III. The Secret of Music

September 8, 1986

SCIENCE AND CULTURE

Truth Is Beauty, and Beauty Is Truth: Understanding the Science of Music

by Lyndon Hermyle LaRouche, Jr.

The editors of EIR *are very happy to publish here, for the first time, an article by Mr. LaRouche drafted on September 8, 1986 as part of a proposed book on the same subject. On October 6, 1986 there was a massive raid on* EIR*'s office and Mr. LaRouche's residence by the very same forces that are today involved in an ongoing coup attempt against President Trump. Mr. LaRouche was then targeted for elimination by the British Empire forces that had deemed LaRouche's collaboration with President Reagan on the Strategic Defense Initiative (SDI) intolerable.*

During the recent period, Pope John Paul II has launched a campaign against Satanism. Leading groups within the Catholic Church, and also concerned Protestant groups, have been concerned over years with role of so-called "rock music" in promoting Satanism. Since the end of the 1940s, when Satanism and witchcraft were legalized in Britain, there has been a steadily accelerating increase in the numbers of openly professed, practicing witches. Overlapping this, there is a persisting report of witchcraft groups' involvement in sexual abuse and ritual murders of children, although, as in the case of the early 1980s investigation of mass-murders of children in Atlanta, Georgia, clues to the role of known witch-cults in such abominations are usually buried under the indictment of isolated scapegoats.

There is no mere coincidence in the recent decades' recurring connection between "rock music" and Satanism. The promotion of Satanism and "rock music" were both leading projects of professed Lucifer worshipper, Aleister Crowley, and Crowley's homosexual drug-user's cult, the Golden Dawn. Among the sponsors of Crowley's spread of witchcraft cults, have been the one-time husband of anthropologist Dame Margaret Mead, Gregory Bateson, and Bishop Paul Moore's New York diocese of the Anglican Church. More darkly, the center of such diabolical music projects, has been the "European-cultural" front-projects of Venice's powerfully influential San Giorgio Maggiore, the latter traditionally an adversary of St. Augustine's doctrine of musical polyphony.

To those who know the history of music, especially the rhythmical features practiced by the ancient Phrygian cult of Dionysos, there is no mere coincidence in the connection which Crowley's followers saw between Satanism and their concoction of "rock." Even without satanic lyrics and implanted subliminal images, "rock" is intrinsically satanic.

The origins of modern Satanism can be traced in England to such influentials as the founder of British socialism, Oxford University's John Ruskin. Theosophy and the Fabian Society, were both products of the influence of Ruskin and of the Pre-Raphaelite Brotherhood of Ruskin and Benjamin Jowett. In Germany, the roots of Satanism in music are found in the music and cult-circles of the composer Richard Wagner. Prior to the 1950s, the foundations on which rock was built, were established with the popularization of that product of the New Orleans whorehouses, jazz. It is simpler, and adequate, to locate the beginnings of modern satanic-rock and related witch craft cults in the work of Crowley

and Friedrich Nietzsche, around the beginning of this century.

The chief impact of both Nietzsche and Crowley upon the twentieth century, was their promulgation of the doctrine that the twentieth century must become "The Dawning of the Age of Aquarius." Both defined the "Age of Aquarius" as bringing the Christian era ("The Age of Pisces") to an end. Both included Socrates (and Plato), together with Jesus Christ, as the heritage to be destroyed. Nietzsche proclaimed as god, the Phrygian Cybele cult's Satan, Dionysos; Crowley, and his collaborator, Astor-family-funded Anthroposophy-founder Rudolf Steiner, adopted Lucifer as their anti-Christ.

Assyrian earth-mother goddess Ishtar (Astarte), derived from Harappan Shakti.

Recently an organization of U.S. witches, which has adopted Salem, Massachusetts, as its official national headquarters, has protested that witches' civil rights are being violated by the popular assumption that witches are Satan worshippers. The witches insist that they are worshippers of the "earth-mother goddess," and are subject to all the privileges of any religious body! These witches are lying; what else would one expect a witch to do?

"Dionysos" and "Lucifer" are, quite literally, names of Satan. The original name for the semitic "Satan" was the Dravidian penis-god, Siva. Siva is the fellow-deity (partly sexual consort, partly son) of the "Harappan" (Dravidian) "earth-mother goddess" Shakti. This Harappan culture established a number of colonies, including ancient Sumer in lower Mesopotamia, Ethiopia, and Sheba (approximately the region of modern Yemen). Herodotus, quite rightly, traces the ancient Phoenicians (Philistines) to these same Harappans. The Harappans' colonial subjects, those semitic pastoral tribes over whom they ruled, were induced to adopt the Harappan's satanic religion in such forms as the Chaldean's Ishtar cult, the Sheban cult of Athtar, and the Philistine cult of Astarte-Venus. Through Ethiopia, the same cult was spread by conquest into Upper Egypt, where Shakti and Siva assumed the Hellenistic names of Isis and Osiris. In Phrygia, the names for Shakti and Siva were Cybele (the Roman Sibyl) and Dionysos.

Lucifer is a transliteration of the name for the Syrian Mithra cult's Satan. "Satan" is the common semitic name for Siva. In Russia, this "Whore of Babylon" is worshipped as "Matushka Rus," the earth-mother goddess associated with the "sacred blood and soil of Holy Mother Russia."

In the Christian New Testament, the name for the Harappan earth-mother goddess, is "The Whore of Babylon." The appellation is well deserved. Ishtar, Astarte, Venus, and so forth, were known to the ancient Mediterranean world as the patron deities of the whorehouses. In ancient Mesopotamia, the priestesses of Ishtar performed a mass sexual orgy with the communicants as part of regular religious services. Traditionally, witches have been whores and also commonly lesbians. Similarly, Siva-like satanic figures, such as the Osiris of Hellenistic Egypt, were the patrons of male homosexuality.

In history, the Phrygian cult of Cybele-Dionysos was what we would recognize today as a terrorist form of drug-using radical-ecologist movement. The leading target of this cult's wrath was the rise of city-state republics in Ionia and at Athens. Like the Soviet-directed Baader-Meinhof Gang of West Germany, the cult of Dionysos seduced adolescents from the families of leaders of the cities, sated them with drugged sexual orgies, and turned them into assassins, assigned to kill the families of their parents and their parents' friends. A key element in the process of turning these seduced adolescents into terrorist killers, was the blending of the drug and sexual-orgy routines with a mind-deadening form of dance, the model used by classical scholars associated with Crowley, to produce the rhythmic patterns of modern "rock."

The points to be stressed in this connection, are the following:

1. The launching of the "Age of Aquarius," or "New Age," movement, around the beginning of the Twentieth Century, was done by persons who avowed themselves to be militant Satanists, dedicated to total destruction of western European Judeo-Christian, family-centered values.

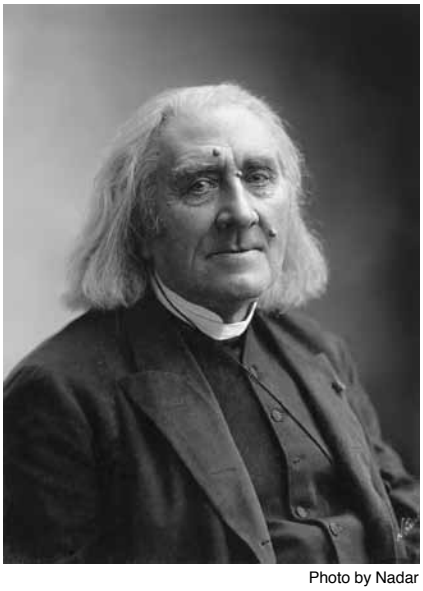


Photo by Nadar

Franz Liszt

Richard Wagner

Photo by Gustav Adolf Schultze

Friedrich Nietzsche

2. The leading founders of this movement, were classical scholars, such as Nietzsche, and those circles of Ruskin and Jowett which produced Crowley. They modelled their "New Age" cults on dionysiac cult-movements of the classical-Greek period, which they had studied exhaustively, and whose efficient psychological techniques they understood and imitated.
3. "Rock" is a modern imitation of the principles of the dance-rhythms of the Phrygian, Cybelline cult of Dionysos, which has both an historic, and efficient psychological connection to Satanism.
4. The nineteenth-century "Romantic" movement in music, typified by Franz Liszt and Richard Wagner, and the ultra-Romantic "modernist" currents leading into jazz and rock, were introduced artificially to culture by the current which produced Nietzsche and Crowley.
5. The stated purpose of all forms of Satanism currently in vogue, including rock, is to destroy civilization from within, by destroying the minds and morality of the youth.
6. The professed Satanists who created and popularized rock, knew in advance the general political-psychological effect of what they were doing.
7. The Russian Empire's Soviet dynasty, itself, like Nazism, a direct product of the "New Age" movement, has promoted the satanic rock-drug-sex counterculture in the West and among developing nations, as a means for destroying resistance to Soviet conquest from within our nations.

PRNewsFoto/Elliott Landy

Dionysian Woodstock orgy of August 1969.

The intellectual architects of the "New Age" Satan movements, have understood very clearly the importance of destroying the classical polyphony associated with such famous names as Bach, Mozart, and Beethoven. Not only are the Romantic dogmas of Wagner, the ugly twelve-tone and other cacophonies of the modernists, jazz, and rock, each a product of a conscious intent to promote evil; the authors of this evil within music, understood the power for good specific to classical polyphony.

Although a scientifically sound doctrine of modern polyphony was begun by the circles of Leonardo da Vinci, and elaborated during the eighteenth century, what we

CC/Christophe Meneboeuf

The Acropolis in Athens, Greece—the epitome of Beauty.

know as the "classical music" repertoire of, especially, Italy and Germany, was a culmination of the musical doctrine of St. Augustine. St. Augustine studied and adopted the principles of harmonic beauty found in Plato's dialogues; but, it was Augustinus' establishing these principles as a canonical feature of the doctrine of western Christianity, which has been the efficient source of our western musical culture.

The Satanists agreed with Augustinus' wisdom, to the effect of seeing, that the compatibility of well-tempered polyphony with Christianity is such, that to destroy well-tempered polyphony is to attack Christianity's rooting within the individual and community of families on a vulnerable flank.

This paper is written as the introduction to a projected book, to be written, in chief, by David P. Goldman and a group of his immediate collaborators. The principal subject of this paper, is identification of the scientific proof of the aesthetic principles of Plato and St. Augustine, concentrating on the application of that proof to the rudiments of musical composition. The principal subsidiary feature of this paper, is identification of the specific, anti-scientific aesthetical doctrine of Immanuel Kant, which paved the way for the rise of both the Romantic movement in Germany, and, in directly so, for the rise of Wagner's follower, Adolf Hitler.

We mention the connection of this Nazi doctrine of music to the analogous musical-interpretation doctrine adopt ed by Soviet Russia.

In war against Satan, as in all war, it is indispensable to know the face of the enemy. It is even more indispensable to know the true nature of the cause we are defend ing against that enemy.

1. The Fundamental Principle of Aesthetics

The design of the Athens Acropolis is one of the true wonders of ancient civilization. Contrary to some textbook myth-making, the Acropolis's design was not a hodge-podge of successive additions at different points in time. The final structure was the fulfilment of a comprehensive, original design, to the effect, that from Erectheum, through Parthenon, and Nike Apteros by the gate, the whole is a coherent design, based on the elaboration of a single principle.

The principle of design, is a constructable series of divisions of the circle. These divisions correspond to the harmonic composition of the human form. Underlying that ordering, is a very special geometric construction, the Golden Section. All great classical Greek plastic art and music were based on that same ordering principle: the harmonic orderings determined implicitly by the Golden Section.

This approach to aesthetics is a leading feature of Plato's dialogues. Beauty is that which corresponds to life, especially the perfection of human life. That which is not consistent with such forms, is ugliness; ugliness is that which is anti-life, death, the inorganic.

Plato's dialogues are the first still-surviving source in European literature, for the proof that whatever is beautiful according to these principles is also truth, and that whatever is truthful is also beautiful. Plato's dialogues define the proposition, that physical science is the study of the universe in terms of the same Golden-Section harmonics. Thus, the root-principles of physical science are identical with those of aesthetics.

This is taken over by St. Augustine and his followers. The greatest single advance over simply following Augustinian principles for aesthetics, was set into motion by Leonardo da Vinci and by the School of Raphael following him. This was set into motion in the following way.

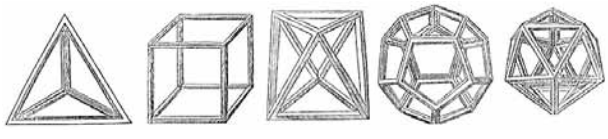
Modern physical science was founded by Cardinal Nicolaus of Cusa.

Formally, Cusa's founding of modern science appeared first in the 1440 publication of his *De Docta Ignorantia* (*Of Learned Ignorance*), and in those of his sermons which address the same matters. In this, Cusa picks up the central topic of Plato's Parmenides dialogue (most emphatically), the knowable and efficient interconnection between the macrocosm (the universe, etc.) and the microcosm (the human individual, etc.). In *De Docta Ignorantia*, Cusa's treatment of this connection is posed in terms of the efficient interconnection between the Maximum (the macrocosm) and the Minimum (the microcosm).

Painting attributed to Jacopo de' Barbari, 1495

Luca Pacioli

This writing has many implications for the most fundamental issues of physical science, but two of those features are most noteworthy at this immediate point in our report. First, Cusa presents his argument in the terms of what modern science terms a "synthetic," or "purely constructive" geometry. A synthetic geometry is one, which prohibits all axioms and any use of an axiomatic-deductive method of argument; the only allowed argument is one based purely on construction from a starting-point of nothing but circular action. Second, Cusa presents the first statement of the most fundamental principle of a synthetic geometry, a principle known to modern geometrical topologists as "the isoperimetric theorem."



The five Platonic solids.

Nothing respecting form is self-evident in the universe, except that there exists a relatively minimum perimetric action which defines a relatively maximum area or volume. From this starting-point, all the mathematics of mathematical physics can be properly constructed, without permitting any resort to axiomatic-deductive-logical methods.

After the 1440 *De Docta Ignorantia* (published, significantly, during the Council of Florence's sessions), a significant number of Cusa's writings concentrate on mathematical physics. For example, Cusa was the first modern scientist to present an approximation of the solar hypothesis of Johannes Kepler.

The period of Leonardo da Vinci's greatest efflorescence began in Milan, Italy, during the 1480s. At Milan. Leonardo became a close collaborator of Fra Luca Pacioli, the later author of the famous *De Divine Proportione*. Pacioli concentrated on elaborating crucial features of Plato's work from the vantage-point of Cusa's scientific writings. This led to Pacioli's elaboration of the work perfected by Leonhard Euler during the eighteenth century, the proof of Plato's report, that, in visible space, only five regular solids can be constructed: the so-called "five platonic solids." It was the collaboration between Pacioli and Leonardo on this and related matters, which set into motion both a higher form of aesthetics and the pre-Kepler foundations of modern mathematical physics.

The first indicated proof of the uniqueness of the five platonic solids had been supplied to Plato by a con-

Self-portrait

Leonardo da Vinci and a few of his studies of water.

temporary working at the Cyrenaic temple of Ammon. However, that proof itself was later misplaced. It was not until Pacioli, that the proof was rediscovered.

In brief, the construction of one of the five platonic solids, the twelve-sided dodecahedron, is accomplished by first constructing the Golden Section. By simple division, the other four are constructed as a series: the tetrahedron, the cube, the octahedron, and the icosahedron. No others are possible in visible space. (The fact that there are twelve tones in a musical scale, is shown to be necessary by understanding the topological implications of this construction.)

The next step toward both the establishment of mathematical physics and a richer doctrine of aesthetics, was the collaboration among Pacioli, Leonardo, and their associates, in proving that the form of living processes was also based on the principles of proof of the five platonic solids.

The medieval effort to explain the harmonic peculiarities of growth of living species' populations, had been Leonardo of Pisa's Fibonacci-number series. This method, based on arithmetic, rather than geometry, gives an interesting approximation, but explains very little scientifically. Pacioli and Leonardo proved, that all living processes have a characteristic harmonic pattern in form of growth, which is consistent with the Golden Section. A Fibonacci-number series does converge upon the values determined by the Golden Section, but the attempt to understand this convergence from the standpoint of an axiomatic arithmetic or axiomatic algebra, leads to absurd results.

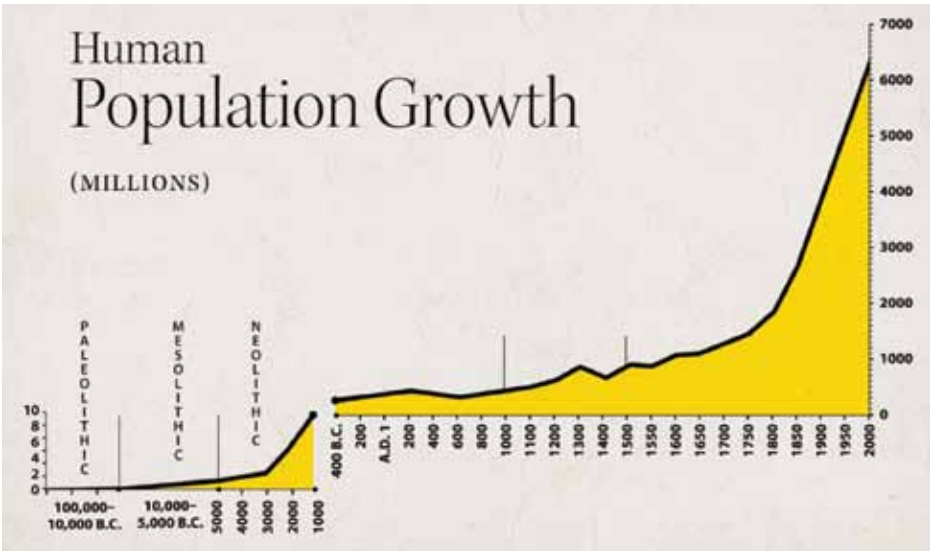
Today, we know, that, on condition that we except the extremes of scale, of astrophysics and microphysics, from consideration, that any process which has a harmonic ordering congruent with the Golden Section, is either a living process or a special class of object produced by a living process. It is a fact, which we need no more than identify at several relevant points of this report, that the fundamental laws of astrophysics and microphysics, are also based on harmonic orderings congruent with the Golden Section. The "fine structure constant," which reflects the curvature of physical space time on both the astrophysical and microphysical scales, is one example of this. In a Gauss-Riemann mathematical physics, defined from the standpoint of a rigorous synthetic geometry, the constant speed of light and the quantum constant, also reflect, interdependently, the same connection. For our principal purposes in this report, we avoid astrophysics and microphysics as much as possible, and concentrate upon the physics and aesthetics of the ordinary scale of perception.

This work shaped Leonardo's fundamental discoveries in what became later several branches of physical science: hydrodynamics generally, optics as a branch of hydrodynamics, acoustics as a branch of hydrodynamics, Leonardo's discovery of the constant speed of light, of acoustical shock-fronts, of the wave-function of propagation of all radiation, and so forth. The collaboration of Pacioli and Leonardo on the harmonics of living processes, leads into the relevant work of Louis Pasteur, and into modern optical biophysics. This also determined the several revolutions which he accomplished in plastic arts and music. The latter included, spherical projection, to replace Albertian linear projection. The impact upon drawing and painting is most easily demonstrated. Although the known surviving writings of Leonardo and his collaborators on music, are fragmentary, the indications from those sources are crucial.

Both in physical sciences, and in aesthetics, the entirety of Leonardo's work is subsumed under a common principle, such that, as for Plato and St. Augustine ear-

lier, truth and beauty nowhere have differing definitions, or represent in any way a different subject-matter, a different branch of human knowledge and practice.

The essential thing to be stressed at this point in our report, is that Pacioli and Leonardo supplied a fresh basis for affirming the same principle of aesthetics central to Plato's dialogues. Life is beautiful, and death is ugliness. Those forms which correspond to the characteristics of living processes, as distinct from non-living, are within the realm of beauty. All other definitions of artistic forms, lead to nothing but ugliness.



Art: Beauty Surpassing Itself

Beauty is not yet necessarily art. All living things express beauty. The astrophysical and microphysical laws of the universe, also express beauty. The mere existence of a human child, is beautiful. A horse is also beautiful, and so is the song of the well-trained European nightingale. A leaf is beautiful, and so a tree, or a flower. Art is distinguished from natural beauty, in that is expresses something pertaining to the perfection of the human species.

The essence of art, is that it must both conform to the form of beauty as we find beauty in living nature, and must also be an efficient expression of that which distinguishes mankind absolutely from the beasts.

From the vantage-point of "animal ecology," mankind is not an animal species.

The condition of society which most nearly approximates the bestial, is so-called "hunting and gathering society." In this state of affairs, approximately ten average square kilometers of land-area are needed to support one average individual in an extremely wretched condition, at life-expectancies significantly less than twenty years of age. This would place an upper limit upon the human population, of approximately 10 millions individuals.

Today, there are approximately 5 billions persons living on this planet. With general use of nothing more advanced than today's technologies, we could sustain a population of approximately 15-20 billions, at standards of living comparable to those prevailing in the U.S. during the early 1970s, and with average life-expectancies approximately those of the U.S.A. today. The human potential population-density has been increased by a factor of about 1,000; the average individual of today is better in quality, by a factor of about 1,000, than that of primitive man.

Man is no animal. In the language of animal ecology, mankind's practice of scientific and technological progress enables the human species to do what no animal species can do. Animal species can adapt to environmental changes, and can be educated to a certain degree by mankind. Man-made or other changes in the environment, can cause the potential population-density of particular animal species to increase or decrease. No animal species can increase its potential population-density by its own means by even as much as one-tenth of an order of magnitude.

Mankind is the only species which can transform its own species-behavior. Transformations for the better, each and all occur through individual creative mental activity of a kind consistent with fundamental scientific discovery.

The animal ecologist's statistical methods, would require that we define "transformations for the better," as behavioral changes which have the effect of increasing the potential population-density of mankind: the average number of individuals who can be self-sustaining, per average 100 square kilometers of the Earth's land-area.

In animal species, the potential population-density can be increased or decreased externally. Such externally determined changes in potential, include both man-made changes, and those occurring without man's intervention. The cultivation, selective breeding, and training of animal stocks, by man, is a notable element in the range of such possibilities. However, relative to any level of circumstances induced by such "external factors," the animal species' own ability to improve its potential is either fixed, or approximately so. With mankind, this potential has been increased by man himself, by a factor of approximately 1,000, and could, in fact, be increased by an additional factor of between 10 and 100, during a coming interval of approximately fifty years.

This set of facts requires us to discover the nature of the causal relationship between willful increase of potential and scientific progress. Broadly, there is a correlation between man's progress in knowledge of the laws of the universe, and the increase in potential through changes in behavior induced by progress in scientific knowledge. The only forms of human behavior which are properly termed "rational," are those in which scientific progress is regarded as the characteristic and indispensable standard of human behavior, and in which "scientific progress" is defined only in terms consistent with the notion of increased potential efficiently caused by such progress.

Man measures, tests, what he should regard as progress in scientific knowledge, by limiting such progress to those implicit forms of changes in human behavior which cause increases in potential population-density.

Such improvements in human behavior are inseparable from improvements in the quality of the human individual. "Quality" is reflected in improvement of health and longevity, of material conditions of life generally, and in the level of scientific knowledge of the average individual. In other words, the line of advancement of culture consistent with scientific progress, and increased potential, defines more advanced societies as analogous to a higher species of being than less advanced ones. The individual of the more advanced society represents a greater power over nature, per individual than the less advanced one. What can be accomplished in lower species only by evolution of biological heredity, is accomplished by man as a willful evolution of mental organization to higher forms.

The specific feature of human mental life, which makes possible such willful evolutionary progress of our species, is that which distinguishes mankind absolutely from all lower species.

The only rational definition of "art," is that which combines natural beauty (Golden-Section-congruent harmonics) with the essential characteristics of fundamental scientific discovery. The latter, "essential characteristics," signifies that the composition of the work of art must be fully consistent with exactly the same creative faculties of mind required to effect a fundamental scientific discovery. The included restriction is: in no way, must the creative faculty violate the principle of beauty, and also, in no way must beauty be achieved by any means but the elaboration of this "essential characteristic."

The relationship between the principle of beauty and the creative principle, which we have just identified, is of the form we call "doubly-connected" in synthetic geometry.

For example, in the case of doubly-connected circular action, an "independent degree" of circular action is acting upon circular action constantly. By adding a third, "in dependent degree" of circular action, we generate everything which it is possible to generate by construction within the bounds of visible space. (The "bounds of visible space," are defined as to principle by the proof of the uniqueness of the five platonic solids.)

In the case of art, beauty and creativity are, respectively, "independent degrees." The one can not be derived simply from the other, and the action of neither can modify the other moment as such. At every imaginable point, in the physical space-time of artistic composition, beauty is acting upon creativity, and creativity is acting upon beauty, such that the effect is their combined action, but that neither action as such is altered by the other. At least, this limitation is the first-approximation case, pending consideration of more advanced principles derived from the elaboration of this case.

However, creativity itself has a characteristic form of action. This is demonstrated by comparing the most fundamental laws common to astrophysics, living processes (as distinct from dead or inorganic ones), and microphysics. To make such a comparison, requires that we consider nothing true about the lawful composition of living processes, which does not distinguish each and all living processes absolutely from non-living ones. To make such a comparison requires, that nothing is fundamentally lawful in astrophysics or mi-

crophysics, which is not consistent with the absolute principle distinguishing living from non-living processes.

Kepler's founding of universal mathematical physics, was based successfully on the principle of life as previously identified by Pacioli and Leonardo. Kepler's astrophysics has flaws of insufficiency, as he himself was the first to emphasize; in other words, it is correct, relative to the fallacy of all contrary astrophysics, but is inadequate as an absolute statement of astrophysics, and contains demonstrable errors of measurement attributable entirely to that specific inadequacy. However, to move backwards or sideways from Kepler's solar hypothesis, as Galileo, Descartes, and Newton did, is to produce nothing but silly errors.

Nicholas of Cusa (1401-1464)

Johannes Kepler (1571-1630)

Kepler is right as far as he goes, excepting a relatively minor error, relative to earlier work of Leonardo et al. on musical harmonics. His inadequacies are limited otherwise to the fact that he does not go far enough, inadequacies conquered largely by the later work of Leibniz, Gauss, and Riemann.

With those qualifications, Kepler already proved, that the same harmonical principles which distinguish living from non-living processes, are the fundamental laws of astrophysics. The effect of the work of Leibniz, Gauss, Riemann, et al., was to make this more emphatically clear.

Since the laws of the universe are of the form of harmonic orderings congruent with the Golden Section, fundamental scientific discovery reflects man's capacity to bring our minds into congruence with such harmonic orderings. Thus, the action corresponding to the creative potential of the human mind is congruent with such harmonic orderings. Creative thinking is beautiful thinking; all other thinking is, relatively ugly thinking.

Thus, art is defined as a doubly-connected action, in which each independent component of such action is itself congruent with the harmonic orderings of the Golden Section: True art is beautiful thinking about beauty, as elaborated within the bounds of beauty of form.

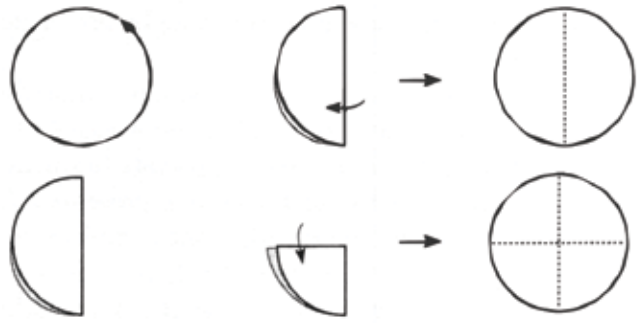
Creativity in Art

What we have outlined up to this point, shows generally the reciprocity, the interdependence of truth and beauty, but only in a preliminary way. "Truth" must satisfy two additional requirements, in addition to those we have explicitly described thus far. These two are, creativity as such, and love in the Greek sense of "*agapē*."

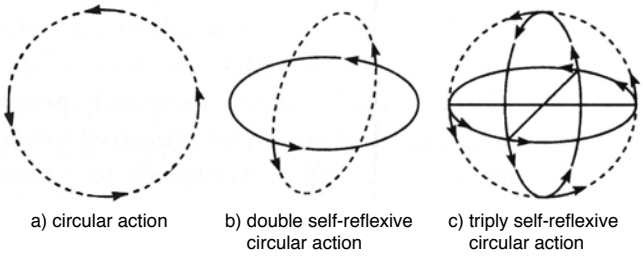
The widespread, ignorant assumption among literate persons, is that "laws of the universe" signifies fixed laws, as we associate "fixed laws" with the mechanics of Isaac Newton, for example. As Philo Judaeus of Alexandria argued correctly, Judeo-Christian theology views belief in "fixed laws" as not only very bad cosmogony, but as a most insulting attitude toward the Creator.

In Genesis, the Creator composed the beginning of the universe out of a formless void. If Plato were to read such a passage, he would grasp the meaning of this more or less correctly, and instantly so. From the standpoint of modern platonic science, that of Gauss and Riemann, we are able to be more precise than Plato might have been. Plato would insist that we read any passage as profound as this one in the language of a synthetic geometry. From the standpoint of modern synthetic geometry, the mathematical physics of Gauss and Riemann, we can read this more precisely.

In synthetic geometry since Cusa's *De Docta Igno-*



Using "synthetic geometry," we generate a straight line and a point from the circle, by folding it upon itself.



The sphere is generated by triply-connected circular action.

rantia, the presentation of elementary synthetic geometry from an advanced standpoint, begins with nothing but triply-connected circular action, acting within a domain which seems otherwise to be a formless void. No particles exist, no straight lines exist, no notion of measurement exists. This action creates a straight line, and then creates the first point. In the process of generating these two creations, the idea of measurement is first introduced, as divisibility by one half. With nothing more than these beginnings, every form which can be constructed in visible space is created, without introducing anything new from the outside.

This kind of rigorous scientific thinking guided Cusa to define creation as a process of continuing, universal evolutionary development of successively higher forms of existence in the universe. This same view of a higher ordering of the process of continuing creation, was emphasized by Leibniz, in such among his more widely-read writings as the *Monadology* and *Theodicy*. Finally, the work of Gauss and his collaborators produced a means for stating this conception in a way suited to our purposes here. The work of Gauss, Dirichlet, Weierstrass, Riemann, and Cantor (among others), permits us to state in a mathematical way, exactly what we ought to mean by the term "human creativity."

These scientists have enabled us to state and analyze the most important class of mathematical functions, functions of a class often nebulously described as "non-linear." In introducing such functions to students in classrooms, the best example with which to begin, is what is termed a "Weierstrass Function." If we represent such a function in terms of algebra, the result is a special kind of trigonometric function. As a whole, this function is a continuous function; it can be extended more or less indefinitely. Yet, If we attempt to plot this function graphically, it appears that this function is constantly interrupted by what we often describe as "mathematical discontinuities." Many kinds of such quasi-continuous functions can be constructed, in addition to the elementary "Weierstrass Function." All of what are meaningfully described as "non-linear" functions in mathematical physics, are either of this general class, of a higher class sharing the same essential peculiarities.

The relevance of our reference to this higher class of such functions, is that Riemannian physics provides us a physics-language, in which to restate the broader implications of Cusa's insistence that the laws of our universe are evolutionary, rather than mechanical laws of the type we associate with the followers of Descartes and Newton. This pertains both to the way we must see the question, "What is the form of the fundamental laws of our universe?," and the terms of reference within which the term "creativity" must be defined.

For purposes of reference, the most relevant facts are these.

Gauss-Riemann physics is an advanced development of the kind of synthetic geometry implicit in Cusa's *De Docta Ignorantia*. Instead of the multiply-connected circular action, which we use in elementary synthetic geometry, we substitute for circular action, the conic form of self-similar-spiral action. In elementary synthetic geometry, we create lines, points, surfaces, and solids, starting from nothing but multiply-connected circular action, and introducing nothing added at any point of the elaboration. These points, lines, surfaces, and solids, we term "singularities." In Gaussian synthetic geometry, we generate all of these, but also a higher class of singularities, which latter can not be constructed in Euclidean geometry or elementary synthetic geometry. These higher-order singularities, correspond to the mathematical discontinuities of an ideal "Weierstrass Function," they are the mathematical existences which correspond to such phenomena of physics as so-called "elementary particles."

Whenever we generate such a high-order singular-

ity within a process, we change the local physical laws of that process. If we attempt to explain the laws of physics in terms of linear mathematical functions, of the type popular among followers of Descartes and Newton, those laws break down whenever a higher order singularity is generated in a process.

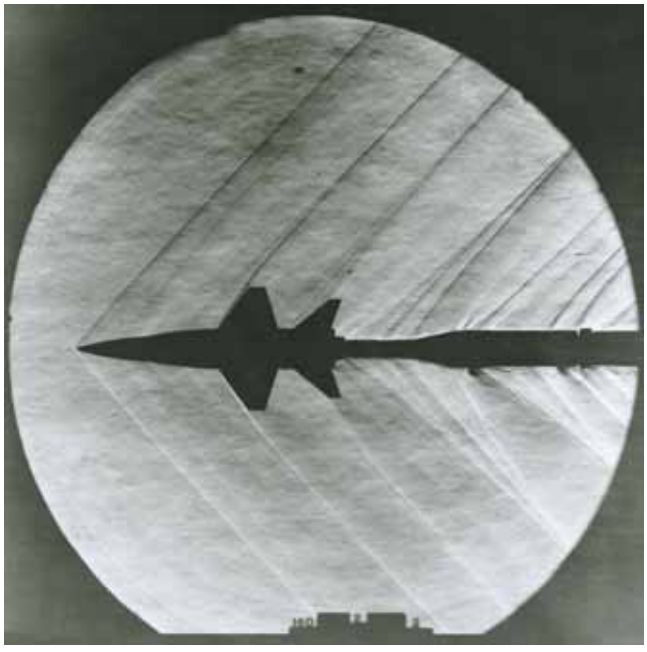
The classic example of this, is an 1859 paper written by Riemann. The English translation of the title of this paper, is "On the Propagation of Plane Air Waves of Finite Magnitude." This was the paper which predicted, among other things, what must happen if an aircraft breaks the sound barrier. The followers of Descartes and Newton insisted, up to the 1940s, that Riemann was wrong, that transonic and supersonic flight were impossible. They assumed that the singularity encountered at the speed of sound, would be an absolute barrier. Riemann pointed out, most correctly, that the local laws of flight are changed as the transonic region is entered, and that new, altered local laws prevail.

It should be obvious, that what is required in all situations of this kind, is a new, higher kind of physical law, which accounts for all of the mutually-differing local laws of action, before and after the generation of each such singularity is encountered. Gaussian synthetic geometry, as developed by Dirichlet, Weierstrass, and Riemann, shows us exactly how such higher laws must be constructed.

This situation is precisely analogous to what occurs in the human mind, as a fundamental new scientific discovery is being generated by that mind.

In physics, the series of discoveries within which Riemann's work is situated, requires that we abandon all fixed, mechanical kinds of mathematical expressions, in attempting to state what are the fundamental laws of the universe. The fundamental laws of the universe ultimately govern what must occur when two particles either collide, or come close to one another; however, we must not commit the blunder, as Descartes and Newton did, of assuming that we can discover the fundamental laws of universe merely by studying such collisions.

We must, instead, explore the behavior of the universe at its outer limits. These limits are essentially three: astrophysics, microphysics, and those aspects of living processes which distinguish living processes in the most essential way from mere organic chemistry. We must discard the popularized, but false teachings of Descartes and Newton. We must not assume that the universe is made up of particles moving about within empty space and empty time. We must think in terms of physical space-time, such that the ideas of matter, space, and time, can in no way be separated from one another.



The followers of Descartes and Newton insisted, up until the 1940s, that Riemann was wrong, that transsonic and supersonic flight were impossible. Shown here are shock waves generated by an X-15 model being tested in the NASA/Langley Research Center's Supersonic Pressure Tunnel in 1962.

We discover, as Gauss and his collaborators showed, that Kepler was essentially correct. That, to discover the laws of the universe, we must begin by ignoring all questions of how particles interact with one another in space. We must, instead, say to ourselves, that physical space-time as a whole has a certain curvature, and that all of the fundamental laws of physics are properly discovered, by discovering this curvature of physical space-time.

It is this curvature of physical space-time, which causes our universe to experience a definite speed of light as a limit, which requires that quantum constants and the fine-structure constant, exist. Today, those otherwise differing notions of fundamental physical laws, which may be classified as scientifically competent, are premised on this point of view.

In other words, the mere fact that a supposed physical law is stated in the form of a linear, an algebraic formula, is sufficient demonstration, either that the formula is wrong, or that, at best, the formula does not represent a fundamental physical principle. All fundamental constants are necessarily either transcendental numbers, or approximations of such.

"Ordinary," scalar numbers for such things as mass, temperature, and so forth do not express directly any fundamental values, but are, at best, useful engineering terms which may serve a useful purpose within a limited range of applications. Proper mathematical statements of fundamental physical principles, are necessarily in the form of the kind of higher-order "non-linear" functions to which we have referred.

Using the popularized, and wrong, image of (linear) physical laws as a point for comparisons, we may describe true physical laws to the high-school science-graduate in the following way. Imagine the case, that the local laws of action change as processes reach certain relative limits of the type which we have associated with higher qualities of singularities. Imagine, that the local laws of action, before and after this change, can each be expressed approximately in linear statements. What we require is a mathematical function, which treats such "local laws" as the variable term of a function. That function would, then, aid our prediction of the kinds of local laws which would come into existence under certain conditions, and should describe each and all such cases. In other words: a higher-order law, covering all cases of different kinds of local laws, a higher-order law which defines the way in which new sets of local laws come into existence. In other words: a law which rules the way in which changes in local laws occur.

So, in speaking of fundamentals, we should focus our attention on this higher kind of law, and not make the mistake of viewing any linear form of statement of a local rule of physical action, as representing a "fundamental law."

The fundamental laws of the universe, are of this higher form.

The same is true of the human mind's process of creating scientific knowledge. The mind's idea of scientific knowledge changes with scientific progress. Yet, to the degree that these changes do indeed represent progress, the way in which the mind orders these changes is itself a lawful way:

> Human Reason is not of the form of deductive logic. Human Reason is located in the higher functions by which accepted forms of logic are superseded by new, higher forms of logic. Human Reason and the kind of creative reasoning, through which valid, fundamental discoveries of science are accomplished, are exactly the same thing. The Laws of Reason are the laws which pertain to this domain of human practice, and no other.

It is this aspect of Reason which determines the power to think beautifully. We indicate the way in which Golden Section harmonics occur in creative reasoning.

The elementary projective characteristic of conic self-similar-spiral action, is the Golden Section as the essential metrical characteristic that projection. These projections are also expressible in terms of ordered sequences of elliptic functions or hyperbolic functions (primarily), of which the elliptic functions are more general, for reasons we need not consider in the scope of this report. Such forms occur in the form of thought, in the most immediate and efficient way, in creative thinking. Creative thinking is of the form of a Riemannian function (e.g., a Riemann Surface function). Algebraic statements corresponding to such functions are merely descriptive locus-statements of the corresponding synthetical geometrical construction. That construction is of the form of multiply-connected, conic self-similar-spiral action: the form in which higher-order transformations occur. The metrical characteristic of such transformations, both in the form of thought, and in the efficient effect of such thought, is the Golden Section.

Actually creative thought, is of that form and implicit effect. In aesthetics, the proper use of the term "art," is restricted to those compositions, in which a creative transformation of this type is that central feature of the composition, with respect to which all other elaboration of the composition is coherent.

In the case of well-tempered composition, the form of such composition can be reduced to statement of a set of principles. These principles are as fixed as the initial set of principles elaborated in either an elementary or an advanced synthetic geometry. However, the mere faithful elaboration of those guiding principles, does not produce a valid musical composition. The mere elaboration of those principles, is a valid classroom or homework exercise for the music student, as the composition of correct textbook fugues illustrates the point. Such compositions are musical activity of the learning process, but are not worthy of being called works of art. Once the mastery of these principles has been accomplished, such schoolroom exercises have the effect of boring monotony.

I repeat this important point: The process of reliving

a discovery, should represent the greatest amount of expenditure of effort by the teacher and student. The reliving of the discovery of a principle and its consistent application, does call directly upon the student's creative powers, and is exciting to students for that reason. However, once established principles have been learned in that way, mere repetition of those principles adds nothing to humanity's store of musical knowledge.

To produce a composition which contained nothing more than an elaboration of school-book principles of composition, and perhaps, worse, its contamination by some arbitrary elements of irrational personal impulse, would be like an astronomer's rushing to the podium of a 1986 scientific conference to announce that he had just accomplished the original discovery of the planet Neptune. Just as every secondary-school student should experience the rediscovery of Neptune, that student should re-experience the discovery of (what ought to be) schoolbook principles of musical composition, but should never present a classroom exercise of that sort as a work of art.

The essence of a good musical composition is one or more higher-order singularities. These singularities are generated in the manner representable as a Riemann Surface function. The same is true of painting, sculpture, architecture, poetry and classical drama. In all cases, that aspect of the composition which departs from schoolbook principles of composition, must not be an arbitrarily inserted item. It must be brought into existence in the same sense synthetic geometry brings a new thing into existence. It must necessarily follow from principles, in the sense that Riemannian synthetic geometry creates existences such as electrons, out of a formless, empty void of the multiply-connected continuum. That is, the new element must be a discovery, analogous to a scientific discovery, such that, retrospectively, it both surpasses previously known principles, but is, at the same time, something recognizable as necessarily following from those same principles which it surpasses.

These singularities of an artistic composition, taken together with the way in which they are generated, and in which the composition as a whole is an elaboration and resolution of this act of discovery, are the identity of the composition. It is from this viewpoint, that the composition as a whole corresponds to a definite idea.

Respecting great classical musical compositions, throw all the "program notes" interpretation of the symbolic meaning of a composition away, for the trash it is. The composer, whether as musician, painter, poet, dramatist, is a part of life, and takes inspiration from life as

Painting by Raphael, 1504

Physical space-time has a certain curvature, and that all of the fundamental laws of physics are properly discovered by discovering this curvature of physical space-time. Shown here is Raphael's "Marriage of the Virgin."

life; the idea of "absolute music" is as pathological in its own way, as the opposite disorder of typical program notes. The mind of the creative artist, as such a mind, is always probing experience in general for the germ of, for example, a musical idea. Once the artist has abstracted that germ, the entire affair becomes an artistic process. The subject of all art, is the celebration of truth and beauty in that medium. Art never violates the beauty of nature's display of the principles of composition of life in general; but nothing which limits itself to nature's beauty, is art. Art is the celebration of creativity, as valid, fundamental scientific discoveries distinguish creativity from the intellectually sterile anarchist's wont to view arbitrary, irrational impulses as a substitute for creativity.

Art is never a "personal expression;" it is the macro-

cosm presented by the microcosm. It is the universality of truth and beauty, consciously concentrated in an individual's artistic creation. The subject of art is the power of the individual mind to encompass the universality as such, in an efficient, rather than merely a sterile, contemplative way.

Painting by Thomas Eakins, 1876

It seems that a light of joy has turned on in the child's mind at this moment. Shown here is Eakins' "Baby at Play."

Agapē as Truth

Let us focus only upon the fine art of western Judeo Christian civilization, the art which follows Augustinian principles of harmonies of composition. Essentially, we mean "Christian art," since there is nothing else worth the name of "art" in western civilization. Great artists of Jewish origins walk in the footsteps of Philo of Alexandria, and work in ecumenical fellowship with Augustinian principles, as Philo himself was a personal collaborator of St. Peter, at Rome.

Although the principles of art so adduced, seem to be particular to western Europe and the Americas, they are true principles nonetheless. If the person encultured in this western European civilization wishes to understand the artistic works of Asian cultures, that person will find that the principles seemingly only specific to the Augustinian tradition are truly universal ones. That person will be enabled to discover, that by situating the notion of art rigorously in terms of his own cultural experience, he acquires in this way the power to comprehend art universally.

The most beautiful aspect of Christianity is presented first in the opening chapters of the Gospel of St. John; later following St. Paul, this truth and beauty is affirmed and elaborated by St. Augustine. The clarification of the Latin Nicene Creed with *Filioque*, captures the essence of this.

The Logos (conventionally referred today by today's Christians as the "Holy Spirit") is the essence of Reason, as we have identified the higher-order laws of the universe here. Yet, this is not abstract reason; without the active role of a certain quality of love, *agapē*, reason dies. This quality of love is the essence of Reason. It is, at once, love of God, and also a kind of love toward mankind made concrete by Jesus Christ as God's love toward mankind. Whom God loves, we love, and in that fashion. The flow of perfect Reason and perfect Love from Christ toward mankind, as from the Creator, is the common essence of science and art.

This love toward mankind is focussed on that aspect of the individual personality which distinguishes mankind absolutely from the lower species: the "soul," the development of the divine spark of potential for scientific reasoning.

A child, for the first time, succeeds in building a column of four blocks placed atop one another. It seems that a light of joy has turned on in the child's mind at this point. Ever after, whenever the child effects what is for that child a valid, original discovery consistent with reason, this same joyful illumination occurs. Adults sensible of what is occurring at such points, are sometimes brought to the verge of tears of joy. This is agapic love in its simplest expression.

We do not, or should not love, the child's outbursts of hedonistic irrationalism. The child has two conflicting natures, the bestial (hedonistic irrationalism) and the human potential for creative reasoning. We must not love the former; rather, we must work to free the child from this imitation of inferior species, by loving only that which is good, which is truly human, the progressive development of those powers for which the "divine spark" of reason is the germ.

True science is such love of mankind. By mastering reason less imperfectly than before, we are grasping the power of the Creator into our hands. We do this lovingly, because it is a sacred, beloved thing. We express the power we have thus received as an act of God's love toward mankind. It is the same in art.

Truth and Beauty are the only subject-matters of art; there is no other. Truth and beauty are qualities of creative reasoning, nothing less. Without the motive power of adoption of God's love toward mankind as one's own passion, neither truth nor beauty could exist. This is the subject matter of all science, all art.

Painting by Jean-Baptiste Isabey, 1819

The 1815 Congress of Vienna determined the shape of Europe after Napoleon's defeat at Waterloo.

2. How Art Was Destroyed

The elementary principles of music which we shall present in the following chapter of this report, include some which would be received as either simply "highly controversial" or as intolerable, among many professional musicians and musicologists today. However, excepting that we have applied certain of the fundamental scientific discoveries of the nineteenth century to this subject-matter, the principles we defend are those commonly employed by the greatest among classical composers. What has changed, such that most among today's musicians are either ignorant of, or hostile to those principles which the greatest composers considered indispensable?

For example, from approximately 1711 through the 1840s, classical composers tuned the middle-C of their keyboard instruments to 256 cycles, as opposed to the A = 440 (or, even higher) introduced approximately the close of the 1840s. For reasons to be indicated here, the shift of approximately a half-step in tuning, changes the interpretation of a composition composed at C = 256. In the Classical period, the keyboard was tuned approximately to the well-tempered values of the scale, values which are not quite the same as the so-called equal-tempered or even-tempered values, a difference of some marginal significance for the interpretation. Most modern musicologists and professional musicians do not accept the classical standards of tuning, and tend even to become angry when confronted with the physics-basis for well-tempering.

For example, if one performs a Mozart or Beethoven composition with the (mistaken) view that A = 440 is an acceptable tuning, the interpretation provided in the performance will usually contain very significant blunders. The problem involved is recognized more easily by well-trained singers, than by instrumentalists, for reasons we shall identify at a later point. If the blunders caused by tuning at A = 440 are not recognized, then the professional musician, by attempting to build a theory of interpretation around acceptance of the error, will be unable to recognize, or to present, the most crucial features of phrasing and intonation in performance of such compositions.

It may seem curious, but some of the best musicians do combine bad theory with relatively good or even excellent presentations of classical compositions. A good musician develops what is sometimes described as "musical instinct." Taught theory aside, the musician resorts to matters outside the domain of taught harmony; "an ear for poetry," a sense that each key has a distinctive "color," combined with a sense of forcing the instrument "to sing," are exemplary of this. They add these considerations, as a cook adds a final touch of seasoning, and thus produce effects, even at A=440, converg-

ing upon the composer's intent.

All such considerations duly listed, the net effect is, that there is a break in the internal history of music, such that composers born after the 1815 Congress of Vienna seem to have lost the "secret knowledge" known to the generations of Mozart, Beethoven, Schubert, Chopin, Schumann, and so forth. Brahms and, until his last years, Verdi, as leaders of the war against Liszt and Wagner, typify that last generation of persons still able to compose with knowledge of classical principles. Among most contemporary musicians, not only is the knowledge lost, but, like a man who seems to have lost a sensory or other physical faculty too long, they seem chiefly unaware that any loss has occurred.

Friedrich Karl Savigny (1779-1861)

It is impossible to deal effectively with the hard objections to what we shall report, unless we are able both to identify, and to understand when, how, and why, this break in the internal history of music occurred. So, before we proceed to summarize the controversial points, we must interpolate this chapter on the subject of that break.

Following the 1815 Congress of Vienna, there was a concerted effort to eradicate the musical knowledge of Bach, Mozart, Beethoven, and so forth in Germany. This was not limited to Germany; but the related campaigns in other nations are consistent with what was done inside Germany. This campaign was centered upon the university at Berlin, based among the students and collaborators of the official "Prussian State Philosopher," G. W. F. Hegel, and Hegel's close collaborator, and Karl Marx's professor of law, Friedrich Karl Savigny.

Savigny, whose work prefigured and laid the foundations for the so-called *voelkisch* legal doctrine of Hitler's Nazis, is known within law as one of the leading founders of what is called "the Romantic school of law." The use of "Romantic" in this context, has exactly the same meaning as in its application to music, to politics, to sociology, to psychology, to ethnology-anthropology, to theology, and to art generally. "Romantic" means essentially, the precedent of the law and culture of the Roman Empire in general, and the evil irrationalism of the Justinian code for Byzantium. In law, Savigny combined the general principles of Roman imperial law, with included emphasis on a specific sort of pro-irrationalism popularized in Germany by the notorious Madame de Stael and her accomplices.

It is important to emphasize here, the "hereditary" connection between Savigny and Hitler's Nazis, as well as to the case of proto-Nazi composer Richard Wagner. Franz Liszt was the criminal who made Wagner possible; Wagner was the arch criminal who contributed much to making Hitler's Nazis popular. Proto-Nazi Wagner is the benchmark to be studied, to understand the origin and the character of the break within the internal life of music. Every obscenity in the name of "musical modernism" which came after the 1840s, was made possible by the developments centered around Wagner.

Although Roman law was itself already "Romanticism," when the epithet "Romantic" is applied to Savigny, this usually refers to a very specific, leading feature of Savigny's work in both law and in culture generally. Savigny insisted, that "natural law" as Augustine defined it, did not exist. In place of "natural law," Savigny substituted what he termed the "*Volksgeist*," the changing customary opinion of each generation. Crudely stated, Savigny substituted a judge's estimate of currently prevailing trends in "popular opinion," for moral principles of law. This doctrine reached its logical outcome in the Nazi race laws and in the *voelkisch* (populist) doctrine of Nazi law in general. Whatever the high priests of the Third Reich cult defined as the "popular will of the German people," was law.

The kinship between Hegel's "World Spirit" and Savigny's "popular spirit," is so readily obvious, that we need not expand upon that connection here. More important to stress, is the fact that the Soviet interpretation of Russian culture, of the "collective will of the people" of each particular piece of ethnic real-estate, is consis-

tent with Savigny's doctrine, and also identical to the Nazis' "populist" doctrine of law. (The essential difference between Nazism and Bolshevism, is that the Nazis wished to make Berlin, and the Bolsheviks Moscow, the new capital of a world-wide, new and permanent form of Roman Empire.) This is key to understanding the Russian tendency to infuse every performance of a classical musical work with the spirit of the popular ballad *Kalinka*, as sung sentimentally after a slightly less than stunning dosage of vodka toasts. Russian professional musicians tend to run to a prodigious technique, and to let a sentimental employment of that technique overrun any consideration of the composers' intent.

CC/Wolfgang Moroder

The Benedictines of Venice's San Giorgio Maggiore have been consistently sworn enemies of truth and beauty in music, and of Saint Augustine.

Savigny legislated the imposition of the same Romantic dogma of law upon every aspect of what are called today "liberal arts" subject-matters. He insisted, that the rigorous reasoning appropriate to the physical sciences, must not be permitted entrance to the domains of law, politics, sociology, theology, and art. From Savigny came the modern German tradition, of assuming an axiomatically hermetic separation of *Naturwissenschaft* (natural science) from *Geisteswissenschaft* (social sciences, art, theology).

This kind of undertaking was not original to Savigny. Savigny's significance was that he codified this evil doctrine for Germany, and that this poisonous development within Germany interacted with, and re-enforced similar endeavors outside Germany. With those two qualifications, Savigny is the key benchmark for understanding, why most modern professional musicians are not only ignorant of, but hostile to some of the most fundamental principles of classical musical composition. [To indicate one example: this is key for understanding the elementary blunders spoiling the otherwise meticulous work of the twentieth-century Viennese musicologist Heinrich Schenker.]

The Romantics' efforts to eradicate truth and beauty from music, were a new phase in a long campaign to suppress Augustinian aesthetics. The Benedictines of Venice's San Giorgio Maggiore have been consistently avowed enemies of truth and beauty in music, and of St. Augustine.

The Benedictines are, by legal origin, a Byzantine monastic cult. The Benedictines, especially the handful of international coordinators based at San Giorgio, have been the enemies of Augustine and Augustinian aesthetics for approximately a thousand years, and are all near the center of the fostering of the satanic "New Age" cults of the present century. In respect to music as such, they have led in attempting to outlaw Augustinian principles of music, demanding that the West submit to the oriental paganist's anti-musical Gregorian chant.

The fact of the Benedictines' consistent efforts to eradicate Augustine from music, science, and theology, is well documented, and an important fact in itself. It is more important, to understand the cause of this behavior. Once we recognize the cause of such behavior, the fact that Savigny's irrationalist dogmas echoed the Benedictine precedents, seems no longer a mere coincidence.

Pagan monasticism was introduced to Europe from the Orient, from such distant sources as the Taoism of China and kindred phenomena in the Indian sub-continent. It was a well-established pagan practice under Rome, and flourished in the proliferation of pagan cults under the Roman Empire. Its formal introduction to Christianity was accomplished chiefly by the Byzantine Emperor Constantine, and institutionalized in Italy under the codes of Justinian. The formal origins of

pseudo-Christian monastic cults are centered around the Byzantine emperors' adoption of the hesychastic "desert monks" of St. Catharine's of the Sinai. The international capital of monasticism today is the community of assorted hesychastic and quasi-hesychastic cults at so-called "Holy Mountain" at Mount Athos in Greece. The synthetic culture of Russia was manufactured chiefly by monastic cults steered from Mount Athos, and later, from Venice. The Benedictines, established as a Byzantine imperial agent of influence in Italy, are, together with their spin-offs, such as the medieval Cluniacs of the Burgundian region, the center of this eastern influence within western Europe and the Americas.

Sociologically and otherwise, the Benedictines represented the old Roman imperial families and the tradition of the pagan cults of the Roman pantheon. Thus, the first Benedictine headquarters was established at the old temple of Zeus on Italy's Monte Cassino. Thus, later, the Mithra cult's Isle of Capri, since Augustus the personal property of the family of the Caesars, was also given to the Benedictines. Since the establishment of Venice's San Giorgio Maggiore (named for the Phoenician pagan cult of "St. George," transmitted to twelfth century England by way of Genoese "Lombard" banker creditors), the chief source of the great power of Venice has been the symbiosis between the Benedictine headquarters there and the ruling council of the Venetian rentier-financier nobility.

The Benedictine's adaptation to Christianity echoes the doctrine of proposed toleration of Christians (somewhat reluctantly) adopted by Diocletian and implemented by Diocletian's Mithraic heir, Constantine. The condition of the toleration, was that the Christian church submit to the paganist pontifical authority of the emperor.

Constantine's appointment of bishops, including the notorious Arius, forced the confrontation leading to formulation of the Nicene Creed as a constitutional code attempting to prevent the Emperor's aggressive paganization of the episcopacy. The continuation of the Byzantine imperial paganization programs was then countered by St. Augustine, who strengthened the Nicene Creed by defining what became later adopted as the *Filioque* of the Latin Creed.

In secular affairs, and in theology, Augustinus defined Roman law and traditions as evil from the outset. He prescribed a form of society consistent with Christianity, based on a natural law implicitly defined by the New Testament. Thus, the split between the eastern and western churches began.

In secular affairs, the split between East and West took the form of the East's role as bastion of Roman imperial law, and the West's counter-position, the rule by natural law. Russian culture was manufactured by the East, as a synthetic religion combining pagan beliefs common among the wretched subjects of the Varangians with already half-paganist byzantine cults. The Benedictines have consistently represented the standpoint of Roman imperial traditions within the West. Their leading, continuing role, in promoting anti-musical, Gregorian grunting, and seeking the suppression of Augustinian principles of composition, has been at the center of all efforts to destroy classical music, down to the present day.

In addition to the straightforward efforts to outlaw music from the churches, in favor of Gregorian chant, the Benedictines and their accomplices have employed an assortment of flanking tactics. For example:

1. Leonardo da Vinci and his circles codified a well-tempered polyphony. (Although Leonardo's own book on music is lost, fragmentary references in his extant writings and the writings of a collaborator, indicate the tenor of his approach.) Beginning the Venetian-directed Habsburg sack of Rome, and subjugation of the Papacy, in 1527, until Mazarin and the defeat of the Habsburgs in 1653, a Venetian-directed semi-dark-age descended over most of Europe. The leading cultural feature of the Venetian-directed Counter-Reformation was to eradicate the influence of the 1439 Council of Florence, with included special emphasis upon destroying well-tempering in music.
2. The eighteenth-century codification of well-tempering was accomplished on the initiation of the scientist Gottfried Leibniz, who established Middle-C at 256 cycles as the pivot of well-tempered scales. The faction opposing Leibniz within the House of Hannover, led the effort to crush J. S. Bach and well-tempered polyphony.
3. Classical well-tempered polyphony, pivotted on Middle-C at 256, was established throughout Europe by the students of Bach. Beethoven was educated by a student of Bach, Neefe. About 1783, Mozart brought himself directly under the influence of Bach's work, as is reflected in his musical composi-

tions from that year onward. After 1815, Savigny and others moved to stamp this out through introduction of the dogmas of Romanticism.

Immanuel Kant

Portrait by Allan Ramsay, 1766

David Hume

Savigny's influence on German culture would not have been possible without the preceding influence of the replanted Scottish Pietist Immanuel Kant, especially the influence of Kant's final Critique, his *Critique of Judgment*. The key to understanding the way in which Savigny's ideas worked inside music, is the case of Kant.

Kant's original career in Germany was as an apostle of the Scottish philosopher (and British secret-intelligence official) David Hume. Kant combined the "moral philosopher" of Hume with the axiomatic-deductive schemas of Wolffian logic, to the purpose of eradicating Leibniz's influence, in favor of Hume's dogmas. Then Kant appeared to have broken with Hume, as Kant documents in his Prolegomena, and in the introduction to the first edition of his *Critique of Pure Reason*. The degree of Kant's break with Hume is usually exaggerated; the content of the *Critique of Judgment* shows most clearly how limited were Kant's differences with Hume. Savigny differs from Kant chiefly in the respect, that Savigny adopted the theses of Kant's *Critique of Judgment*, but also adopted that feature of Hume's later, more radical doctrines, with which Kant had disagreed.

In his earlier works, on "Scottish moral philosophy" in general, and "human nature" and "human understanding" in particular, Hume had insisted upon a radically extreme version of the Calvinist dogma. He insisted that man is incapable of knowing the actual laws of the universe. However, during the earlier period, Hume had rejected the radical immorality of the Walpole period's "Hell-Fire Clubs," by asserting that established custom must temper acceptable behavior. Later, in Hume's more radical phase, he moved toward the absolute immorality codified by Jeremy Bentham's *Principles of Morals and Legislation*, and *In Defence of Pederasty*. It was with this later streak of what Kant called "philosophical indifferentism" in Hume, which Kant broke, to write his Critiques and *Prolegomena*.

In the *Critique of Judgment*, Kant asserted two dogmas prompting an extended denunciation by Friedrich Schiller: First, Kant asserted, that the act of creative scientific discovery was accomplished by no knowable principle. This is fairly described as asserting, that creative scientific discoveries "just happen," in a manner which the mind can not describe. Kant stripped himself naked with the second assertion, that there was no rationally definable standard of beauty in art. These two Kantian dogmas were the starting-point for Savigny.

Relevant light is cast on the combined influence of Kant and Savigny, by the poet and political thinker Heinrich Heine.

Three writings of Heine's, best described as well-informed counterintelligence-research products, are most relevant. His exposure of the fraud of Romanticism, in his 1835 The *Romantic School*, exposes the manner in which the notorious Madame de Stael had corrupted such lions of German classical literature as Goethe. Heine became hated by the Mazzinian radicals of Europe, because of his exposure of the case of Ludwig Boerne, showing that the "socialist movement" was a subsidized creation of certain rentier-financier

families; Heine was a regular of the household of James Rothschild, and knew the inside story of the "socialism" of Karl Marx's time. In his last major prose writing, *Religion and Philosophy in Germany*, Heine unveils the devil in Immanuel Kant.

By hard-won, but greatly undeserved popular reputation, Kant was the epitome of German rationalism and *Gruendlichkeit*. On closer inspection of all of his writings, especially from the retrospective vantage-point of the two cited dogmas in his *Critique of Judgment*, Kant is almost Russian in the seething violence of his irrationalism.

Kant was the apostle of axiomatic-deductive logical formalism in the extreme. In the language of mathematical physics, as the great Gauss denounced Kant for this, Kant was a thorough neo-Cartesian in physics, and one who insisted that only linear mathematics, and nothing else, existed. Kant was the avowed enemy of Leibniz, especially of the Leibniz writings more accessible to him: the *Monadology*, *Theodicy*, and Clarke-Leibniz correspondence. For Kant, anything which was "non-linear" simply did not exist. Since creative reasoning, and the principles of beauty in art are both essentially "non-linear," for Kant they did not exist.

One among Gauss's denunciations of Kant, in passages of Gauss's writings referenced to crucial effect by Riemann, focusses upon Kant's famous treatment of the subject of rotational action. Gauss pointed out, that for rotation to exist, something must be rotated: rotation can not exist in empty space and time. In other words, rotational action is a "property" of a unified notion of physical space-time, nothing less. This illustrates the relevant point, that Kant's entire philosophy is premised on Kant's refusal to recognize the existence of elementary synthetic geometry, and hence the refusal to recognize any conceptions which depend upon recognizing that synthetic geometry is actually a physics, rather than an abstract mathematics. Since the generation of higher order singularities, pertaining to reason and to beauty in art, are comprehensible events only from such a standpoint in synthetic geometry, such conceptions were refused hysterically by Kant.

In other words, in those matters which bear most directly upon human behavior, the super-deductive Kant avowed himself an unbridled irrationalist. So, Heine echoed Schiller's attack on Kant, in the aesthetical-letters collection, in warning that Kantianism portended the later eruption of some evil irrationalism in Germany.

Savigny, operating in a university of Berlin itself corrupted by Wolffian, anti-Leibniz formalism, exploited the credulities of the addleheaded Kantians to secure toleration for his own, more extremist dogmas of irrationalism. The communist Karl Marx, and the leftist Swiss later turned fascist "New Age" source for Friedrich Nietzsche, Jacob Burckhardt, obtained their radicalism under Savigny's direct influence at Berlin. Marx's "historical materialism," for example, is nothing but a restatement of Savigny's *Volksgeist* theory of history. So, in relevant essential points, is Hitler's Nazism, and Dostoevsky's representation of the "Russian soul."

The formal, axiomatic aspect of Savigny's doctrine shows his debt to Kant most clearly.

Like Kant, Savigny accepted a formalist, linear notion of physical science. Like Kant, in all matters which are distinctively human behavior, Savigny decreed that irrationalism ruled. Just as many later Marxists, such as Leon Trotsky, for example, embraced the self-avowedly satanic Jeremy Bentham, the distinction between Savigny and Kant is solely that Savigny carried Kant's dogmas to the radical extremes which Kant had resisted in David Hume.

To understand Savigny's influence inside Germany, and the acceptance of Savigny's program in France and among English-speaking nations today, it is indispensable to emphasize that Savigny was essentially a French-Swiss production, rather than a German one. He belongs to the French-Swiss school of revival of Roman law, associated with such figures as Montesquieu and Napoleon Bonaparte, and his Romanticism is that of Madame de Stael directly, rather than the later German Romanticism leading directly into Nazism, which latter Savigny himself greatly assisted in establishing.

The so-called Scottish school of "moral philosophy," associated with Hume and Adam Smith, was predominantly a Swiss creation, from the region of Geneva, Lausanne, and Sion. "Swiss," in this context, must be understood to signify the emergence of Burgundy out of the process dominated by the Clunaic branch of the Benedictines at the beginning of this millennium, a Burgundian disorder which has more than a bit to do with the case of Charlemagne's brainwashed son, a sort

Library of Congress
Charles Louis de Secondat, Baron de Montesquieu

Portrait by Nicholas de Largillière, c.1724
François-Marie d'Arouet (Voltaire)

Portrait by Maurice Quentin de La Tour, 1753
Jean-Jacques Rousseau

of French version of Russia's Czar Alexander I, Ludwig the Pious.

Montesquieu, Voltaire, and the deranged Rousseau, typify a network, linked to Scottish freemasonry and the Jesuits of France's Clermont, which promoted the affirmation of ancient Roman Law and the destruction of Augustinian natural law. The founders of the Bank of England and of the East India Company, were part of this complex, who modelled their eighteenth-century project for a British empire as a plan to make London the world-capital of a third Roman empire. The case of the East India Company's Gibbon, and the circumstances of his near-marriage to the Madame de Stael, merely underscores the Swiss-Britain connections of relevance. David Hume's principal foreign service on behalf of the House of Hannover's Edinburgh section of intelligence services, was done in France, in close collaboration with these Swiss banking families. Not accidentally: the family of Robert Bruce's Templars had been clients of Genoa, and so also the duchy of Burgundy, since the early fourteenth century. As much political-economy as Adam Smith ever learned, was received in Switzerland and France, from Swiss bankers directly, and from those Swiss' agents in France, including the Physiocrats of Dr. Quesnai. Smith's connections for these studies abroad, were arranged by Smith's master, the Second Earl of Shelbourne, and were the collaborators of David Hume.

It was these Swiss bankers, in collaboration with the British East India Company, who created and deployed the Jacobins of France, both in collaboration with the same Duke of Orleans who organized the storming of the Bastille and the kidnapping of the King and Queen of France from Versailles.

The Venetian networks in Italy, especially in the Habsburg-occupied regions of Italy, were part of the same complex.

The same connections we find for the case of the attempt to exterminate classical musical principles, are found in the war against Kepler and Leibniz in the physical sciences.

From the time of France's Louis XI, France had been the most powerful, best developed national economy in Europe. From the time of French Minister Jean-Baptiste Colbert's sponsorship of scientists such as Huyghens and Leibniz, until shortly after 1815, France was by far the most advanced nation in Europe scientifically. The process of destroying France's economic and scientific rank began with the 1815 Congress of Vienna; excepting the influence of Louis Pasteur's circles, French collapsed into a second-rate status in science during the course of the nineteenth century.

The re-accession of Orleans after Germany's Bluecher rescued Wellington from a massive defeat at Waterloo, set off a counterrevolution against French

science. The destruction of science was led by LaPlace and LaPlace's chief assistant, the notorious plagiarist Augustin Cauchy. The direction of this destruction of science was steered from Rome, by the Venetian Abbot Moigno. Through the collaboration between exiled Lazare Carnot and Alexander von Humboldt, French science was saved by moving it to Prussia, and, to Gauss's Göttingen. Hence, Germany's scientific and economic superiority during the nineteenth century.

Augustin-Louis Cauchy

The reason Humboldt moved the capital of French science, initially to Berlin, rather than Gauss's Göttingen, was not only that Berlin was the capital of Prussia, but that the House of Hannover was moving to suppress science at Göttingen. During the 1830s, Göttingen became temporarily almost a scientific desert under the Duke of Cumberland. It was later, during the 1840s, that the Humboldt program took over protection of Göttingen, and the greatest scientific minds of Europe concentrated around Gauss and his circle there.

Yet, already, by 1850, Clausius and Kelvin were being deployed to destroy German science, with the assertion of the arbitrary, and false "second law of thermodynamics," itself based on a neo-Cartesian misreading of Sadi Carnot's famous work. By the 1860s, Gauss's faction at Göttingen was temporarily crushed; Riemann moved to Italy, to the more scientifically hospitable climate of collaboration with Betti and his Cavour-centered circles, and died there. A partly successful revival of Göttingen occurred under the leadership of Professor Felix Klein, later. With some promising exceptions, German science died a lingering death after World War I, crushed by the hatred of the British and their American dupes.

The political connections among those who led in the effort to crush out the influence of Kepler, Leibniz, Gauss, and Riemann, and the Benedictine-steered pogrom against Georg Cantor, are the same connections responsible for the campaign to exterminate the principles of classical composition in music, poetry, drama, and plastic arts.

The cases of Kant and Savigny, are but the tip of the iceberg. They express in the clearest way, the most formal terms of reference, what has occurred, more broadly, throughout western Europe and the Americas.

There are several converging features which account for the victory of the irrationalists in music:

1. The seizure of control over the relevant educational institutions and concert-stage by aristocratic and rentier-financier interests committed to the popularization of irrationalist fads.
2. The broader climate of irrationalism spread: in law; in the form of the so-called "new sciences" of sociology, ethnology-anthropology, and psychology; and in respect to doctrines of aesthetics.
3. A diabolical clever understanding of the devastating effect on classical music, of altering tuning and attacking the principles known today as bel canto singing.

It is on the third of these points that we concentrate our attention briefly, now, in concluding this chapter of our report.

During the 1840s and later, there was a concerted effort to reconstruct keyboard instruments and wind-instruments, in such a way as to shift away from the well-tempered tuning of performances. This was accompanied by a shift of the tuning of A upward, by approximately a half-tone, or even higher. For reasons we shall next identify, on the positive side of the matter, this action largely destroyed the means for performing classical compositions competently. This, in turn, led to the emergence of new theories of musicology, which attempted to explain classical and other composition from the vantage-point of the changes in conception of register and pitch effected beginning the 1840s.

How diabolically clever! Amid all of the collateral

propaganda and manipulations used to promote the Romantic school, the enemies of the Augustinian tradition concentrated on the one slight change in musical instruments which would destroy the possibility of a rational interpretation of classical compositions. These slight changes produced a situation, in which the best standard of professional musical practice itself would force an interpretation of music and musical theory contrary to the classical principles, thus depriving the musician of a rational basis in practice for rediscovering those principles from performance of the compositions themselves.

Alexander von Humboldt

Lazare Carnot

3. The Double-Connectedness of the Classical Musical Manifold

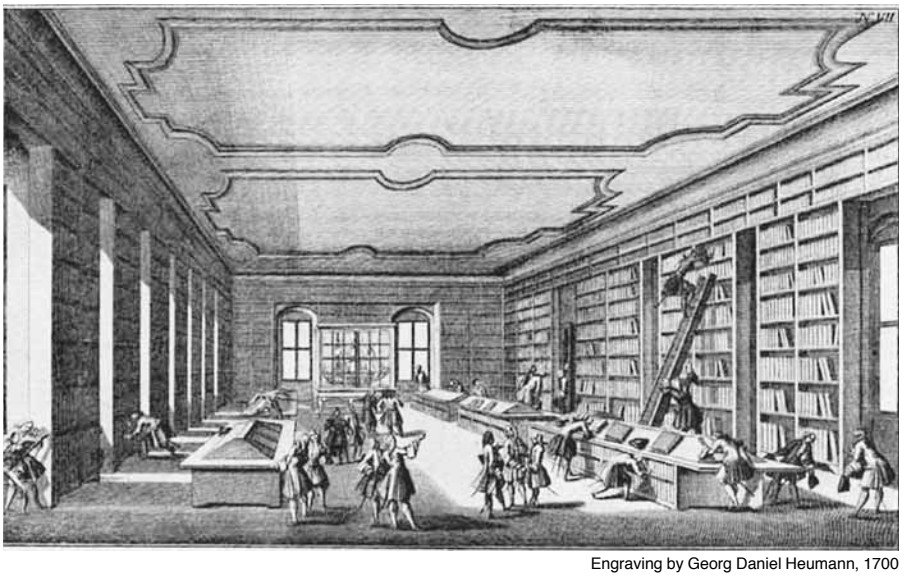
The well-tempered system of twenty-four combined major and minor keys, is defined by the interaction of two sets of considerations. The first consideration, is the defining of the scale itself; this is done from the standpoint of physics as such. The second consideration, is the fact that the properly trained singing voice, in moving upward from Middle C, must change singing-voice register, in passing through F♯ from the subdominant interval of F, to the dominant interval of G.

Since the natural points of passing from one register to another are essentially fixed in terms of the absolute values of the well-tempered scale, the human activity of music differs in two fundamental respects from an instrumental music not subordinated to human considerations.

Most simply grasped, of these two distinctions, is the fact that every key has a distinctive "color," differing from that of each of the other keys.

Take the well-tempered key of C, major or minor. From the G below Middle-C, through the F above Middle-C, we have a register we shall name as "B"-register. In other words, from the lower G to the F above C, we have a constant register. On the F♯, the seventh step of G-major, the voice-registration becomes the relatively higher register, denoted here by "C" register. This is true only for the case that Middle-C is equal to 256 cycles, or very nearly so. Thus, the natural singing value of the F♯, as the point of passage from F to G, defines a required value for Middle-C, as 256 cycles.

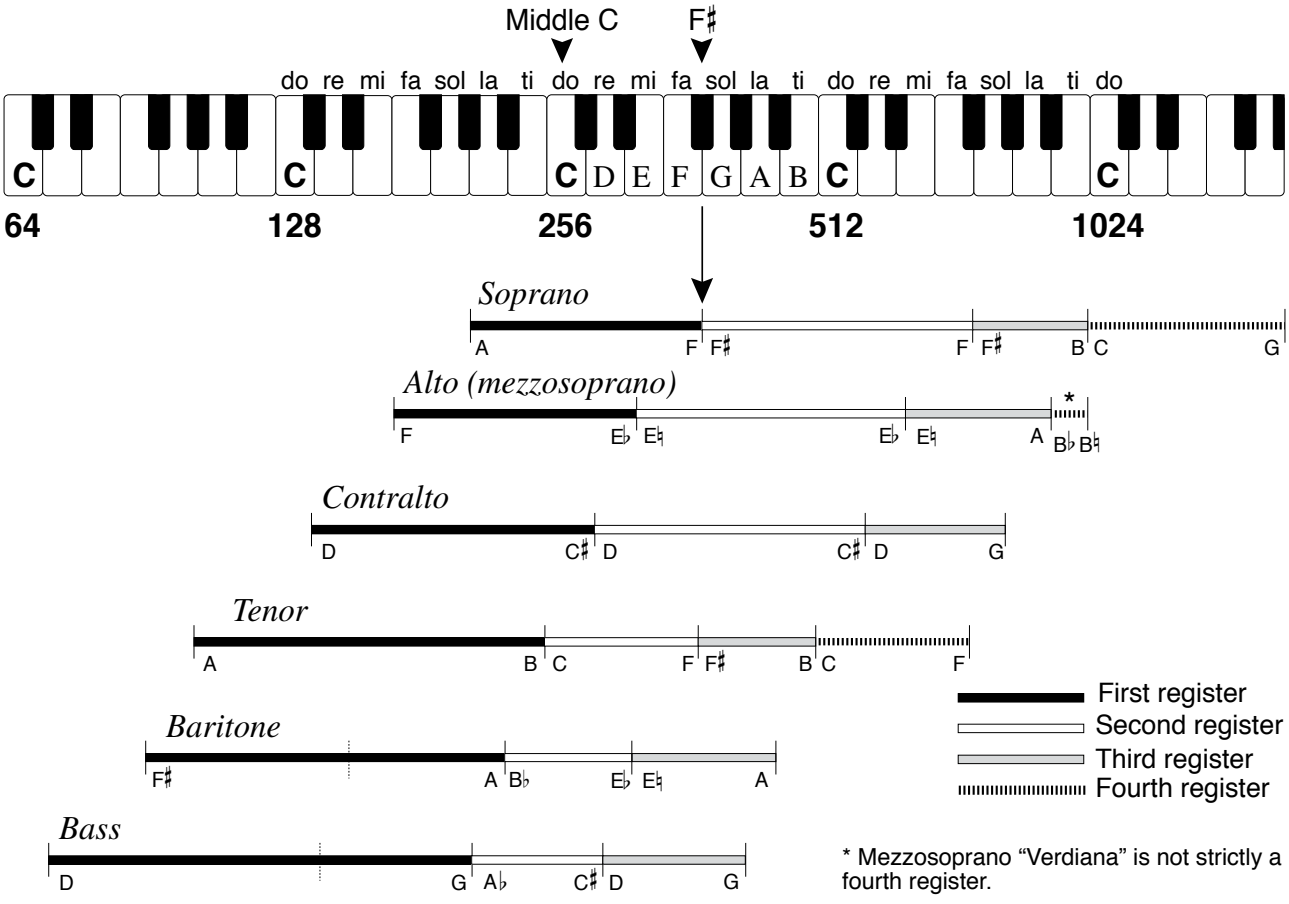
The value of the F, as the subdominant interval, and G the



Engraving by Georg Daniel Heumann, 1700

Interior view of the library at Göttingen University.

Six Species of the Human Singing Voice



dominant, for the key of C (Middle-C = 256), has a very precise musical significance, best understood from the stand point of constructive geometry. For the moment, it is sufficient to indicate, that a key which divides the octave at subdominant and dominant in this way, is the most natural of keys from the standpoint of physics and principles of classical composition. The congruence of the division of the octave by singing-voice register, with the passage from the subdominant to dominant, is crucial for understanding the interconnectedness of singing with definitions of well-tempered scale. This interconnectedness, is the ground-principle which distinguishes human music from the abstract music of such dead objects as musical instruments. This is what defines human music, the only real music, as situated within a doubly-connected manifold.

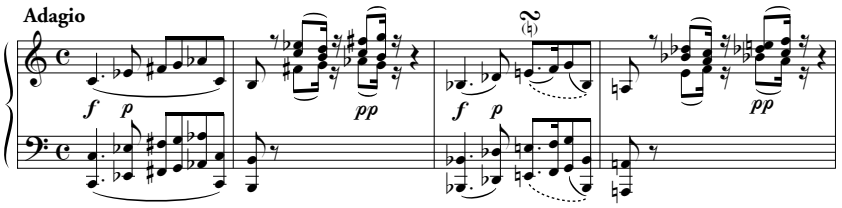
On the first level, the resulting absolute difference among the respective 24 keys, is the aspect of music most easily demonstrated.

Start with a system of unchangeable, "absolute" pitch. Choose for this purpose a well-tempered scale at a Middle-C equal to 256 cycles. Now, using standard musical notation paper, lightly color each (for example) tenor register-range, to define the way in which that singing voice defines a fixed division among the notes of the scale. Now, lay out each of the twelve major keys, starting with C-major. Mark off, for each key, the note which corresponds to major third, sub-dominant, and dominant interval of that key. Repeat this for the 12 minor keys, substituting the interval of the minor third for the major third. Concentrate attention on the question: relative to the tonic, and two one another, in which singing register do each of the notes corresponding to these intervals lie?

What could be simpler! In singing, the first level of implicit phrasing of passages is defined by register.

Take as an example, the opening statement of Mozart's C-minor Fantasy, K. 475. The first two notes lie in the same register. The F♯ does not. How are the respec-

Opening of Mozart Fantasy for Piano, K. 475



tively ascending and descending sequences of this statement as a whole implicitly phrased? What is a common error among instrumentalists in phrasing this statement? What are the compositional implications of correctly phrasing this opening statement? A study of the composition as a whole, included in the [proposed] book of which this report is a part, indicates the significance of this approach to the opening statement for the performance of the entirety of the composition.

This musical example, has among its importances, an added feature most significant for our point here.

Every interval in music divides the octave. From C to G implies the interval from G up to C; it also defines the descending interval, from C to G. Similarly, the interval of a sixth, as from C to A, defines the complementary interval, from A to C above. This system of complementarities among ascending and descending progressions, defines the simplest aspect of harmonic development within musical composition.

Mozart referenced the famous, breakthrough in composition embedded within J. S. Bach's "Musical Offering." Mozart's treatment of the F♯ carried Bach's discovery a step further, to the effect of making this C-minor pianoforte sonata (K. 457) and the later prefixed fantasy, one of the greatest scientific works in music, a scientific discovery carried much further by Beethoven, picked up by Chopin, and followed by a bungled, failed effort at imitation by Liszt. This scientific discovery amounts to a breakthrough in understanding the lawful relationship between C-major and C-minor, most immediately, and also showing how all of the keys are lawfully referenced in terms of this immediate relationship.

From this point of reference, an enormous amount of musical fun ensues.

Considering only the points we have indicated thus far: transpose a thematic statement from one key to another. Taking into account the fact that singing-register values are fixed, the transposed statement is not equivalent to what seems to be the same statement in the original key. It must be sung differently, or, at best, the singer might attempt to parody the natural phrasing of the original key by some effort.

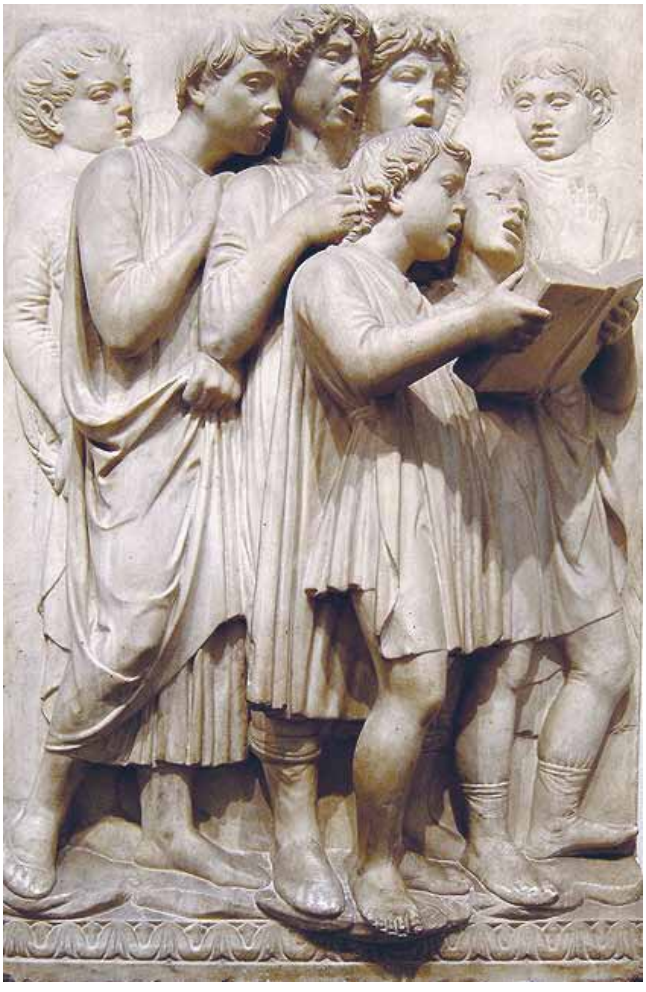
Thus, classical song compositions must be performed in their original key, at Middle-C equal to 256. Hence, similarly, one can recognize that songs belong to specific voice-ranges of singers, by composers' intention. Better, turn that observation inside-out. Once a composer has chosen thematic statements, and has conceptualized a general notion of the development of the composition, the composer recognizes that that composition belongs in a definite key. The classical composer chose that key, because it was the right key for articulation of that composition. To transpose it to a different key, is to introduce a very important error.

The homework exercise we outlined above, suffices to show the reader why each key in an absolute scale has a different "color." First, a different starting-note for a key means that the octave of that key-signature is divided, registrally, in a different way than any other. The major and minor differ both in the difference of their progressions, and in the respect that division of the octave in terms of thirds, differs as major and minor thirds differ, for example. Second, in composition, the division of the octave in terms of essential statements, and in terms of registration, must interact.

So, every composition's choice of general or locally quoted keys, has both an internal, structural significance for the process of composition, and also a relationship of tension respecting the overall distance from C-major.

These points are clear in musical practice, only under two required conditions. First, that the musician has learned to sing and hear only in terms of a fixed, "absolute" set of pitch-values, for a well-tempered scale. Second, that the musician adopts the standpoint of singing as the foundation of all musical composition and performance. On the latter account, the standard of singing as earlier, or perhaps earlier than the fifteenth century, later called "bel canto," is the proper standpoint for defining registration.

Musical instruments (other than trained singing voices) are dead. Good musical instruments are designed to assist the performer in reproducing precise analogs of human voice-registration. The quality of design of the instrument to this effect, is combined with the singing in the mind of the instrumentalist, to force a



The standard of singing, perhaps earlier than the 15th century, later called "bel canto," is the proper standpoint for defining registration. Shown here is one of Luca della Robbia's bas-relief panels for the Cantoria (choir loft) in the Cathedral of Saint Mary of the Flower in Florence, Italy.

dead instrument to accomplish something otherwise contrary to that instrument's nature as a dead thing.

It does not end there. With string instruments, for example, registrations can be created in performance which differ from the human, but which are otherwise analogous to those of the singing voice. Thus, in the development passages of a composition, it is feasible to transpose the quoted key of a local statement to produce a registral division of the octave which is either parallel to or different than the division associated with earlier use of the same statement. Instruments must not invariably conform to singing-voice registration, but the difference in registration should be employed only for some clever musical-scientific purpose.

As in all rigorous science, we can construct all sorts of things which vary from the initial premises of construction, provided this conforms to lawful generation by construction, and serves some proper musical-compositional purpose.

For example, Mozart and Beethoven's keyboard works were referenced not only to Middle-C equal to 256, but the key board instruments incorporated registral distinctions not present in the modern concert Steinway, for example. If those keyboard works are performed on modern instruments, the meaning of the composer's elaboration of certain passages is not clear.

The elaboration is always rational, but sometimes the reason it is necessary, is not clear, because the value of elaborating material in several distinct singing registers is not clear. This is one of the reasons it is most useful to perform classical repertoire on a pianoforte. Not only are the dynamic balances with other instruments and singing voice appropriate to the composer's intention; the registral color integral to the composer's intent, is presented more readily. One does not propose to junk the modern concert Steinway entirely, but at least to approach the performance with a musical understanding that the composition was written with the forte piano as a point of reference.

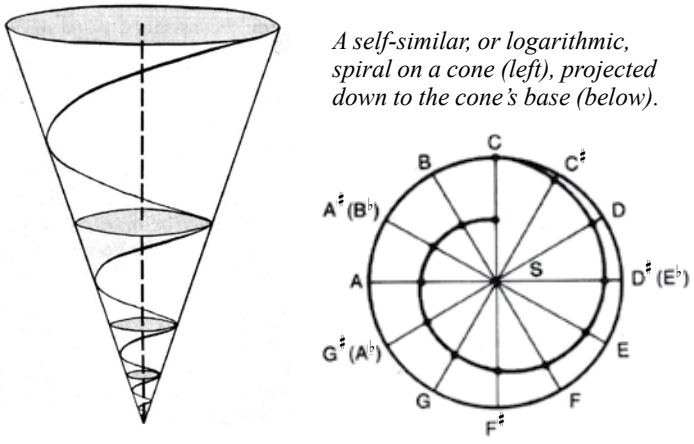
The principle is, that the musician must impose the notion of human music upon the dead musical instrument. The performer must not read notes from score as instrumental notes.

The composer must translate the score into human music, and then impose that human-musical notion of the notes upon the act of forcing the instrument to produce the desired result demanded by the singing mind.

Why should human beings require well-tempered scales, and why should the registration of the human singing voice create a situation in which Middle-C must be set at 256 cycles? We shall come to that after exploring the physical principles underlying the well-tempered scale.

Kepler and Riemann

In first approximation, the way in which physics defines the proper values of the musical scale, was presented by Johannes Kepler. There are two flaws in Kepler's construction. First, there was a degree of outright error. Kepler's musical education had been partly under the direction of a member of the Galileo family, Venetian-controlled circles which rejected the work of Leonardo's circles on well-tempering. That is treated in the book of which this report is a part. Second, insofar as



A self-similar, or logarithmic, spiral on a cone (left), projected down to the cone's base (below).

Kepler's approach was otherwise essentially the correct one, his argument is merely preliminary, not fully adequate. Not until the work of Gauss and Riemann, was a truly adequate approach possible.

It is the inadequacy, which we correct here.

What Kepler proved, among other important things, is that the physics of Descartes and Newton is essentially, axiomatically absurd respecting fundamentals. He showed that planetary motion lies in orbits which are determined rigorously with no consideration of pairwise interaction among solar bodies, but by the geometry of physical space-time, alone. In other words, stable orbits lying between those of the planets, are, in general, not possible.

He proved, that the intervals between the available, tubular orbits are determined by a series of platonic solids, and that the ratios of aphelial and perihelial orbital velocities form an harmonic series, determined by the Golden Section. This actually proved, also, that the available tones within the musical octave, both the number of such tones, and the value of each, are determined only by the Golden Section.

There must be twelve tones, for the same topological reason that a dodecahedron has twelve sides. The values of the fifth, fourth, major third, and minor third, are precisely determined by construction. The values of the other tones are determined by successive series based upon repeating this construction for each tone determined as the key-signature tone. The result is a well-tempered form of equal-tempering, with values distinct from the usually given values of equal-tempering.

The values for planetary orbits supplied by Kepler, are approximately accurate, to the degree that nothing better were possible until the work of Gauss and his collaborators. The attempt to calculate these multi-body values from the stand point of Descartes and Newton leads only to absurd results. In fact, no conventional derivation from an axiomatic-algebraic function could succeed here, in or attempts to determine the values of the musical scale. All such latter exertions incur an intrinsic absurdity, akin to attempting to construct a squaring of the circle or trisecting of the angle in elementary geometry.

The elementary solution to the problems left unsolved by Kepler on this account, was discovered in a relatively early work of Gauss, on the subject of the arithmetic-geometric mean, the root-basis for Gaussian and Riemannian elliptic functions. This approach yields directly, the correct values for the well-tempered scale, and also a correct physical understanding of the primary intervals.

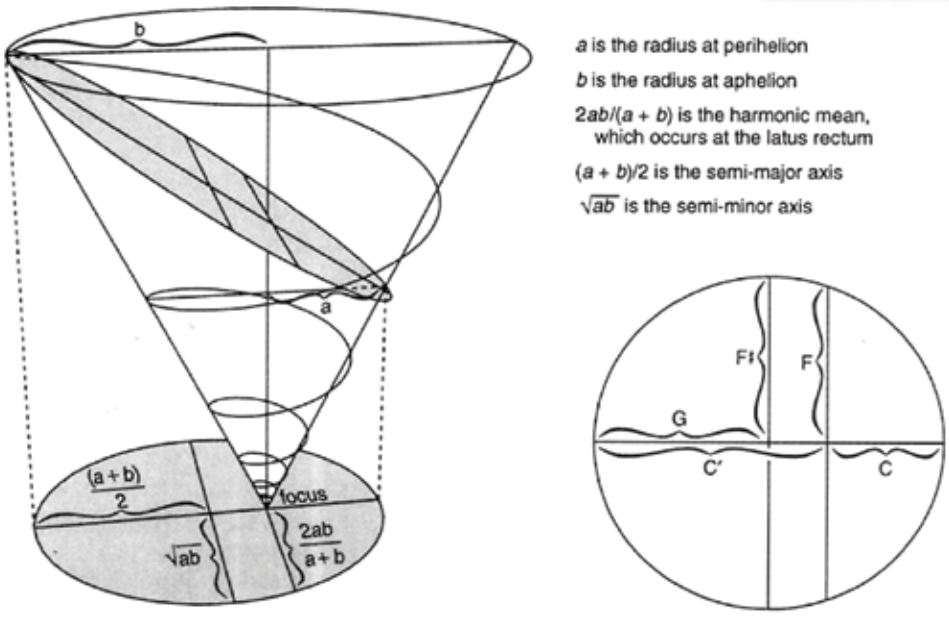
We begin, by replacing Kepler's circular action, by conic self-similar-spiral action. Although Cusa's and Leibniz's successive definitions of a Principle of Least Action, contain the germ-form of an adequate solution, they are not yet a fully adequate solution. All action in the universe is primarily rotational, but action in physical space-time involves a special sort of circular action, conic self-similar spiral action, rather than simply-circular action.

Construct a cone. Construct a self-similar spiral upon that cone. Examine the series of elliptic cuts of that cone, as defined by a complete (360-degree) rotation of the spiral. Cut a circular cross-section of the cone at the beginning and ending of one cycle of rotation. Distinguish, first, between the point at which the point represented by progressive, spiral action, reaches a mid-point between the two circular cuts, and also the point at which it has rotated 180-degrees. Cut circular cross-sections at each of these two points. Make an elliptic cut of the cone across the two latter circular cuts.

Make the other elliptic cuts indicated. Now, place the tip of the cone on a sheet of paper, and project the image of the elliptic cuts on the paper. Repeat the same exercise without the circular and elliptic cuts, projecting only the image of the spiral itself.

Use this approach to define the available planetary orbits.

Take the projected image of the spiral itself. Divide the circle which contains the spiral's projected image into twelve equal sectors. Now, observe the way in which the spiral divides the lengths of each radius-line



Projection onto a plane of the ellipse formed by slicing diagonally between the circular cuts representing C = 256 and C = 512, showing the important division points of the octave.

harmonically. Also observe, the way in which the radii divide the arm-lengths of the spiral harmonically. Where do the thirds lie?

Rework Kepler's construction of the scale, in terms of the topology of the platonic solids, in this context. Repeat what we have indicated for the topology of the dodecahedron, for the tetrahedron, the cube, the octahedron, and for the icosahedron. See the coincidences and problems involved. This, in first approximation, indicates the principles and associated problems in construction of the well-tempered scale.

Now, using the elliptic series associated with the indicated construction, define the meanings of the fourth and fifth, and the elliptic value of the arithmetic-geometric-mean cross-section. Also, observe the complementarity of the dominant and subdominant, respecting alternate, ascending and descending, progressions.

Our purpose here, is not to work through these matters in detail, but only to indicate the relevant, principled musical considerations by a selection of the briefest points of illustration. The essential point, thus far, is that the fundamental laws of astrophysics underlie a rigorous, unique determination of the well-tempered scale.

We must add one point on physics to this.

One is conditioned to think of a uniform vibration of some definite frequency as corresponding to a sine-wave. This is useful, up to a limit, but misleading if taken too literally.

The underlying form of physical action in the universe, can not be defined with what we ordinarily imagine to be visible space. The real universe is the physical space-time of the complex domain, not the universe as naive sense-certainty imagines it to be. The sine-wave image, belongs to a class of plausible, common-sensical ideas, which are relatively indispensable, in the attempt to afford a relatively maximum number among poorly educated people a reasonably competent understanding of surface features of scientific work. If the focus is shifted, from the relatively superficial, to fundamentals, all plausible explanations in the language of common sense become absurd. Our discussion of tuning and harmony, has now taken us to the outskirts of plausible ideas, where real scientific work begins.

What misguided common sense imagines to be the real world of objects floating in empty space and time, is merely a distorted shadow of reality. In the extant literature, Plato was the first to supply a proof for this; the very existence of modern physics, the physics of the complex domain, depends absolutely on Plato's proof of this fact.

So far, we have said nothing explicitly, which does not seem to assume that frequency is simply a function of the medium and the length of the piece of resonant material in the medium. The image of this "frequency," is an image of the sine wave. Now, we come to the point at which we must consider: What should it vibrate at all? There are various explanations for this in mechanical doctrines of physics; but close study of those formulations shows us, that the mechanistic formulas are merely statements of correlation, which are fortunately useful in many circumstances: no more, no better.

We are in the outskirts of Riemannian electrodynamics. We are in the realm of qualities of evidence, which prompted such as Weierstrass, Riemann, and Cantor to overcome the fallacies which arise from ordinary Fourier Analysis. We are forced, most emphatically, to lead our discussion into this region, because of that "double-connectedness" which is identified at the

beginning of this chapter of the report. Epistemologically, the discussion of music becomes paranoid schizophrenic, and quite literally so, whenever the credulous are duped into accepting the terms of reference of that notorious hoaxster, Helmholtz, whose frauds are the common place textbook assumptions of the musicological classroom today.

The secret of music lies not in Newtonian mechanics of vibrating rods, nor even in the scope of ordinary Fourier Analysis. Music is intrinsically human, such that its sensations are subsumed within the definitions of a "nonlinear" optical (e.g., electrohydrodynamic) biophysics: the biophysics of bel canto singing, for example.

In the ordinary general practice of science, physics is not based upon statements which are proven absolutely. We require only that the physics employed for general practice be adequate for that practice. For this work, we require, not perfect assumptions, but merely adequate ones. Laymen might see this mistakenly as a mere truism, or perhaps as merely a philosopher's quibbling. In fact, the most common source of wild blunders in scientific work, is the scientist who does not keep this distinction constantly in mind. To understand that a scientific idea is "merely adequate" for one range of circumstances, is to understand that that same idea is "in adequate" once we trespass the limits of such habitually assumed ranges of circumstances. Existing physics is inadequate in that sense. Even in the so-called inorganic domain, inquiry has trespassed the limits of generally accepted textbook-assumptions. This inadequacy is given many forms of practical expression. One of the most important general classes of cases, in which such inadequacy is most prominently featured, is the investigation of matters which involve the overlap of the inorganic and the living. The attempt to impose a mechanistic approach, or to impose any form of axiomatic-deductive mathematics, upon the functional interface between inorganic and living processes, is total incompetence.

In modern musicology, this incompetence is commonplace. If we put the outright lies and other frauds in the musical doctrine of Helmholtz to one side, and examine only the construction of his acoustical dogmas, Helmholtz's *On the Sensations of Tone* is the paradigm of the worst incompetence in the effort to impose the mechanistically misinterpreted inorganic upon living processes. The complement to Helmholtz's approach, is the view that music is utterly irrational. Our discussion of the implications of voice-singing register, shows how any sensitive musician can easily prove, from the empirics of music, that Helmholtz is absurd. Most classical manuals on tuning of key board instruments, either state explicitly, or reflect the fact that classical keyboard instruments were even-tempered on the basis of C = 128, 256, 512, and also an estimate for the Golden Section interval of a fifth. This proves that Helmholtz and his musicological apologists were liars, as well as cranks. Therefore, to the degree that a musician mistakenly views Helmholtz as a paradigm of scientific rationality, the musician must insist that the essence of music lies outside such a definition of "rationality." The musician, thus, is led toward nodding assent to Kant's doctrine of irrationality in aesthetics, and to toleration of Wagner's musical criminality.

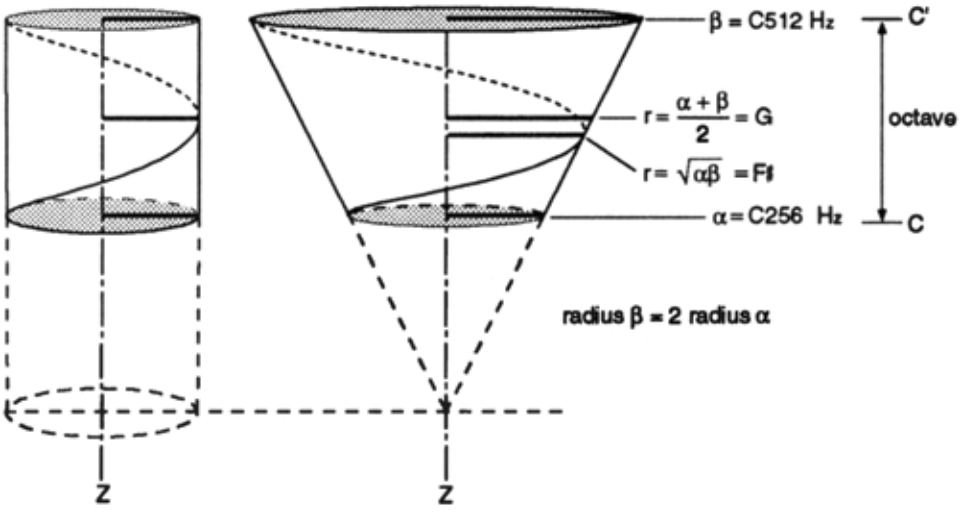
Admittedly, any person who is unfamiliar with the crucial features of the internal history of physical science, is instantly befuddled once confronted with the most fundamental issue of tonality: the double-connectedness of well-tempered harmonics and singing-voice register. How do we account for singing-voice register's importance to the human mind, from the standpoint of physics? Or, to restate this: Where can we locate a basis in inorganic physics, in terms of which a rational equation can be established, between inorganic physical processes and characteristic features of living processes?

The key required is supplied by the overlap of the work of Pacioli, Leonardo, Dürer, and Kepler. The really fundamental questions of physical science can be addressed only by driving scientific inquiry to the limits of the scale of empirical events: to astrophysics, microphysics, and matters bearing directly on the distinction between merely organic chemistry and living processes. Only that which is common on all three fronts of these limits, can be rightly viewed as both fundamental and sound. The essence of modern physical science is, that Kepler was the first to demonstrate, that from the laws adduced from the harmonic characteristics of living processes, and in no other way, the fundamental laws of astrophysics are obtained.

In other words, the mere existence of living processes suffices to prove implicitly, that our universe is of the form of physical space-time, rather than particles moving in empty space and empty time. The characteristic feature of this physical space-time, is a definite "curvature" of the universe, consistent with the harmonic orderings subsumed by the Golden Section. In other words, pairwise interactions among bodies in physical space-time,

is "merely" behavior subsumed by such kinds of fundamental laws of the universe as are adduced by considering nothing more than the curvature of physical space-time.

Thus, the notion of "universal gravitation" was discovered by Kepler. Kepler supplied a mathematical expression for this, such that the simple algebraic manipulation of this by such mathematicians as Hooke, supplied Newtonian mechanics with its famous expression for universal gravitation. Although the Newtonians insist that universal gravitation is a law governing pairwise interaction among bodies, the law was originally formulated by ignoring such pairwise interaction.



Simple spiral action in the complex domain (left) is cylindrical in form; at one-half rotation, the distance moved along the vertical z-axis is one half the distance moved along the z-axis by a full rotation. The radius at one-half rotation is the arithmtic mean (α+β)/2, which divides the octave at the fifth, or the movement from C to G. In self-similar spiral action (right), the radius at one-half rotation is the geometric mean √αβ, corresponding to the movement from C to F♯.

Whenever mechanics does this, the result is some seemingly mysterious constant, such as the constant for universal gravitation, the constant speed of light, the quantum constant, the fine-structure constant, and so forth. These constants are not properly mysterious; the example of Kepler's work already indicates their rational determination. These constants reflect the harmonic composition of a universal space-time of a definite curvature.

The idea of Least Action in the universe, is a corollary of such rational determination of the necessity of constants.

Kepler's physics is based on the combined physics-work of Nicolaus of Cusa, and that of Pacioli and Leonardo after Cusa. A correct reading of Cusa's "Maximum Minimum" principle, viewed in proper reference to the central feature of Plato's *Parmenides* dialogue, defines Least Action as rooted in the idea of circular action. Kepler's proof, that Least Action in astrophysics is determined by Golden Section harmonics, leads to the Gaussian discovery, that Least Action is of the form of conic, self-similar-spiral action, as the proper form of circular action in physical space-time.

Apparent "straight-line" action in the visible domain, is easily determined as the consequence generated by multiply connected, conic, self-similar-spiral action, in the complex domain. This leads to the result, that our universe is a constantly expanding, "self-developing," "negentropic," hyperspherical function, of the type ordered by multiply-connected, conic, self-similar-spiral action. Implicitly, the most seemingly arbitrary physical function in our universe, can be expressed, potentially, by a continuous, non-linear function, one consistent with that subsuming, hyperspherical function.

It is in that sense, that the visible domain is, relatively speaking, only the "surface" of physical reality, in precisely the sense of the shadows in Plato's cave. Plato proved this to be the case, from the standpoint of synthetic geometry: the existence within the visible domain, of forms which are constructively incommensurable with forms derived from assumed axiomatics of sense-certainty respecting the visible domain. Leonardo's revolution in perspective, replacing the linear perspective of Alberti with spherical-projection perspective, is of the same general significance as Plato's argument. Reality lies in what mathematical physics identifies as the complex domain. The proven inadequacies of Fourier Analysis have shown, that the right choice of complex domain, is a hyperspherical (negentropic) universe of the form generated by a multiply-connected, conic, self-similar-spiral action.

So, in first approximation, what we portray as a sine wave, is actually a very simple Fourier function, a projection of cylindric self-similar-spiral action (a uniform helix) in the complex domain, upon sense-certainty. Construct a function, which is merely an algebraic de-

scription of the generation of a helix. This function is of the form "a+bi," such that the term "a" corresponds to uniform displacement of the locus of the function along the axis of the cylinder, and the term "bi" represents a uniform rate of rotation of a point on the surface of the cylinder. The helix becomes merely the integral of this function with respect to time; the side-view projection is a sine-wave. A simple locus-function for the projection, based on the locus-function for the helix, gives the sine-wave function.

Then, compare this with Gauss's derivation of harmonic ordering of elliptic functions, from his work on the arithmetic-geometric mean. Construct a locus-function for the conic self-similar-spiral, as for the helical function. Construct locus-functions for the plane projections of this spiral, both parallel to the motion along the cone's axis, and in a plane perpendicular to the axis of the cone. For the properly educated secondary-school pupil, this begins the demystification of the complex domain.

Least Action is located in the complex domain, not the superficial domain of sense-certainty. It is in the complex domain that cause and effect actually occur. The task of mathematical physics, is thus defined as twofold. First, to discover which choice of complex domain is the one which corresponds to the actual universe. Primarily: is the moment of multiply-connected Least Action either simply-circular, helical, or conic self-similar-spiral? If the latter, which of the possible multiply-connected domains so implied, is the correct choice, both for the universe in general, and for the local phase-space being considered? The second task of mathematical physics, is to account for the necessity of the phenomena of the visible domain, in terms of the causality of the real domain, the so-called complex domain?

The deeper, correct understanding of principles of physics underlying musical composition, is of this form and degree of sophistication.

We must recognize, that the correct principles of classical composition appear to have been reached without taking up the matters of the complex domain. Yet, we must also recognize, that if we view the work of Plato, Augustine, Leonardo, Leibniz, Bach, Mozart, Beethoven, et al., from the vantage-point of Riemannian physics, the musical principles of Bach's, Mozart's, and Beethoven's practice, are not merely scientifically sound. Our deeper insight into the Golden Section, and the employment of either that Golden Section, or of working-principles derived from it, shows us clearly that they were already employing the same axiomatic standpoint we encounter in Riemannian physics.

More advanced physics-principles come into play in music for several reasons:

First, to extend what was accomplished through the work of the greatest classical composers, we must proceed in directions informed by Riemannian physics.

Second, to defend music against such avowed enemies as Helmholtz and the pseudo-scientific rantings of the modernist musicologists, we are obliged to strip away their undeserved reputations as scientific authorities.

Third, to promote a correct conception of the spiritual importance of classical modes of composition for all people, we must correlate musical creativity with the definition of creativity from the standpoint of a Riemannian approach to optical biophysics: we must show how a certain ordering of the sensual aspect of music, respecting the biology of human beings, has an efficient, physical correspondence to the creative mental functions.

As part of this corrective instruction, we must emphasize, as we are doing at this point, that the notion of the twelfth root of two, or any other Cartesian approach to analysis of harmonics and tonality, is intrinsically absurd. The problem is not merely that such calculations are axiomatically absurd. The deeper problem associated with such calculations, is the assumption, that values might be calculated in this way. If that assumption were a competent one, then the physics side of musical matters could be explored without considering the complex domain. It may be easier to understand linear powers of the number two, than complex functions, but medicine would also be much easier to explain wrongly, without germ theory.

The C-pivotted octave series is itself a frequency, within which the twelve tones of the octaves each represent sub-frequencies in their own right. This C-pivotted octave-scale is not music as such. There is another frequency series, based on the dominant-subdominant interval of singing voice register-series. Each of the twelve tones of the C-octave coincide with the twelve steps of the singing-register range.

In each of the cases, the frequencies associated with the individual tones, correspond to phase-angles of the octave frequency. Thus, the tone E, for example is a phase-angle of the C-octave-series and a different phase-angle of the singing-register series. Determine phase-angle as a harmonically ordered interval of rotation, of one complete cycle of a helical progression. De-

termine the frequency of an individual tone, or interval of several tones within an octave, as a phase-angle of the frequency of the octave as a whole.

Have some fun. Compare, then, the phase-angle of E with respect to the C-series, to the phase angle of E with respect to a reverse rotation of the higher G. Introduce, then, a new octave-series, F♯. Now, do a series of comparisons of phase-angles, of both ascending and descending intervals, in respect to a series of C-octaves, G-octaves, and F♯-octaves. Using C, F♯, and G, compare the phase angles for both E and E♭.

Now define the tones E and E♭ multiply, as complexes based on pairwise complexes of phase angles for, first C and G, and then C, G, and F♯.

Now, turn to the primary elliptic functions of a self-similar conical spiral, as Gauss's treatment of the arithmetic-geometric mean defines this. Define the mean of phase angle of tones according to these elementary terms of reference. State phase-angle series of intervals, corresponding to these complexes of multiple phase-angle functions, as an elliptic function. You are now beginning to get into the proper track. You are now attempting to express a multiply connected, conic, self-similar-spiral function, in terms of elliptic functions.

Why conic? Did we not set up this preliminary recreational exercise in terms of helical functions?

Compare the different frequencies of tones of music with the tuning of a laser. Note one very important feature of a laser-beam's action, relative to change in frequency: "self focussing." As we rise up the scale, the same amount of singing energy is becoming increasingly "intense." In physics terms, this signifies that the cross-sectional area of self focussing is becoming correspondingly smaller, the energy of the beam is being concentrated into a smaller area of effect.

Now, reconsider the three sets of octave-interval series we have identified (C, G, F♯). The characteristic of each such octave-frequency is now shown to be not a simple sine wave, not a simple helical cycle. It is a transformation from lower to higher density of action. To include this increase of density within the octave-cycle, in defining the octave as a unit of action, we must transform our statement of the wave-cycle, from an helical, to a corresponding self-similar-spiral function. Behold! Now, Gauss's treatment of the arithmetic-geometric mean comes into clearer focus as the absolutely necessary characteristic of the octave! The relationships among C (Middle-C at 256), G, and F♯, come into clearer focus. Also, the multiply-connected complexes of phase-angle relationships, among these three octaves and each individual tone-intervals, now make sense. Adding to the case we have developed for the dominant case, include the subdominant case, the F-octave series. Consider the synthetic-geometrical hierarchy of the points considered thus far:

1. Musical harmony is doubly-connected, with respect to register-octave and C-octave series.
2. All four among the primary octave-series associated with Middle-C = 256 (C, F, G, F♯), are multiply-connected with respect to each tone-interval of the scale.
3. The functions do not admit of elementary Fourier Analysis, because the complex function is conic, rather than cylindric.
4. Rather than counting frequencies, frequencies of tones are defined as determined by phase-angles of the octave-series taken as a frequency of cycles of conic, self-similar-spiral action.
5. The C-octave scale is defined by the arithmetic-geometric mean function of the singing-register octave. This determines the Middle-C = 256 value.
6. The primary multiple-connectedness of the musical scale is the phase-angle relationship between the two primary octaves, C-octave and singing-register-octave.
7. Tones, rather than being single frequencies, are defined as the harmonic ratios among phase-angle complexes.

The complex of phase-angle relations among the C, F, G, and F♯ octave-series, is the absolute value of the musical scale. This corresponds, in physics, to the Least Action configuration. This value defines any musical composition absolutely, whatever the key-signature or locally quoted key of that composition.

The introduction of a different key-signature, super imposes a new set of phase-angle complexes upon the absolute values, to an effect appreciated by the musician as the distinctive "color" of each respective major or minor key. The musical significance is that the dominant interval of that key-signature does not conform to the fixed division of the C-pivotted octave-series, as defined by the singing-register octave's superimposition.

However, since every key can be derived from any other key, as Mozart's K. 475 treatment of the C-major/C-minor relationship underscores this, the en-

tirety of the musical domain is consistent and coherent throughout, such that every musical argument admits of physical analysis, within the terms of reference, of multiply-connected phase-angle harmonics, which we have just outlined.

A multiply-connected domain of such description, is, by its nature, one which precludes any competent analysis by means less than those consistent with Riemannian physics of the complex domain.

Two leading additional points follow from this.

In general, it is an error to interpret the effect of wave-functions from the counting of whole cycles, or simply half-cycles, quarter-cycles, or integral multiples of a complete cycle of a definite frequency. What must adduce some characteristic frequencies for the whole process within which this radiation occurs, and construe the effect of specific radiation as forming a multiply-connected phase-angle coupling with the particular radiation considered. The determination of the harmonic orderings of complexes so defined, and the correlation of these harmonic orderings with elliptic functions as metrical characteristics of a conic least-action, is a most desirable approach to analysis. Gauss's elaboration of the meaning of elliptic functions, within the setting of the constructive analysis of the arithmetic-geometric mean, is the primitive conceptual standpoint from which this work is to be undertaken. This is to be emphasized most strongly, in treating living processes, such as the activities of human singers and audiences. From this standpoint, reconsider the significance of the two primary octaves, and the characteristic intervals: dominant, subdominant, the C-F♯ interval, major third, and minor third. The physics significance of these intervals, is that each is a conic function, rather than a tone of fixed frequency; yet, these intervals are also wave-functions per se. Relative to these conic functions, the individual tone exists as a phase-angle of that conic function. In a domain which is defined overall as multiply-connected in terms of these conic function intervals, the individual frequencies' relationship to the domain as a whole, is that of an harmonic complex of phase-angles, rather than a simple helical function.

In other words, music is not an aggregation of individually sounded, isolated tones. Music is harmonic progressions, which progressions are meaningful only as conic functions. The principled, and principal intervals of the musical domain, are the primary progressions. Every other sequence of tones, as also a progression either in agreement with or contrast to the primary ones, is a conic transformation whose significance lies in its multiple-connectedness to the primary transformations. In this sense all music lies, not on the notes, but between them, among the progressions between them.

What distinguishes music from sound, is this ordered process of transformation, in which the transformation, rather than the sound of the individual tone, is the primary physical event of music. We can not analyze a musical passage as a sequence divisible into its component tones; not less than two notes represent a minimal musical action.

Hence, for music, the issue is not the fixed frequency of the individual tone, but, rather, the harmonic complex of phase-angles of a conic function, as we have out lined this point. Yes, each note must have a definite, fixed frequency, which thus seems to imply simple helical functions; yet, this, although permissible for abstract study of individual tones apart from music, is worse than useless as a basis for understanding the function of the individual tone in music. It is the harmonic ordering of the complex of phase angles associated with the tone, which is the only admissible starting-point for the analysis of tone.

Most attempts at physical analysis of music, commit the crude blunder of ignoring the most elementary question involved. Why should a length be resonant to a tone? When is the vibration as a frequency which is at least approximately a coherent one? Obviously, our universe is electrohydrodynamic, in the sense of electrodynamics implicitly put forward by Leonardo da Vinci, and as associated with the progressive work of Gauss, Weber, and Riemann. This universal function, corresponding to substance, is a multiply-connected conic form of Least Action, for reasons implicitly demonstrated by Kepler.

How shall we consider ideally coherent frequencies of vibrating substances, in light of this demonstrated nature of our universe as a whole?

What we have outlined for music, above, has been a description of musical phase-space within the universe as a whole. The multiply-connectedness of the whole universe, is always acting electrohydrodynamically, upon every phase-space defined within it, including musical phase-space.

The second general consideration, on which we have barely touched directly so far, is the question of whence the singing-register octave of good singing and musical hearing? It is to this that we turn our attention, in the concluding chapter of this report.

4. Human Music

If we put momentarily to one side, the fact that the fundamental laws of astrophysics and microphysics are coherent with the principle of life, we may say that, on every other scale of events, all processes which are harmonically ordered in congruence with the Golden Section are either living processes, or a special class of artefact produced by action of a living process. On this count, since the relevant work of Pacioli and Leonardo da Vinci, we have known that the only distinction between living processes and non-living ones, is this.

Since Leonardo, modern biology has accomplished two outstanding steps toward comprehension of living processes from this standpoint. Of crucial importance, has been the work centered upon the achievements of Louis Pasteur, especially with respect to optical activity of molecules associated with living processes. More recently, Pasteur's line of approach has been revived around the "non-linear spectroscopy" of living processes, defining a distinct field of biological research, most aptly named "optical biophysics."

We must not confuse the usefulness of particle chemistry with the assumption that "bio-engineering" is a pathway leading to mastery of the principles of life. In terms of physics, what distinguishes living from non-living processes, is located within the domain of electrohydrodynamics of living processes. Harmonically-ordered shifts in the spectrum of radiation from such features of living processes as DNA and chlorophyll, point our attention toward the uncovering of the physical essence of what distinguishes living, from non-living processes. Much remains to be uncovered, of course, but we do know, conclusively, that the processes unique to life are necessarily ordered in a manner congruent with the Golden Section.

We must put together the musical evidence we have outlined, with that which characterizes human beings as living processes. In attempting this, at the outset, we know two things about living human beings which bear directly on the making of such a connection. We know that life is governed by the same harmonic ordering principles as musical polyphony based on the well-tempered scale. We also know, that the creative mental processes, as associated with fundamental, valid scientific discoveries, are also harmonically ordered in the same way.

Apart from such broad certainties, our knowledge of the specific biological mechanisms which link the two, is limited. Riemann's hypotheses on the subject of the human ear, are now proven. We know enough about the nature of the transformation of tone accomplished by bel canto methods of singing, to infer with certainty the kinds of "lasing-like" processes involved. The mapping of visual perception by the brain is known in sufficient detail for understanding how this physiology produces those representations which the careless mind misinterprets as sense-certainty. These and other relevant bits of established knowledge, are a tiny fraction of what we wish we knew, but they are sufficient to make a conclusive case for the point at hand. The evidence is sufficient, on condition that we limit our conclusions to those which could not be overturned by additional discoveries.

What is certain, above all else, is that the curvature of the phase-space of living processes, is that determined by a Golden Section's harmonic ordering. This is necessarily the characteristic metrical property of all aspects of the living process. A metrical characteristic of a process is such, that every facet of that process is also characterized by it; it is sufficient to show, that a process as a whole has such a characteristic, to have proven that no facet of the process as a whole can be characterized in any way contrary to that characteristic. For that reason, the human sensory organization could not be organized on any other metrical basis but harmonic ordering congruent with the Golden Section.

There is an array of evidence, which illustrates how that principle of metrical phase-space reveals itself in aspects of our biological organization bearing upon music. The proving of Riemann's hypotheses on the physiology of the ear, coincides with that metrical principle. Leonardo's reform of perspective, illustrates the point, that vision is not organized as commonsense sense-certainty supposes; it is organized implicitly according to the same metrical principles as hearing, instead. The physiological mapping of the functions associated with the visual cortex of the brain, shows the Riemannian topologist how the human brain organizes sensory cognition, showing again the way in which the metrical principles implied by the Golden Section determine all the essential features of musical phase-space.

The chief source of difficulty, among those who can not understand what we have been reporting on harmonic orderings, can be summed up as follows.

The uneducated, or miseducated person believes, that the image which the mind forms of a sensed object,

is a kind of mirror-image of the object itself. The most essential difference between the qualified physicist and the inadequately educated person, is that the qualified physicist knows the commonsense belief to be an understandable delusion. The history of all fundamental progress in physics, is centered around a study of the human processes of vision. The form of this study is known as constructive geometry; the primary tactic employed by constructive geometry is projective geometry, as the latter is typified by study of perspective. The contrast between the perspective of Alberti and Leonardo da Vinci, efficiently identifies the kinds of problems confronted.

What we do know with certainty, respecting human visual perception, is that the images formed in the mind are projections of the physical events associated with those acts of perception. We also know, that ordinary mental images of perception are not exact copies of the events experienced. We know from physics, that the events we experience occur within the complex domain, rather than the linear, Cartesian space imagined by misguided common sense. For physics, the problem of vision, is to discover what our visual perceptions tell us about events actually occurring within the complex domain.

In geometry, as Riemannian topology illustrates the approach required, we begin with study of synthetic geometry as Professor Jacob Steiner's text illustrates the introduction of these principles to secondary-school pupils. The mastery of such synthetic geometry, is prerequisite for introduction to study of mathematical physics. In the introduction physics classroom, we use projections of solid objects upon flat surfaces as the most convenient way of acquainting the pupils with the quality of problem to be considered. Projections of simple spherical and conic functions upon flat surfaces, are the basis for projecting back, from images on flat surfaces, to the projected images on the surfaces and interior of solid spherical and conic functions.

The center of this classroom work, is to familiarize the student with the problems arising when we project from N dimensions to (N 1) dimensions, or from N to (N + 1) dimensions. This classroom inquiry is refined, by noting, that, hypothetically, the higher-order space (N + 1) might have one of several different curvatures.

In the course of this classroom-work, the question is introduced: Imagine that you know only the projected image on the flat surface; what can you rightly infer from this, concerning the projected image in (N + 1)-space? Those qualities of images which are "preserved," in projections from an (N + 1) space upon an N-space, are associated with a notion of "projective invariance." The elaboration of the principles of projective invariance, is known either, simply, as geometric topology, or, in physics, as the topology of differential geometry. (These notions were first established, in elementary form, by Leibniz.) Then, given the known characteristics of human vision, treat vision as analogous to the simplest case of the images projected upon a flat surface. Instead of treating these images as mirror-images of physical events sensed, let us concentrate attention upon those features of the images which correspond to projective invariances. Once we know that real physical space-time, in which the events actually transpire, is the Riemannian complex domain, what is the image in that complex domain which is in projective correspondence with the brain-image? Physics-thinking, is learning to think about mental visual images in terms of the corresponding image in the complex domain. The capacity for such rigorous forms of physics-thinking, is developed through the pupils' habituated mastery of elementary and advanced synthetic geometries, in much the same way a literate form of language is learned. Instead of imagining, wrongly, that vision is a perfect mirror-image of the sensed event, imagine that vision is a very efficient scientific instrument, which faithfully reports the projective invariances preserved in projection of the complex domain (the real universe) upon the dials of our scientific instruments. The trick, is knowing how to interpret the readings on those dials.

In developing his system of perspective, Leonardo did what is for modern physicists, a very elementary thing. He extended Albertian perspective to the extreme cases of vision, and showed that, in these extreme cases, Albertian perspective did not reproduce vision. As a matter of principle, this is the same method of fundamental inquiry we employ when we insist that the laws of physics can be proven, only by proving that they are equally laws for the extreme cases from each and all of astrophysics, microphysics, and characterist ic features of living processes. It was this approach which enabled mankind to discover that the real universe is the Riemannian form of complex domain, not the Cartesian manifold of miseducated common sense.

So, to restate the essential point bearing upon the fundamentals of musical phase-space, we must understand the projective invariances of musical phase-space

images, that we can translate these into reconstructions of the appropriate images of the corresponding reality, in the Riemannian complex domain.

As Kepler's physics already demonstrated, in the real universe, there are no self-evidently existing elementary particles, and action does not occur self-evidently in straight lines. Action is fundamentally an harmonically ordered form of circular action; beginning the indicated work of Gauss, we have discovered that the correct form of circular action, Least Action, is multiply-connected, conic, self-similar-spiral action, as Kepler's accomplishments already implied this. In such a complex domain, only certain states are relatively Least Action states, just as the available number of stable planetary orbits are restricted to such an array of harmonically ordered elliptic orbits. The quantum constant reflects the same thing for microphysics, just as the fine-structure constant reflects the characteristic curvature of the real universe's complex domain for both astrophysics and microphysics.

If our universe were not so organized, then the night sky would be brighter than that of the sunlit day. This undeniable fact, shows that our universe is finite in extent, and that the number of available positions for luminous and reflecting bodies is limited to those determined by the principle of Least Action in a complex domain. Music occurs as an activity of human beings, within an expression of the Riemannian complex domain more narrowly defined as musical phase-space. This leads us to a proper view of the role of musical instruments other than the voice itself.

The best musical instruments are made of properly treated wood and strings made of animal materials. The advantage of wood, in particular, is that it was formerly living, such that its structure, at death, was harmonically congruent with the Golden Section.

Musical Instruments Are Dead Things

Excepting the human voice, all musical instruments are composed of either inorganic or dead materials. Excepting what is possible by aid of advanced electronics, the best musical instruments are made of properly treated wood and strings made of animal materials. The advantage of wood, in particular, is that it was formerly living, such that its structure, at death, was harmonically congruent with the Golden Section. The problem in construction of wooden components of musical instruments, is to preserve this harmonic structure, both at the time of assembling the instrument, and in use over years thereafter.

The shift from wood, to greater use of metal, gave us a more durable sort of instrument, one implicitly cheaper to construct and maintain, and one perhaps less capricious in certain respects; but, the instrument became less musical, essentially because of the crystalline structure of the metals employed. The overtones, for example, are not those of true music, for reason of the internal harmonic characteristics of the metal. For related reasons, a well-constructed, chiefly wooden, bowed instrument, is the one most easily adapted to a musical purpose. For related reasons, the more technically difficult to service fortepiano of the period of Mozart's, Beethoven's, Schubert's, Chopin's, and Schumann's period of mastery of principles of classical composition, is superior as a musical instrument to the modern piano. For the same reason, the use of plastics in place of wood, creates musical difficulties.

The best wooden material requires a curing of the wood in such a sensitive fashion, that the harmonical structure of the cell-tissue is preserved to the maximum relative degree. The treatment of such wood, must preserve this harmonic structure, and the use of the instrument must reenforce this advantageous feature.

The essential requirement, in construction and use of musical instruments, is to enslave those instruments to the musical principles adducible only from definitions based upon the properly trained (i.e., bel canto) human singing voice.

The best-studied portions of the history of classical music, are the cases of the extensive "musical systems" of Italy and Germany. In an activity centered upon use of vocal polyphony as an integral feature of church services, the small children of communities learned solfege

for singing. Since no later than fifteenth-century Italy, good singing was based on methods the modern period knows as "bel canto." Instruments from the eighteenth-century and later, show that Middle-C was set at the medical tuning-fork standard of 256 cycles, a standard introduced no later than 1711 A.D., under the influence of Leibniz. The development of equal-tempering of key board instruments, and Bach's well-tempered standard (not the same values as equal-tempering), defined a well-tempered singing solfege centered upon Middle-C = 256 as the central tendency of learning of music from early childhood ages.

Roberto Irsuti

Baritone Piero Cappuccilli, singing a Verdi aria, demonstrating the superiority of the Verdi tuning, during a Schiller Institute conference at Casa Verdi recital hall in Milan, April 1988.

Choruses so constituted, centered around church services, were the foundations of popular and professional musical culture. Thus, well-tempered polyphony, based on singing, was established as a learned form of literate popular language. Instrumental performance, was the imposition of the principles of music so sung, upon instrumental voices incorporated into the polyphony.

The relationship among popular amateur music, centered in chorus-activity, and the highest level of musical professionalism, may be described as pyramidal. The base of the pyramid was a more or less nation-wide popular musical activity, overlapping the leading role of well-tempered polyphony in church services, as the case of J.S. Bach illustrates this point. Local professionals' activities, based on the popular musical activity of the period, produced the gifted professionals recruited to the principal regional and national centers of professional musical activity. The leading professional composers and performers, associated with regional and national centers, perfected standards radiated down the lines of the pyramid, to the local centers.

Today, there are but weak echoes of such former, great, national musical systems. The base of the pyramid has been shrunken, near to the point of extinction. The overwhelming majority of the populations, have become musical illiterates, a condition which has worsened emphatically since approximately World War I, a deterioration which has been most rapid and extensive since the 1950s. There is a paucity of the meagerest musical literacy, and the few musicians who still exist, lack healthy roots for their activity in the population generally. The musical activity of the population generally, is worse than illiterate; brutish local dialects, based on ugly sounds and dionysiac irrationalism, are the popular musical culture. The worst state of affairs, is the loss of the ability to sing. In former times, the popular singers of today would have been fortunate to find a few fellows in the market-place so kind as to acknowledge their existence with barrages of tomatoes and rotten eggs. Insofar as serious musical activity exists, there has been a shift away from the singing-basis, to an instrumental basis, a shift which began about a century and a half ago, but which has accelerated most rapidly over the period since World War I.

The mere fact, that the definitions of harmonics required by rigorous study of singing-voice register, are not tolerated among leading music schools today, and that the lunatic frauds of Helmholtz are so much tolerated instead, attests to the degree to which musical theory has been shifted away from singing, to unsound doctrines of instrumental performance. Accompanying this, is the loss of the sense of music as a form of literate language. It is popular singing, pivotted upon methods we associate with bel canto, and based upon a fixed sense of well-tempered absolute pitch, which defines music as a literate language. Without that sense of the role of singing, music is degraded either to a matter of sensual effects, as the Romantic degeneration typifies

this, or to a schizophrenic sort of "intellectual" exercise, as the ugly productions of the twelve-toner formalists illustrate this. One is reminded, in both forms of derangement in modern musical doctrine, of persons who have become familiar with the sounds and syntax of a language, and who babble fluently in that language, without knowing the meaning of any of the words used.

The obvious fault of musical theories based upon instrumental performance, is that instruments are intrinsically non musical, except as the standards of singing-voice register are imposed upon those instruments by the builder and performer. The function of the instrument is, essentially, to imitate the principles of the singing voice. It is only to the degree that that imitation is successfully forced upon the instrument, that instrumental music exhibits the principles of music.

The revolution in design of the keyboard and wind instruments, launched during and following the 1840s, had the effect of tearing those instruments away from the possibility of adapting adequately to singing-voice standards. The shift in tuning, by approximately a half-step or more, compounded the difficulty. It became impossible to produce orchestral performances of classical compositions according to the composer's musical intent, and increasingly difficult to do this on keyboard instruments.

This wrecking-operation was compounded by the nineteenth century campaign to suppress bel canto, for both throaty bravura and "blank" voice.

Helmholtz's work on the subject of music, was launched in his capacity as an agent of British influence, in connection with a British effort then in progress. Helmholtz discovered nothing, right or wrong, in music; he merely lied as he must, in service of his commitment to popularize this musical destruction then ongoing in Britain. He studied the dogma of "blank voice" practice then being promoted in Britain, and invented fraudulent arguments in the name of physics, as such frauds might appear to the credulous as justifying the British practice Helmholtz was promoting. The idea of "natural scale" was one of those British efforts to impose Newtonian mechanics arbitrarily upon music.

For those who wish to inquire into some of the specifics of this fraud, see "Appendix XVIII" of the Ellis English edition of Helmholtz's *On the Sensations of Tone*, with extensive notations by Ellis included. The details of the hoax to which Helmholtz contributed his efforts, are summed up fairly by both Helmholtz and the translator in that location. Ellis' account of this is most interesting:

> In 1812 the two Miss Glovers … invented and introduced into the schools … a new sol-fa system, based upon the 'movable doh.' [This] was published about 1827 as A Scheme for rendering Psalmody Congregational.… I recollect his [Helmholtz] saying to me, 'We could not do that in Germany.'

To the extent that musicians were successfully duped, or otherwise corrupted by Helmholtz's approach, the inevitable consequence was to place the emphasis upon a purely instrumentalist interpretation of music. Helmholtz's fraudulent physics of "natural scale," depended upon a Newtonian theory of vibration of inorganic materials.

The history of tuning since the Golden Renaissance, is an uneven one. At first glance, as Helmholtz attempts to confuse matters with a superficial view of the divergencies, it appears that there was there was never uniformity, excepting the change after approximately 1815, established during the 1830s, from the C=256 used by the classical composers, to the modern A=440 or higher distortions of pitch. If one knows the internal history of music, especially the wars against Augustinian and well-tempering principles launched during the 1527-1653 period of Venice's Habsburg domination of Europe, the "tuning wars" produced pitches according to which faction was dominant in that location at that time. It is clear that the tuning of Mozart's and Beethoven's keyboard instruments was never far from close to the correct values we have indicated here. Their tuning accords with the lawful characteristics of singing-voice register, and their compositions are based upon the double-connectedness of Middle C = 256 with singing-voice register. Any different interpretation of their compositions, is an erroneous one.

If we apply Helmholtz's defective physics to tuning of dead musical instruments, especially metallic ones, then a result ostensibly consistent with Helmholtz's arguments emerges.

However, the result is no longer music. The British scheme on whose behalf Helmholtz composed his hoax, might be tolerated as the musical activity of rocks and other inorganic materials, on condition that human beings were not subjected to such uglinesses. The prob-

lem is, in the lesser degree, that Helmholtz attempted to impose his "metal music" as a standard for human beings. The problem is, in the larger degree, that musicians were corrupted enough to accept this swindle.

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Music unifies the entire capacity of thought as no other medium. The object of music, is to excite the state of mind to one permeated with a sense of beauty, to such a degree that this love of beauty invades and colors the cognitive functions, and thus contributes to making both the performers and audiences better human beings. Shown here is the Schiller Institute NYC Chorus, performing Handel's "Messiah" at the Co-Cathedral of Saint Joseph in Brooklyn, New York.

The Moral Function of Music

The essential function of classical musical performances is their health-giving effect upon the mind of the audiences. It is this which renders the religious works of Bach, Mozart, Beethoven, and other great composers so suitable, both for church settings and secular performances. It is this which gives a religious quality to all important classical compositions, at least in the Augustinian sense of religious practice.

The simplest identification of this quality in classical compositions can be made at the outside of such works.

The form of musical composition, both its rhythmical structure, and the organization of statements as poetic lines, is derived from classical poetry. The most familiar poetic form is the strophic form beginning with a couplet. Study of cases which conform to this more or less strictly, presents us with principles of composition also common to use of other poetic forms.

This is not accidental. Classical Indo-European languages, such as Vedic and ancient Greek, were sung, to the effect that a written prose statement is a precise musical score. Asiatic languages show the same kind of heritage. In modern usage of European languages, this singing quality natural to speech is suppressed, but adducible by singers who study the matter closely. It has been shown by other researchers, that the structure of language is based upon an ordering of tones and consonant-shifts governed by conic self-similar-spiral functions. Also, as the history of the sonnet reflects this, the form of poetry is itself based either directly or implicitly upon the Golden Section's harmonic orderings. On this and related accounts, a literate language is premised upon the singing of poetry.

Here lies the origin of well-tempered polyphony; music is a development within classical poetry, and the development of literate forms of language through the use of poetic forms of singing the language. Classical music bears all of the hall-marks of this origin. It has been shown, for the cases of Italian and German classical composition, that it was the existence of a high level of classical-poetical activity within the populations, which supplied great composers with the special powers for great compositions. The degeneration of the composition of poetry, among poets born after the 1815 Congress of Vienna, accelerating down to the present day, bears directly upon the loss of the power to compose beautiful music, and the increased difficulties of performers in presenting such music.

At this moment, a narrower aspect of composition is being considered, albeit within the poetical context of music. How might the mere statement of an opening couplet of musical composition, already address the creative faculties of the audience's mind? The selection of Mozart's K. 475 as a case-study, has been made for the included reason that the relevant principle of musical composition is shown in the most concise way. Bach was the prolific giant, the great discoverer. Beethoven exemplifies the blend of titanic laughter and ruthless,

rigorous labor of thorough composition. Mozart exemplifies beautiful facility in seemingly simple strokes of pure musical genius. It is the simple stroke of musical genius, in its most distilled form, which occupies our attention here.

If I state the same musical argument, in terms of two very distinct sets of intervals of progression, in the manner a classical couplet of poetry does this, I have created a condition which the mathematician must recognize as double connectedness lingering over the utterance of every note which follows. The musician, have stated this paradoxical double connectedness, must, in due course, accomplish a musical development which resolves that paradox, and does this to such effect, that at the close of the composition, the composition as a whole represents a definite musical idea, distinct from the ideas encompassed by the bare principles of composition themselves.

In elementary physics, such a double-connectedness has the properties we associate with a Weierstrass Function. It generates discontinuities, but in such a manner that nothing arbitrary has been added to the canonically lawful musical statements from whose juxtaposition this discontinuity is generated. The principle of rigor applicable is identical to the methodological rigor of a strictly constructive synthetic geometry, with emphasis on phenomena peculiar to the advanced synthetic geometries of Gauss, Riemann, et al. The result has an effect analogous to the mental processes of a valid scientific discovery.

A valid, fundamental scientific discovery is elaborated in terms of canons preestablished by construction. Yet, it modifies those initial canons in the completion of the work. The resulting change, may be elimination of some discovered margin of error in the original canons, or may be no more change than an enlargement of those canons, a richer interpretation, richer applicability of them. Rigorous adherence to canons of method, leads to a discontinuity, a seeming paradox. The composer resolves that paradox, through development. The combined effect, of generating and resolving that paradox, forms the essence of the musical idea associated with the composition.

A valid musical composition is an act of scientific discovery, in the same sense as we mean this in physics. The difference is one of emphasis, a degree of emphasis which has reached the condition of a qualitative distinction. In classical art, the emphasis is upon beauty as such. Beauty in art is not possible without truth, or unless the true subject of the composition is human scientific creative potential. On account of these subsumed requirements, beauty in art can not differ morally from scientific discovery. The essential difference is, that it is the beauty of human creative powers itself, which is the purpose and subject-matter.

Music is distinct within the scope of classical art, in that it unites beauty of literate language, with the beauty of literate vision. As language and vision are the substance of human consciousness, music unifies the entire capacity for thought as no other medium. The object of music, is to excite the state of mind to one permeated with a sense of beauty, to such degree that this love of beauty invades and colors the cognitive functions, and thus contributes to making both the performers and audiences better human beings. The sharing of such beautiful experience, is a state of *agapē*. Music is able to serve this purpose, only to the degree its composition is ordered by the same powers employed otherwise for valid scientific discovery.

These connections have been recognized, more or less efficiently, by the enemies of Augustinian tradition. For related reasons, they know, that if they can degrade our musical lives, to Romanticism, "modernism," "rock," and the like, they have attacked the essence of our civilization upon a most vital flank.

That destruction of civilization, was the repeatedly affirmed purpose of the musical activity of Richard Wagner and his circle. Wagner was a terrorist crony of the Russian Bakunin, in the Mazzinian revolts of 1848-1849; on the subject of music, he and Bakunin were in fascistic political agreement.

Wagner is not merely a contributing influence for Hitler's Nazism; Wagner was already a fascist himself, not merely in political leanings, but in the guiding purpose of his attempted revolution within music. The changes which Wagner adopted, in his effort to subvert and destroy the influence of the Beethoven he hated enviously, were explicitly fascist changes within the domain of music, as fascistic within the internal life of music, as Hitler and Mussolini were in the domain of political affairs. Wagner applied the same radical irrationalism to music, which Hitler applied to German political life. If you like Wagner, you are to that degree already being recruited by fascism.

That is why Venice's San Giorgio Maggiore has been so long the center of the international efforts to destroy classical music, as well as to destroy the Augustinian heritage altogether.