up of tiny particles, since under the prevailing doctrines, reality was to be described in terms of matter and its motion. But in the year 1801 the blow fell, when a London physician named Thomas Young passed sunlight through a prism and selected out a fraction of the beam that was of one color. This light he allowed to pass through a pair of tiny slits, onto a screen. What he saw on the screen was a series of light and dark bands. Amazingly, the light even reached into regions where no light corpuscles should have been able to penetrate. This effect, easy to describe in the language of wave motion, is called interference.\(^ {14}\) Worse yet for Newton, it was quickly seen that there is no possible way to explain this effect in terms of corpuscles, a fact that will return to haunt us in later chapters. Therefore, the great Newton must have been wrong after all! We shall soon see why Young’s discovery is probably the most important in the history of science; for after the passage of 200 years we still don’t understand all of its ramifications. The two-slit experiment, in its various ramifications, is a skeleton in the closet of science!

Earlier we spoke of how important a role the Newtonian universe played in justifying the English Cosmopolis. Therefore it is not surprising that Young's experiment did not go unchallenged. None other than Lord Brougham, the future Lord Chancellor of England\(^ {15}\), denounced Young in the pages of the prestigious Edinburgh Review, and in effect called him a charlatan! Lord Brougham’s attack went for nought however, for the experiment was easily repeatable, by anyone who owned a prism, and within a few decades the stray phenomena were rounded up, and the wave nature of light propagation was verified—at least to everyone’s satisfaction at the time. There was only one remaining question: if light is a kind of wave, what is it that is waving? This topic will be discussed in the next chapter.

**The Warping Of Euclid’s Space And The Decline Of Perspective.**

In a previous chapter we learned that, beginning in the 17th century, France had an immense intellectual impact upon continental Europe. Until the time of the Revolution, the French Style was synonymous with what was called The Classical Tradition. Briefly, what this meant was a ferocious emphasis upon order, perspective and balance; and a singled-minded devotion to
mythological themes, as opposed to situations rooted in the present, whether in literature, art or music. This arrangement was by no means accidental; it was politically expedient. As we have seen, since Plato's time, order in literature, art and music have been seen as essential for the existence of order in the Cosmopolis. In art, various forms of linear perspective were common, and on every canvas it was expected that the human figures would be displayed in a balanced way, preferably in the plane of the canvas. This was the goal of art: “to hold the mirror up to nature”, just as it was in science. (Of course a casual glance at the work of Tintoretto, or El Greco will tell us that genius doesn’t have to play by the rules. But these men weren't painting in France, either).

In the nineteenth century the invention of photography gave the art world quite a shock, for it soon became obvious that the camera does not reproduce spatial relations in the same manner as the eye does. Indeed, the eye plays an active part in creating the picture. This discovery was a revolutionary one, for it destroyed the notion that the eye simply records passively the traces of the incoming light. Among the artists, the significance of this was enormous. But in any Cosmopolis there must be a dictatorship of the eye, the ear, the mind-- manifested in all forms of Art. In 19th century France the artist didn't have to fear that his door would be kicked in by the police, but there were always critics available, who could be counted on to demolish the innovator with a poisonous newspaper review. In early nineteenth-century England the unofficial commissar of art was Sir Joshua Reynolds, who claimed to know what was "fine art," as opposed to mere "crafts." in France the same kind of authority was vested in the l’Académie des Beaux Arts. I might add that in late 20th century America things were not all that different; to control people it is necessary to be able to tell them what to see, and the politicians were more than ready to play the role of censors.

But the winds of revolt were already blowing in Paris in the 1830s, in the famous Bohemian Quarter on the Left Bank of the Seine. The purpose of the revolt was the overthrow of the fundamentals of representational art, in particular the “horizon”, the “vertical”, and linear perspective--which were analogous to tonality and harmony in music. Among early artistic successes were those of Théodore Géricault and Eduard Manet. Impressionism and cubism were soon to follow, and Descartes would never have understood any of it. The direction taken by these artists was that of returning Consciousness to a position of Participant, instead of that of spectator. Since Participation is, from the point of view of Civilization, a treasonous dalliance with the Unconscious Mind, the new paths made in art were quickly seen as dangerous to Public Order.

**The Revolt Against Cartesian Music**

_When the mode of the music changes, the walls of the city shake._  
*Plato*

During the period from 1625 to the early 19th century, music found itself under a similar censorship, and for the same reasons. In Paris the Abbé Mersenne, terrified by threats of cultural disorder, had gone so far as to actually prescribe rules for the composition of music. He wanted to ensure that music would not be able to fulfill its ancient mission of inflaming the passions, producing altered states of consciousness or inciting listeners to riot. Mersenne’s rules, which
formed a framework for Baroque music, ultimately found their way into the standard books on harmony, dating from later in the 17th century. The musical analogue of the painter’s horizon is tonality: a clear sense of the key of the music. It was tonality that came under fire in the nineteenth century—especially from Richard Wagner, who perfected a voluptuous chromaticism that was the epitome of everything Mersenne would have hated. As the ice of tonality began to crack, audiences in symphony halls and opera houses heard sounds the like of which would have been unthinkable before 1859, the year of the premier performance of Wagner's *Tristan und Isolde*. The last decades of the nineteenth and the first decade of the twentieth century were the era of Claude Debussy, Maurice Ravel, Richard Strauss Gustav Mahler, and Igor Stravinsky, men who were busily throwing the old rules out the window. It was also a time of great ballets: first Stravinsky's *The Firebird*, then Ravel's sensuous *Daphnis and Chloe*; but the culmination of this orgy of creativity occurred on the night of May 29, 1913, when Stravinsky’s *Rite Of Spring* received its world premiere in Paris, and the audience erupted in a full-scale riot.

**The Revolt of the Authors and Poets**

By the beginning of the nineteenth century it was impossible not to notice the ugliness and destructiveness that had resulted from the Industrial Revolution --especially in England, which had been its birthplace. Among the writers who revolted against Newtonian rationalism, and created the Romantic Movement, the earliest was William Blake. Other English writers were Byron, Wordsworth and Coleridge, and Mary Wallstonecraft Shelley, who wrote the novel *Frankenstein*, the story which seems to contain the most penetrating psychological insight into the modern predicament. In America there were Walt Whitman, Henry Thoreau, Ralph Waldo Emerson, Edgar Allan Poe and Herman Melville. Melville's *Moby Dick* can be read as another warning of the dire consequences awaiting America as a result of tendencies which at that time were being hailed as beneficial. In Germany there was Goethe, with his towering intellect, whose play: *Faust* displays a keen insight into the dilemma arising from man's grasp for power. France has not only given us writers like Victor Hugo, who did much to pry open the grip of the dead hand of Classicism, but also poets like Mallarmé, Nerval, Baudelaire and Rimbaud. To their credit, the last three of these labored to unleash their imprisoned Unconscious Minds by the consumption of heroic quantities of the meager repertoire of Schedule One substances then available, and spent their lives in a continual state of social disrepute. But all the while they managed to produce glorious poetry. During that time, the members of Modern Civilization who passed for "sane" were preoccupied with steam engines, the telegraph, the telephone, the blessings of dynamite, and of course, machine guns.

**The World Of 19th Century Science**

Civilization's heat engine was turning over more rapidly in the 19th century, producing more and more intricate "islands of order," in the form of human creativity. By some subterranean instinct, people began to realize that there exists a vast inward universe of knowledge and beauty, one that during those years began to unfold exponentially, as more and more support became available to the explorers. It was beginning to look as if Francis Bacon had been right; the cumulative power of science was, for the moment, decisive.

Some of the new discoveries came in the form of elaborations upon earlier work done by Newton
and his colleagues on the Continent. In the 1830's a sophisticated calculation derived from Newtonian mechanics made it possible for astronomers to discover the planet Neptune. The public was thrilled by this demonstration of the efficacy of the Newtonian method, for it helped to validate Modern Civilization, and make people feel comfortable. During the same period an Irish mathematician, William Rowan Hamilton, discovered an alternative approach to mechanics, one in which Newton’s laws were reduced to the status of a mere consequence of an even grander concept. Hamilton's discovery went largely unnoticed, though.

In Germany and Austria, culturally distant from the capitals of the great nation states, scientists were examining the light spectra emitted by heated substances, comparing them with curious anomalies in the spectrum of the sun. These anomalies made it possible to compare the spectra of the sun and of other stars with the spectra of elements on earth; and thereby to learn the compositions of stars, as well as their rates of rotation. One insight gained, was that the sun is made of the same stuff that the earth is. It had taken that long for people to find out! Later, in the first part of the twentieth century this research would be able to upset the Newtonian apple cart completely, and usher in the quantum theory; but at the time no one dreamed of its potentialities.

A group of mathematicians working independently made a shocking discovery. They found that there are two distinct, self-consistent varieties of non-Euclidean geometry--that is, geometries that use postulates different from the Fifth Postulate of Euclid. From this it followed that Euclid’s geometry may not necessarily describe the universe that we live in--that geometry has a significance independent of land surveying. Later, in the 20th century, these discoveries and others would result in calling into question the proposition that we can ever really “hold the mirror up to nature”. But at the time the world was unable to imagine such potentialities.

**How Rationalism Attempted To Cope With The Human Condition**

Just as at the beginning of the Scientific Revolution, there seemed to be two dramas playing simultaneously on the stage of history. On the one hand was rationalism, the idea that reason constitutes a sufficient source of knowledge; and on the other hand, empiricism, a preference for observation and measurement. By this time, the mechanistic followers of Newton and Laplace, combining rationalism and empiricism, had amassed a great amount of data and were claiming the omni-competence of their brand of mythology. But there were empiricists of a more radical variety, people who were busily exploring continents where the materialists dared not to trespass.

On the one hand, the post-Cartesian mechanists looked upon the human being as a machine, best understood when completely dissected. This view received ammunition through Virchow’s studies of cellular biology, and through Pasteur’s work on micro-organisms. It was this work that introduced the public to the Germ Theory Of Disease. But there was also Claude Bernard, a pioneer in human physiology, who concentrated upon factors in the cell's environment, which he called: *le milieu intérieur*--what we would now call the connection between the Immune System and the realm of mind-body medicine--in effect, the body considered as an ecosystem, partially under control of the mind.

However, the most influential physiologist of the nineteenth century was the German Hermann Helmholtz. Once, in 1848, meeting together with three other young scientists, he persuaded them
to join him in swearing a blood oath (!!), to the effect that all their future research efforts would be based upon strict Mechanistic and Newtonian science. Helmholtz’s viewpoint affected the attitudes of thousands of scientists who followed in his footsteps; and among them, years later, there was a young Viennese neurologist named Sigmund Freud.

**But There Were Other Mysteries—And Even Today They Remain Unsolved.**

It was in the early 1780's that Franz Mesmer, an Austrian, had appeared in Paris. Mesmer had developed a kind of hypnotic technique, one which involved making passes over his subjects, (usually women), waving a large horseshoe magnet. His technique, (called "animal magnetism," and his flair for showmanship, combined to make him an overnight sensation. But whether it was his talent for theatrics, or because certain men of influence objected to his exercising "animal magnetism" upon their wives, he soon made some powerful enemies. In 1784 a Royal Commission was created, chaired by Benjamin Franklin, to investigate Mesmer’s techniques. The Commission found that, to an extent, these techniques worked; they could induce convulsions, relaxation and drowsiness. But when careful trials were performed upon blindfolded patients placed in a trance by one of Mesmer’s assistants, (Mesmer had discretely left town). The Commission found that nothing had happened. Therefore the Commission upheld the conventional wisdom, concluding like good Cartesians all, that animal magnetism is spurious— that it was nothing but hysteria--“all in their minds”, (and therefore not real); and Mesmer was disgraced.

However, at the same time that the Royal Commission was deliberating, the Marquis de Puységur, who had studied briefly with Mesmer, happened to be using Mesmer's technique to treat a sick peasant who lived on his estate. While Puységur was making his hypnotic passes, the peasant obligingly fell into a deep trance. But while the peasant was thus entranced, Puységur found that the man could apparently read his (Puységur's) mind. Word of this marvel spread rapidly, and further experiments were performed along the lines of those of Mesmer and Puységur. But the results of this kind of procedure proved disappointing, for “traveling clairvoyance” as in the case of Puységur’s peasant, turned out to be a rare phenomenon, and pressure by rationalists did nothing to help the cause. Despite the initial discouragement, the technique of hypnotism survived, and was being practiced in Paris in the 1870s and 1880s, notably by the famed Jean-Martin Charcot, by Pierre Janet, and by the Nobel-winning, physiologist, Charles Richet. One of the most astonishing discoveries of La Charcoterie, (as this group was waggishly called), was that it is possible for a hypnotist to place his subject in a trance from a distance! This result stands in gross violation of all the doctrines of rationalist philosophy; in Newton's time, gravitation was bad enough, but hypnotism-at- a-distance, that was just too much. What could be done about this?

From the foregoing we can guess that the 19th century was a time when Modern Civilization had settled into a defensive posture, based upon the physics of Newton and the materialism of the architects of the French “Enlightenment”. The exigencies of doctrinal consistency demanded that phenomena found to be detrimental to the stability of the system were to be studiously ignored, whenever "plausible deniability" was not available. Ultimately, when no one was looking, the offending facts would be made to disappear down The Memory Hole. Behold the ongoing struggle: Civilization’s constant effort to update its story line, negating human experience
whenever necessary, and relying on the soothing effect of its myriad distractions to perpetuate the collective trance.

**The Great War And Its Aftermath**

At the beginning of August 1914 the Great War broke out, turning Europe into a vast charnel house for young men. All the dreams of “Progress” and Modern Civilization were shattered in the senseless slaughter. During the 19th century there had been a great technological breakthrough: the machine gun. Earlier this invention had been used throughout the world against indigenous peoples, and with deadly effect. At the time, Europeans had been able to rationalize this brutality on the grounds that it was in the interests of "Progress" to eradicate "inferior races." But when war broke out in 1914 they began to use it on each other. What followed was a slaughter unparalleled up to that time, even in the history of Europe.

The armistice of 1918 merely produced a twenty-year lull, but it was one during which creative activities such as art, music and literature were changed drastically, to match the feeling of profound disillusionment that the War had produced. What emerged after 1920, (with the exception of Surrealism), was a style that was distinctly “Modernist”: severely abstract, unsentimental, lacking in sensuousness, ostensibly devoid of context.

Also, the general revulsion against war, and the resulting thirst for order, brought to the surface a variation on the style of positivist philosophical thinking that had been embraced at the beginning of the century by some of the most productive scientists of their time. The underlying motivation of the positivists was the search for a kind of knowledge, one that would produce agreement by all parties. In this way it was hoped to purge knowledge of all metaphysical assumptions, including the irrational nationalism that was being blamed for the Great War. (The fools! It was about power.) Positivism was to become more than a hope; it was to become a kind of missionary program, and ultimately even a metaphysical religion in its own right. The positivists were the intellectual descendents of Descartes, and their missionary purpose was to shore up the social structure of Western Civilization with the timber of what was now called: Unified Science. The goal of their project was to make Science the Established Church of Civilization.

The precursor of this group had been Ernst Mach, a Viennese physicist whose intellectual passions were of a strongly empiricist bent. Mach himself had died in 1916, but his writings had already come to the attention of another, even more radical empiricist, William James, Philosopher and Psychologist; and had the support of Jacques Loeb, the physiologist and materialist. In America, a valuable addition to the group was Mach's friend, the publisher Paul Carus, who worked unceasingly to sell the virtues of positivism to the public. The essence of Mach’s vision of science was best expressed by the words of the philosopher Moritz Schlick: Mach was a physicist, a physiologist, also a psychologist, and his philosophy...arose from the wish to find a principal point of view to which he could cling in any research, one which he would not have to change when going from the field of physics to that of physiology or psychology. Such a firm point of view he reached by going back to what is given before all scientific research, namely, the world of
sensations.... Since all our testimony concerning the so-called external world relies only on sensations, Mach held that we can and must take these sensations and complexes of sensations to be the sole content of those testimonies, and therefore that there is no need to assume in addition an unknown reality hidden behind the sensations. With that, the existence of das Ding an sich is removed as an unjustified and unnecessary assumption. A body, a physical object, is nothing else than a complex, a more or less firm pattern of sensations, i.e., of colors, sounds, sensations of heat, of pressure, etc.

This hard-headed affirmation of John Locke’s famous dictum, (that there is nothing in the mind that is not first in the senses), fired the imagination of several generations of physicists, physiologists and behavioral psychologists, resulting in the publication of an Appeal—“a call to arms” as early as 1912, signed by such luminaries as Albert Einstein, Sigmund Freud and the great mathematician David Hilbert. The goal of the Appeal, (as it would be called in English), was for scientists and other thinkers to join forces for the purpose of producing a Unified Science—to bring all knowledge under the hegemony of one coherent ironclad Method.

After the end of the Great War a group of young Viennese intellectuals, disillusioned with traditional culture and dreaming of a Modern World full of all kinds of good things, formed a group under the leadership of Moritz Schlick, meeting on Thursday nights at the University of Vienna. This group, called The Vienna Circle, thought of themselves as the Cutting Edge of Modernity, the Shock Troops. They proceeded to tighten the screw of positivism another full turn. The group subscribed to a constricting, rigid sect of rationalism, called “Logical Positivism”, a doctrine restricting all meaningful discourse to those statements which either describe possible laboratory experiments, or which are derivable from logic. The dream of logical positivism was to create a truly Unified Science, devoid of any contamination by metaphysical notions. But a careful analysis shows that having a theory without metaphysical notions seems to bear a resemblance to lifting one’s self up by one's bootstraps. After all, by what experiment or logical manipulation can we produce the Logical Positivist doctrine in the first place?

The Missionaries Invade The Art Colony And Make Conversions Among The Natives

The problem with the Modern World is that if you are able to create it, somebody still has to try to live in it. But the enthusiasts of the Vienna Circle felt that they could rise to the occasion, for Modernism was their goal, and it seemed to have inevitability written all over it. An important link was forged with a group of architects working in Dessau, Germany, who have since come to be called the Bauhaus group. We have all seen the Bauhaus style; it is blocky and abstract, built upon very simple geometrical concepts, with little or no attention paid to the requirements of human comfort. By the 1960's it had become kitsch. It is the style common to housing developments, office buildings, hospitals and resort hotels. It is this style that has become synonymous with Modern Architecture at its worst. Its non-contextuality has led to the remark by some wit that "Bauhaus-style buildings are equally out-of-place anywhere on the globe." Still, if you wish to force a lifestyle upon people, the most effective way is through architecture. One can always turn one's back on a painting, but inside a building, one is trapped. “Bauhaus” equals Civilization, taken to its coercive extreme. While living and working in a Modern building, one
is always receiving the subliminal lesson: "Let me out of here!"

The Self-Evident Facts Reexamined

• The Cartesian Theater. Profoundly affected by the writings of Ernst Mach, the behaviorist B. F. Skinner held that the only thing we can observe in humans or other animals is their external behavior. Therefore, he held, it is meaningless to speak of the mind, or anything else that cannot be registered externally, predictably, in the laboratory. From that time forward the Cartesian Theater was closed. There was, for him, no Mind.

• The Real World is simply the group experience of the human race. It has no meaning, apart from what our senses, amplified by scientific instruments, tell us.

• Nothing Is In The Mind That Was Not Previously In The Senses. This is a cornerstone of the Materialist structure; it seemed so self-evident that no one examined it seriously. To question this today is pure heresy. (I do more than question it; I deny it).

• As a result of Special Relativity, events in the Universe now depend upon the state of motion of the Observer, in a space-time continuum. But determinism and causality were heading into deep trouble.

• The Mirror Of Nature. One of the principal tenets of classical (pre-quantum) science was that nature is essentially visualizable, and that a one-to-one correspondence can exist between our language and the features of nature. More trouble was ahead for this idea!

The Canaries In The Mine: A Postscript

One of the functions historically performed by the artist is that of a sensitive antenna, picking up signals--a distant early warning system similar to the canaries, which miners carried down into the mines, because the birds are sensitive to the presence of minute quantities of poisonous gases. The first ones to sound the alarm were the authors. In the turmoil of the Russian Revolution, Yevgeny Zamyatin composed a dystopian novel, called We, which caused great displeasure among the Soviet leaders. After a four-hundred year tradition of Utopias, this, to my knowledge, was one of the very first of the dystopias. In 1929 E. M. Forster wrote a short story, called: The Machine Stops. It is a tale about a time in the future, when humans have created a kind of machine that supplies all their wants while they just sit around and think. Naturally, the humans are much the poorer for this; and besides, the machine ultimately breaks down, leaving the humans helpless. Forster’s story was followed by the publication of Aldous Huxley’s Brave New World, written in 1931. Huxley’s dystopia is one in which happiness and contentment are socially and biologically engineered. The Machine doesn’t break down, but we, his readers, heartily wish it would. Further, the society depicted in Brave New World bears an alarming resemblance to the one in which we presently find ourselves.

Notes to Chapter Seven:
(2) Teaching tools were available for anyone wishing to internalize further the metaphor. The universe as Matter In Motion could be studied by those who played the recently invented game of billiards—a game that was all the rage at the end of the 17th century. Another powerful metaphor was The Clock, an indispensable part of every telescope; for, in the absence of a clock,
as the earth rotates on its axis, the telescopic image of any celestial object will drift rapidly, inexorably, out of the field of view. Therefore, a telescope must actually be mounted upon a clock. The universe as mechanical clockwork was such a powerful metaphor, that after the 17th century another teaching device, the orrery, became popular among the well-to-do. The orrery is a clockwork model of the solar system (not to scale); once wound up, the model planets proceed to revolve about the model sun. In addition to the visible message: the order of the planets and their orbits, there are the subliminal ones. (1) The universe is a machine, and (2) A scale model can be built; one which we can actually see.

(3) After 1660 King Louis XIV took the sun as his emblem, meaning that the French nation-state revolved around him. Here is an example of the concurrence of power and the boundless desire to use it.

(4) The coffee house was the headquarters for political unrest; Paris had 250 of them by the year 1690, and after that the number tripled in less than a century. The very notion of an “intellectual” (typically a writer) whose opinions are supposed to be worthy of public attention, is one that is quintessentially French. See The French, by Sanche de Gramont for a delightful, if painful analysis.

(5) For the philosophers it was a kind of rehearsal for the French Revolution. In Albert Camus’ The Rebel there is a description of the execution of Louis XVI, in which the king begs for his life on the grounds that the executioners, by killing him are killing God. In a sense, Louis was right. Just ask Nietzsche.


(7) This buzz-word was considered to be a very important idea at one time, especially in France, where one can still find hotels and cafés named after "le “Progrès”. Le Progrès was, together with Reason, the religion of the French Revolution. Voltaire’s tract has a special significance in terms of Daniel Quinn’s Ishmael. In the latter half of the 17th century the writer Bishop Bossuet had written that the surest cure for wicked behavior is a firm faith in Providence. The later disciples of Descartes argued that there can be no room for Providence in a mechanical universe. Voltaire argued that human progress is strictly material, and is solely the result of human effort. Thus we can see in Bossuet the last gasping breath of the ‘Leaver’ mentality, and recognize that Voltaire is speaking on behalf of the ‘Takers,’ as defined by Quinn, in his Novel: Ishmael.

(8) It was the steam engine, invented by Newcomen and improved by Watt, that inspired the invention of various mechanical devices for the manufacture of textiles. The inventors who gave England its industrial revolution were not the direct intellectual heirs of Isaac Newton whose center was London, but were actually the descendents of the Non-conformists, inspired mechanics, whose headquarters were in the Midlands: Birmingham—the location of Blake’s “dark Satanic Mills.” There is an entire library of good books on this subject. I recommend William Blake, Penguin, Harmondsworth, Middlesex , Pelican Books, 1944-1954, by the mathematician Jacob Bronowski. Also essential reading for an understanding of “how we got this way” are Witness Against The Beast, by E.P. Thompson, New Press, NY, 1993, and Rebels Against The Future, by Kirkpatrick Sale, Addison-Wesley, NY, 1995.

(9) A heat engine is one that takes in heat in the form of burning fuel, and converts some of it into useful work (like moving your car down the road) in the process. Another example is the steam engine. But there is always heat that is rejected. The exhaust manifold of an auto is much too hot to touch.

(10) It goes almost without saying that a technical discussion of thermodynamics is well beyond the scope of this book: See Fenn, John, Engines, Energy and Entropy, Freeman, SF, 1982, for a
beautifully written treatment at the level of elementary college physics.
(11) Consider the exhaust from a car; its temperature is far lower than that within the cylinders.
(12) In the case of Great Britain, for example, its traditional output has been in the form of textiles. The British government wanted to sell textiles (at a profit) to the American colonies in trade for hemp(!), which was used for sails and rope in their Navy.
(14) For a superb exposition of this, one of the most important experiments in history, see *The Character Of Physical Law*, 1965, MIT Press, Lecture No. 6, *Probability and Uncertainty*—The Quantum Mechanical View Of Nature, starring the great Richard Feynman.
(15) The equivalent rank in the United States is the Attorney General.
(16) It was Reynolds who had made the snobbish distinction between “fine arts” and mere “crafts”. William Blake, an engraver as well as a poet, loathed Reynolds with all his heart.
(17) For the first, see *The Raft Of The Medusa*, for the second see *The Dead Matador*, for the third see *Le Déjeuner Sur L’Herbe*, in which linear perspective goes out the window. For a more complete discussion, see *Art and Physics*, by Leonard Shlain, Quill-William Morrow NY, 1991.
(18) Her novel, written in the early 19th century, was prophetic, and has much to teach us today. Feel free to disregard the movies.
(19) *Moby Dick* is one of the great classics of all time. It is a warning for all those of “single vision”: that the physicist who pursues Moby Particle, the general who pursues Moby Defense System, the CEO who pursues Moby Leveraged-Buyout—all of them are more than a bit mad. There is something about Americans: they don’t respect limits. In fact, it is possible to argue that, when writing Moby Dick, Melville was talking about America. I think that this is the truth!
(20) This tale is told in *The Orphic Vision*, Gwendolyn Bays, Univ. of Nebraska Press.
(21) Although it is the custom to name streets in Paris after politicians, generals, scientists and mathematicians (even obscure ones, if they were French), Not a single Parisian street is named after the latter three men. Nerval hanged himself from a lamp post on a Paris street. One would think that the authorities would have had the decency to name the street after him—or just the lamp post.
(22) Euclid’s 5th Postulate states that through a given point, one and only one line can be drawn parallel to a given line. It isn’t always the case.
(23) There is a very good, concise treatment of the effect of Mechanism upon the science of biology and upon Medicine, in Fritjof Capra’s *The Turning Point*, Bantam, NY, 1983.
(24) The knowledge that micro-organisms cause disease resulted in great advances in sanitation during the nineteenth century. Many epidemics were due to typhoid and cholera, both water-borne. Sadi Carnot died in Paris of both typhoid and cholera! Prince Albert, the consort of Queen Victoria, died of typhoid.
(25) On his deathbed Pasteur exclaimed that Bernard had been right, and that microbes were not that important.
(26) In a minority report, the botanist Jussieu mentioned that he had on occasion seen patients responding to the motion of the mesmerist’s pointed finger at a time when they could not possibly have seen the gesture. But he was overruled.
(27) The word *le magnetisme*, is still used in France to refer to trance induction.
(29) One of Charcot’s students was Sigmund Freud, who later renounced hypnotism in favor of
more Newtonian methods. But it was Freud who discovered the overpowering role of the Unconscious, during his stay in Paris. Today, on the wall of the building where Freud had been staying, (l’hôtel du Brèsil) can be found a plaque (in French) bearing the words: “Here is the birthplace of psychoanalysis.”

(30) *Notes sur Quelques Phénomènes de Somnambulisme, by Pierre Janet, Société de Psychologie Physiologique, Séances d’Octobre, Novembre, Décembre 1885.*

(31) For a very readable account of the beginning of the War and the decades which preceded it, don’t miss *The Proud Tower* and *The Guns Of August*, Bantam, NY both by Barbara Tuchman. There is a great deal of valuable information for our times in her work. And you should also read her: *The March of Folly.*

(32) Positivism is an evolutionary theory of philosophy, which holds that magic, religion and metaphysics constitute earlier, imperfect, successive stages in the evolution of human thought, culminating in “positive” knowledge, based on observation of natural phenomena, empirically obtained.

(33) Holton, Gerald, *Science And Anti-Science*, Harvard University Press, 1993, page 2. Holton is the most eloquent of the Old Guard, the defenders of the Western Rationalistic Tradition. From his vantage point at Harvard he has been in a position to meet most of the key practitioners of that Tradition: "the last of the gun-toting sheriffs of the Old West". The translation is Holton’s own, from *die Neue Freie Presse* suppl. (Vienna) 12 June 1926.

(34) "the thing in itself."

(35) Einstein's early work, such as the Special Theory of Relativity, was heavily influenced by that of Mach. The General Theory, however, deals with the non-Euclidean geometry of space-time—a concept that does not harmonize readily with the simplistic ideas of John Locke, or of Mach either.

(36) Logical positivism, sometimes called logical empiricism, is a school of philosophy subscribing to the notion that all meaningful statements are either derivable from legitimate logical operations or confirmable by observation or experiment; and that metaphysical theories are meaningless. Fortunately for the rest of us, and unfortunately for the logical positivists, to be consistent, the above notion itself would have to be categorized as meaningless.

(37) Abstract painters followed suit; people like Wassily Kandinsky come to mind. And classical music styles too, such as those of Schönberg and Webern became more cerebral.

(38) Small wonder that the inhabitants derive so much spiritual satisfaction from vandalizing those places!