LYNDON LAROUCHE'S GEOMETRY OF THE CREATIVE PROCESS

The inversion of tangents and the music of negative curvature: a report on Lyndon's LaRouche's *Beethoven as a Physical Scientist*

Pierre Beaudry, 01/01/2020

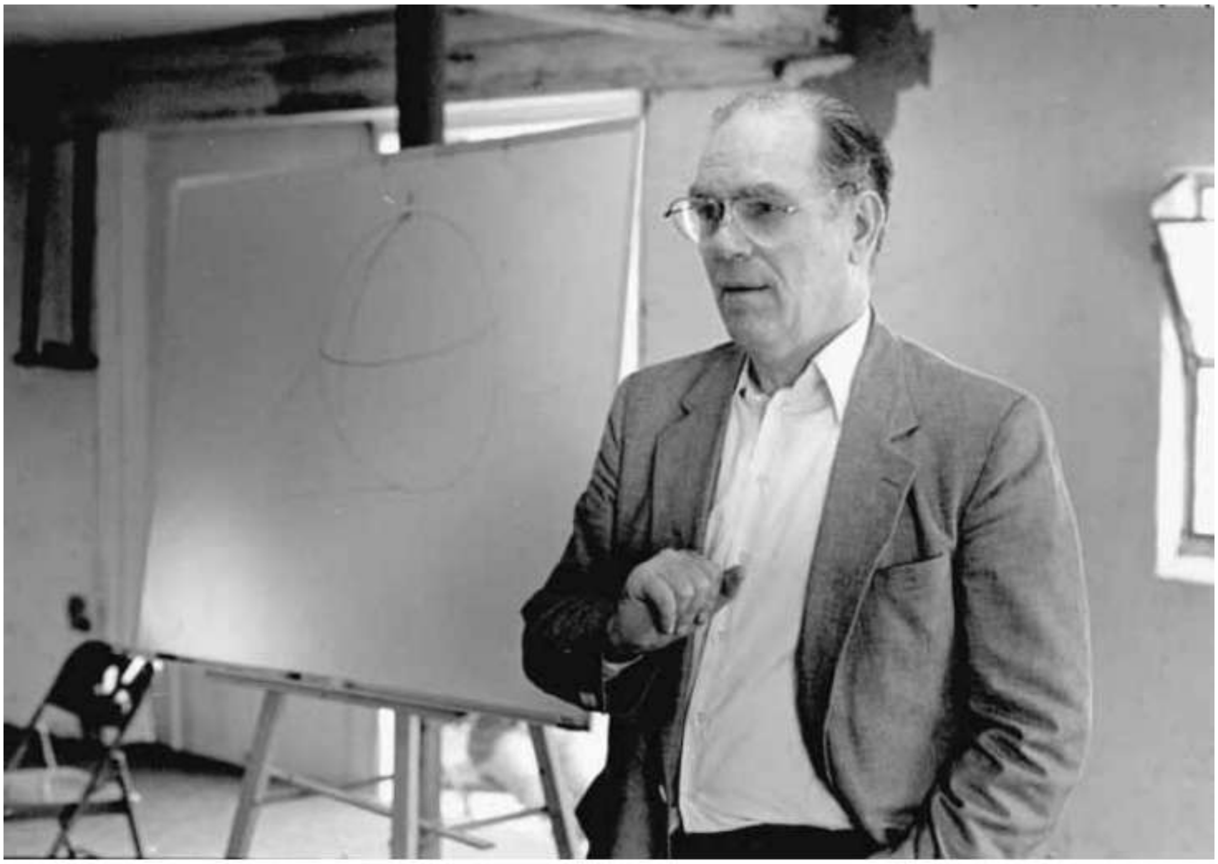
HAPPY NEW YEAR

Lyndon LaRouche's crucial point on the matter of creativity has always been centered on the fact that the student must be given a chance to relive the mental experience of generating a discovery of principle by means of constructive geometry; that is, by means of a transformative process self-developing envelopment. As LaRouche once put it: "Believe nothing that for which you cannot give, yourself, a constructive proof."

During the 1980's, LaRouche identified how to understand music from the vantage point of the geometry that Eugenio Beltrami had constructed following Gottfried Leibniz's and Bernhard Riemann's pioneering investigations in the domains of *analysis situs* and *negative curvature*. LaRouche said at the time: "Crucial proof of Beltrami's corrective supplement to Riemann curvature renders intelligible to a much deeper degree, the otherwise empirically demonstrable principles of composition of classical music."[1]

[1] Lyndon LaRouche, *Beethoven as a Physical Scientist*, EIR, December 29, 2017.

THE INVERSION OF TANGENTS AND THE MUSIC OF NEGATIVE CURVATURE

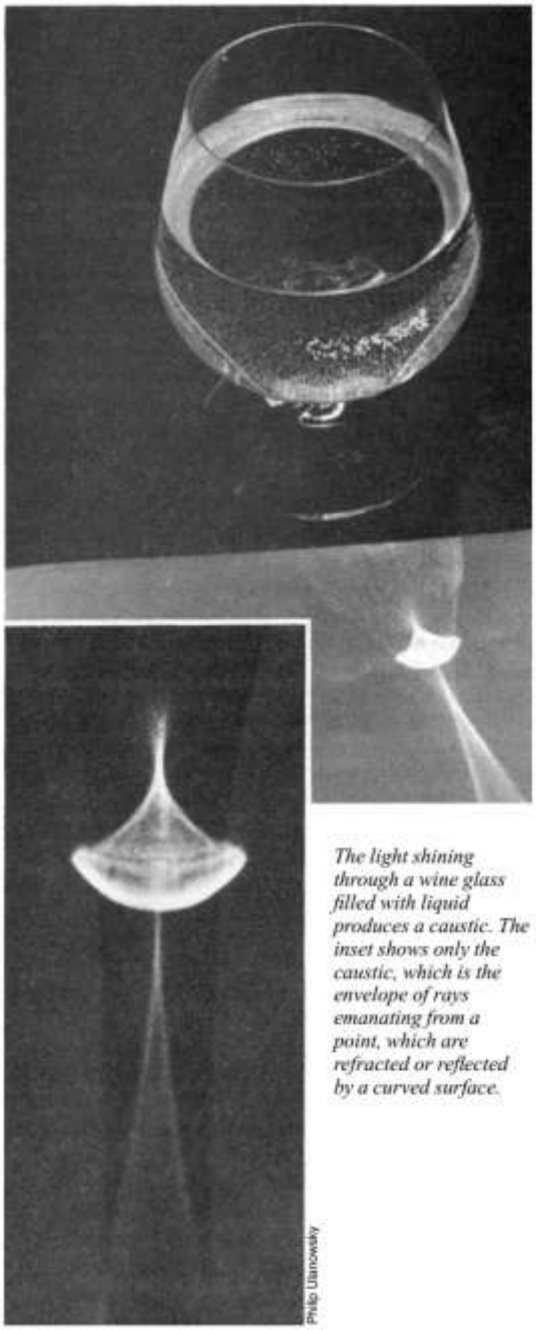


EIRNS/Stuart Lewi

Lyndon LaRouche giving a class in geometry and physical economy in 1985, at the barn of Ibykus Farm in Loudoun County, Virginia.

The purpose of this paper is not to explain, but, rather to demonstrate the LaRouche method of constructing a pathway which links epistemology, geometry, and music through the dissonances of an axiomatic transformation between a lower and a higher manifold.

Caustics



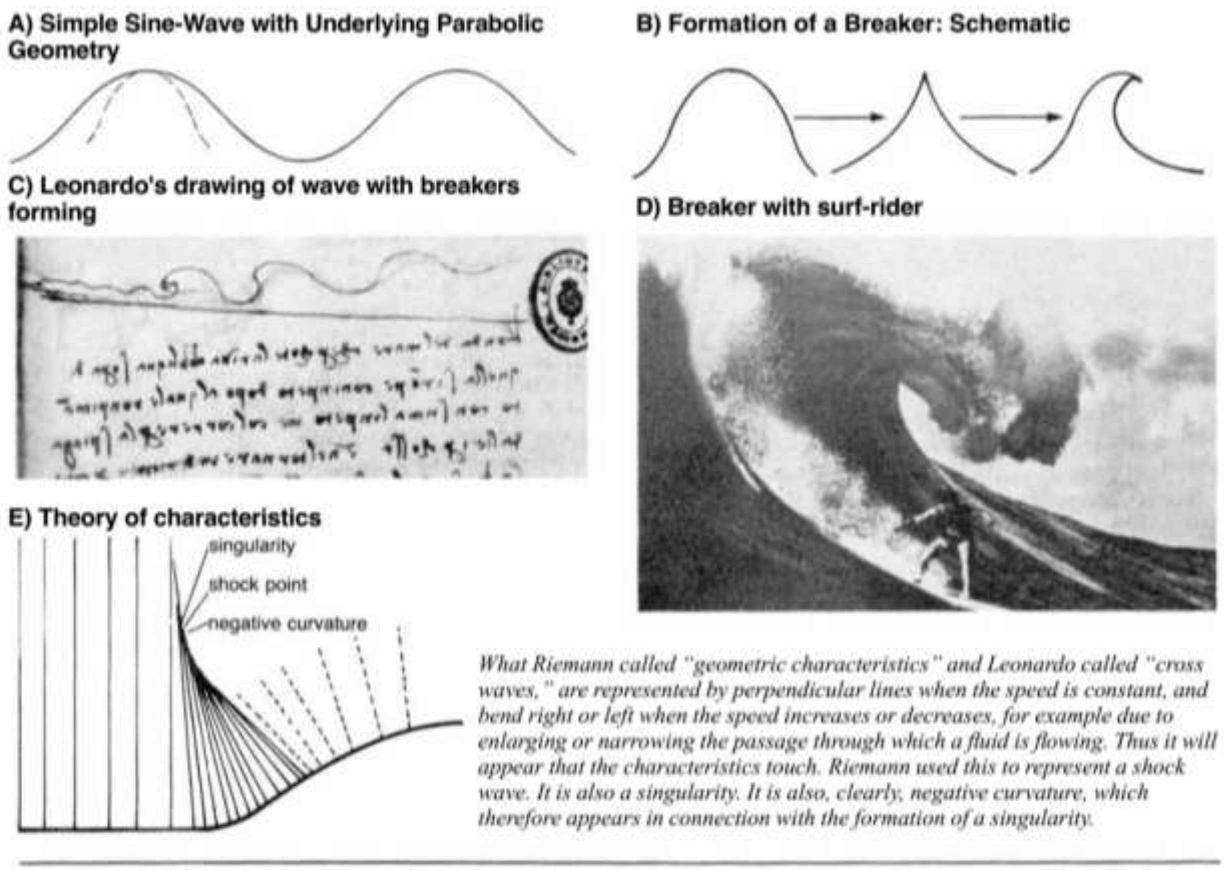
The light shining through a wine glass filled with liquid produces a caustic. The inset shows only the caustic, which is the envelope of rays emanating from a point, which are refracted or reflected by a curved surface.

In his paper on *Beethoven as a Physical Scientist*, LaRouche made the crucial point of linking geometry and music by relating the axiomatic transformation of a human voice register shift to the caustic surface of negative curvature of a light beam projected through a glass of wine. The constructive idea he stressed most emphatically was the Riemannian idea of a shockwave.

Consider the following idea whereby the singularity of a wave break, or the discontinuity of its rotating motion, is generated when the "geometric characteristics", or normal lines perpendicular to a surface, are forced to coincide with each other and become transformed into tangents to the same surface moving in two opposite directions at the same time. (see The Monge Envelope illustration below, page 5.)

This transformation that Leibniz had identified as a process of "*inversion of tangents*", is the geometrical locus where the *coincidence of opposites* between tangents and normals can be best understood through two opposite circular motions generated at the same time to form a surface of negative curvature.

This contradictory process is such that it generates singularities where the normals and the tangents form a "cusp of inversion" of negative curvature that Gaspard Monge had called "une arête de rebroussement" (retrogressing curve).



What Riemann called "geometric characteristics" and Leonardo called "cross waves," are represented by perpendicular lines when the speed is constant, and bend right or left when the speed increases or decreases, for example due to enlarging or narrowing the passage through which a fluid is flowing. Thus it will appear that the characteristics touch. Riemann used this to represent a shock wave. It is also a singularity. It is also, clearly, negative curvature, which therefore appears in connection with the formation of a singularity.

Beethoven as a Physical Scientist

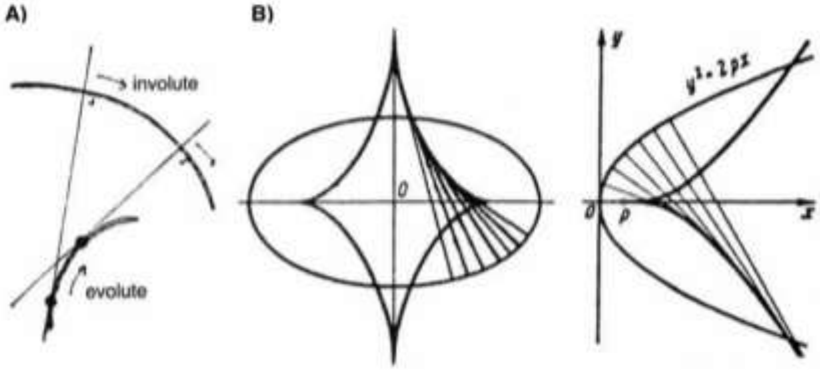
The same principle of "inversion of tangents" was demonstrated by Leibniz when he developed his original construction of the catenary curve.[2] Leibniz's idea was further developed by Gaspard Monge and his associates at the Ecole Polytechnique. The crucial idea to be considered here, however, is the process of *inversion*; that is, a process which, for example, periodically takes place through the inversion of the polarity of the Earth's magnetic field.

[2] **GOTTFRIED LEIBNIZ, " TWO PAPERS ON THE CATENARY CURVE AND LOGARITHMIC CURVE."**

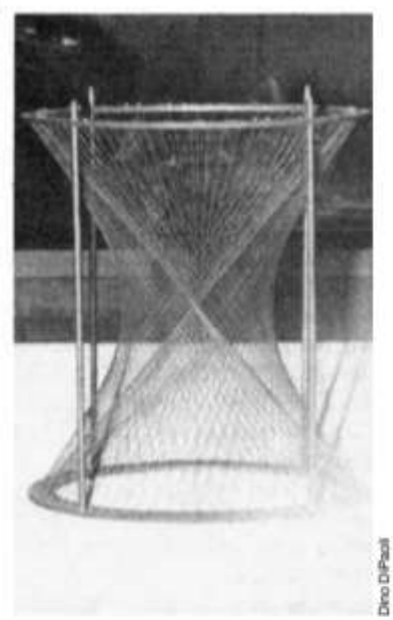
Note how figure C of The Monge Envelope illustration represents a saddle of negative curvature made up of only straight lines which are tangents to two opposite and reciprocal curvatures (toroidal and poloidal) at the same time and which is generated from the doubly-connected circular action characteristic of the torus.

The Monge Envelope

A) B)



C)



The "envelope" is a generic concept developed by Gaspard Monge for a curve enclosing other curves, or surfaces, touching all of them. The evolute is one of many possible such envelopes. The normals to a curve of non-constant curvature do not converge on a point, but rather form a new curve, or "evolute." Every curve has one, and only one, such reciprocal curve, respectively called the involute and evolute. The left hand diagram (a) shows the relationship of involute and evolute; the right-hand diagrams (b) show the involutes of the ellipse and parabola.

(c) Model built by Beltrami showing a Monge envelope in three dimensions. The very obvious curve of the sides of the figure does not physically exist, but is formed as the result of the series of straight strings.

Beethoven as a Physical Scientist

Similarly, the relationships of the Monge evolute and involute curves are both opposites and reciprocals; they have both enveloping and developing functions that Monge identified as "variable of position" within a similar doubly-connected circular action.

The question is: How can such a geometrical construction be made to relate to the creative mental process of self-consciousness, and how can the Leibniz-Monge-Riemann-Beltrami-LaRouche discoveries in geometry, be made to bear upon the principle of epistemology and of classical musical composition?

LaRouche developed this idea at length with the Bach-Mozart-Beethoven ricercare theme inversions in the first part of *Beethoven as a Physical Scientist*. In the second part, he focused mostly on the question of negative curvature as a higher form of geometry developed by Eugenio Beltrami, whose fundamental discovery of principle was expressed by LaRouche as follows with respect to Leibniz's constructive geometrical method of *analysis situs*:

> "The only consideration from which a non-Euclidean geometry begins, is that the intelligibility of developments in this universe must be constructed by reference to nothing but the relative maximal result effected by the relative minimal action. This is the root of the famous central principle of physical science, as first rigorously defined by Leibniz: the universality of a principle of physical least action. This is Cusa's "Maximum Minimum" principle.
>
> "In the simplest case, this yields the isoperimetric theorem. What is the minimal perimeter encompassing the relatively largest area or volume? This proof defines the circle or sphere in a Socratic way, to such effect that the proof is independent of any consideration employed in demonstrating it. The method of this proof is the nature of what Leibniz termed analysis situs, later termed topology. (There are different, defective guises of taught topology, but we may ignore them here.)
>
> "From this beginning, a constructive or synthetic geometry, otherwise the strict definition of a non-Euclidean geometry is elaborated. This is the basis for construction of Riemannian and Beltramian geometry, and thus the key referent for the propositions considered here."[3]

Such an isoperimetric form of least action results in the generation of three main types of negative curvature objects as illustrated below: The pseudosphere, the Catenoid, and the Torus. The Torus is the only geometrical object to display a closed surface which displays both positive and negative curvature (positive on the outside and negative on the inside).

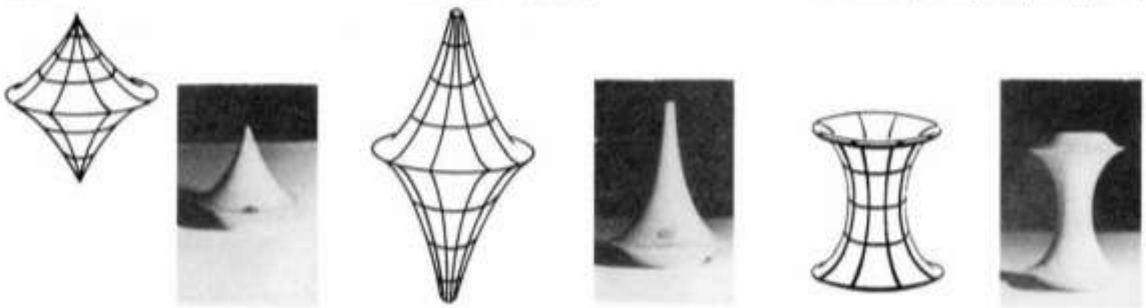
[3] Lyndon LaRouche, Op. Cit., pp. 51-52. All of the illustrations of the LaRouche article were provided and annotated by Dino DiPauli.

A) Surfaces of constant negative curvature elaborated by Beltrami

A-1 Solid generated by the rotation of a caustic

A-2 Pseudosphere generated by a tractrix (see Figure 5C)

A-3 Catenoid type generated by rotation of a catenary or a cycloid (see Figure 5C)



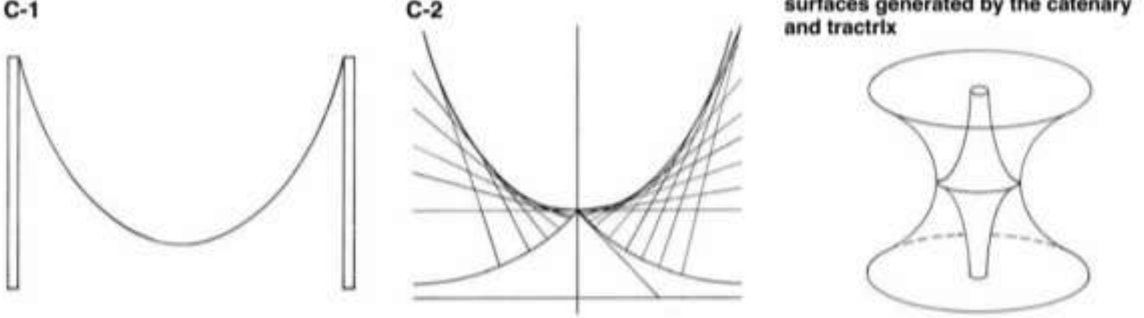
Beltrami showed that there are only three constructible solids of constant negative curvature. He named only one of these, the pseudosphere. The photos by Dino de Paoli show Eugenio Beltrami's original models, which are kept at the University of Pavia in Italy.

B) Multiply connected surfaces

The topology of the projection of a sphere (constant positive curvature) has simple connectivity; there are no singularities (holes), only poles. The projection of a torus, with its center hole, is doubly connected, and the projection of a pretzel shape, with two holes, is triply connected.

C) The catenary and the tractrix

D) Combination of two negative surfaces generated by the catenary and tractrix



The catenary is the form assumed by a chain or rope suspended from two fixed points and hanging under its own weight (C-l). To find the involute of a catenary (or of any curve), imagine a thread on the surface of the curve, which is then cut and unwound from the lowest point on the curve to the left and right. The ends of the thread on a catenary rope trace out the tractrix shown below. Each step of the unwinding is like constructing a tangent of the catenary to the tractrix. If the normal (perpendicular) is drawn to the tangent of the tractrix at any point, it can be seen that this normal becomes a tangent to the catenary. Note that all tangents from the inside of the tractrix to its base are equal in length.

Of this type of curve, called "mechanical curve," the most general is the cycloid. The cycloid is important in two respects: It has the physical characteristic of being the path which requires the least time for a body to descend from one point to another (brachistochrone). Also, descending bodies all arrive at the end of the curve at the same time, independently of the initial position (isochrone).

Such inversions of curvature can also be considered geometrically from the vantage point of the Leibniz geometrical method of *analysis situs*, especially in the case of the singularity of the Catenary/Tractrix as represented in figure C-1, C-2, and D. Here is the “point of dissonance” that LaRouche made on this matter relating to music:

> “This brings us to the juncture, at which the importance of Beltrami's work is shown, both in a general way, and then its bearing upon the principles of classical musical composition. Earlier, we have indicated that we cannot be misled into treating the points of a Riemannian point-set as if they were "points" in the same sense Euclidean deductive geometry defines points axiomatically. In music, the introduction of a relative harmonic or metrical dissonance occurs as the generation of a point in a Riemann Surface; hence, the general case and the musical case are conjoined.”[4]

What happens in a register shift is the creation of a similar unbridgeable gap, a *logical discontinuity*, between a lower and a higher voice register, a gap that Leibniz identified as an “*analysis situs singularity*” which Kant had considered impossible to understand. As LaRouche indicated: “The central issue in this undertaking of Kant's, is the fact that all of Leibniz's work in science and statecraft depends upon a view of the implicit intelligibility of the creative process, to which Leibniz refers in such locations as his *Monadology*.”[5]

Here LaRouche goes through a fascinating deductive argument in order to demonstrate the limitation of the neo-Euclidean approach; leading the reader to walk through the constructive experiment himself, and to consider the significance of the gap between two theorem Lattices A and B. He said:

> “Examine the logical gap, mathematical discontinuity, or singularity, generated between Euclidean Lattice A and neo-Euclidean Lattice B, by “hereditary” implication. Since the “logical gap” so defined between the two respective theorem-lattices is of the smallest degree possible, there exists no alternate theorem-lattice, alternate with respect to either Lattice A or Lattice B, which could make the resulting gap between the two lattices deductively intelligible.

[4] Lyndon LaRouche, Op. Cit., , p. 51.
[5] Ibidem, p. 51.

> "That preliminary conclusion, reached by that route, subsumes what Kant mistook for a conclusive proof that the creative processes are not susceptible of intelligible representation for the human understanding."[6]

After discarding the fallacy of such a "neo-Euclidean" approach in solving this problem, LaRouche went further back in history to Nicholas of Cusa in order to bring the reader to the solution of that singularity, by locating the problem within the parameters of Cusa's "Minimum-Maximum" isoperimetric principle.

This jump is like Alice going through the Lewis Carol mirror, or the successful accomplishment of that inversion by turning a right handed glove into a left handed one. LaRouche succeeded in making that inversion by returning to Leibniz and to his understanding and proof of the Cusa isoperimetric theorem by means of *analysis situs*. Thus, with Leibniz and Cusa in mind, LaRouche established the fundamental basis of his non-Euclidean constructive geometry only on multiply-connected circular action:

> "The paramount considerations here, are three: 1) That circular action is the root-notion from which the notion of physical least action is derived; 2) That circular action is the only standard of measure in physics; 3) That, to construct a geometry, we cannot begin with less than doubly-connected circular action, and preferably triply-connected. By "doubly-connected circular action," we signify that every circular action is acted upon, in every smallest imaginable interval, by a second circular action, upon which it acts, similarly, in turn. In "triply-connected circular action," a third circular action acts similarly upon, and is acted similarly upon, each of the two of doubly-connected circular actions. Such multiply-connected circular action suffices to generate points and so-called straight lines. Hence, at this instant, points cease to have any self-evident existence, since we have shown that they have a fully intelligible existence, as generated by construction. The same applies to the generation of so-called straight lines."[7]

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[6] Lyndon LaRouche, Op. Cit., , p. 51.
[7] Lyndon LaRouche, Op Cit, p. 52.

This brings us to the geometry of music in which triply-connected circular action is further extended into the higher domain of the spherical, conical, and toroidal actions, which excludes all forms of deductive logic and all forms of linear or point reductionism. And LaRouche concludes by leaping over to the musical domain:

> "We are implicitly faced with an analogous state of affairs in the resolution of canonically lawful singularities generated by a quadruply-connected compositional process of classical polyphony. Beethoven may not have been a specialist in the mathematical physics of the Gauss-Riemann domain, but he has, in a meaningful sense, mastered such principles in effect."[8]

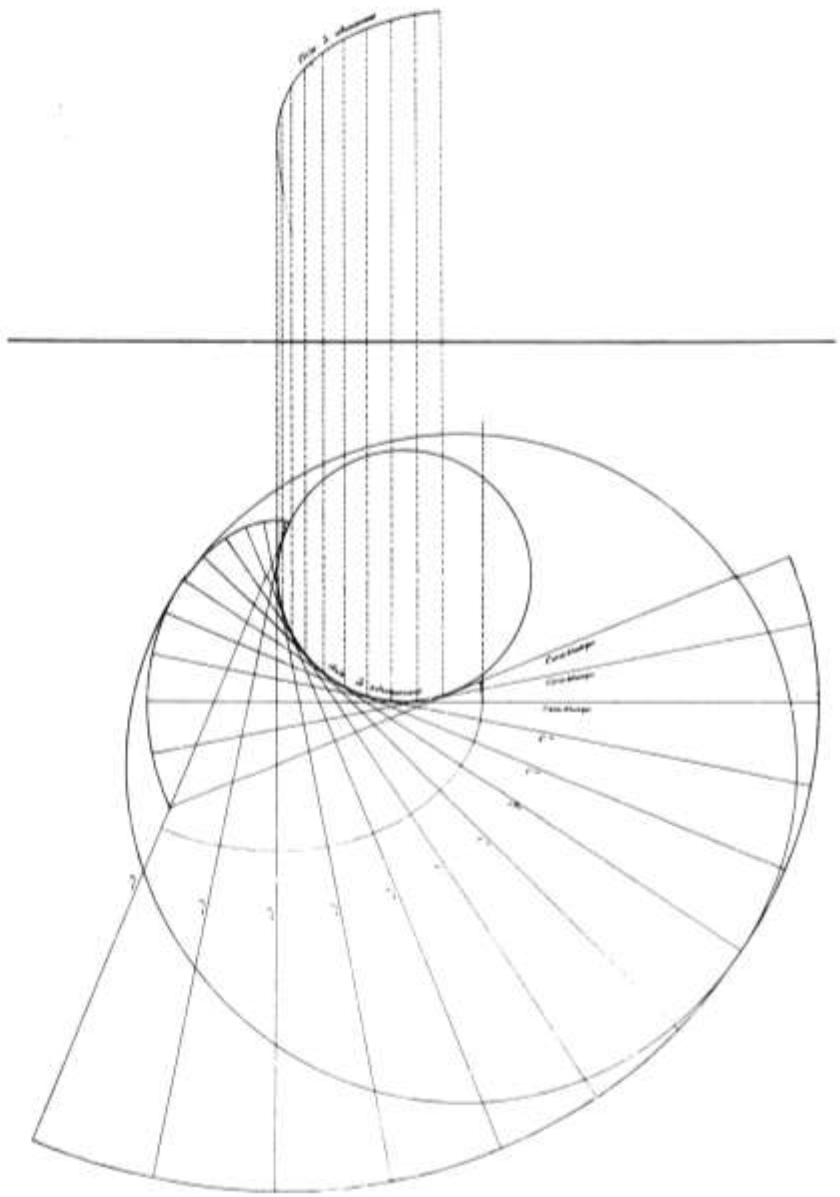
How can such inversion processes of negative curvature be applied to music? The idea cannot be illustrated by an orthographic conical projection of the lydian spiral action, because the matter cannot be explained geometrically by simple means of curve fitting. It is the process of generation of inversions which is comparable among epistemological, geometrical, and musical singularities, not some specific curve. In other words, how can the whole curvature of the function of a register shift transformation be represented by a geometrical inversion?

The inversion cannot be made visible within relationship of the two lydians, say **C-F#** and **Eb-A** inside of a conical projection, because the process requires expressing the *coincidence of opposites*, and only a part of the answer can be found in the Riemannian idea of the shock wave, which is that the water of the wave moves in two opposite directions at the same time. Therefore, the question is: how can the solution be found in the transformation between positive and negative curvatures.

Leibniz devised a method he called the "*inversion of tangents*" which he applied to his construction of the catenary curve. (See my translation of his paper: **GOTTFRIED LEIBNIZ, "TWO PAPERS ON THE CATENARY CURVE AND LOGARITHMIC CURVE."**) However, Leibniz did not apply the same method of "*inversion of tangents*" to the tractrix curve, because he had not made

[8] Lyndon LaRouche, Op Cit, p. 53.

the connection between the catenary and the tractrix curves; neither did he make any application or reference to surfaces of negative curvature, which did not exist before Monge.[9] Here is an example of Monge's discovery of the cusp of inversion:



A "surface envelope" called "canal surface" created in 1795 by Monge where a sphere rotates on a given plane curve. L'École normale de l'an III. Vol. 1, Leçons de mathématiques, Edition annotée

[9] LaRouche has been using a similar Monge method of enveloping-developing characteristics as a means of forecasting important political events.

des cours de Laplace, Lagrange et Monge, sous la direction de Jean Dhombres, Edition Dunod, 1992, *L'invention d'une lange des figures*, p. 300.

The discovery, here, is the singularity of going from the domain of positive curvature to the axiomatically different domain of negative curvature. Monge does not describe that jump in his published notes and the student is left with the joy of discovering how this axiomatic change takes place by himself.[10]

Monge was given the responsibility to teach classes in descriptive geometry in which he established a system of brigades for the formation of all of the engineers of the French Republic under the Government of Lazare Carnot. [11] Carnot made sure that the new school was to be founded on the higher principle of elevating the human soul, and in his curriculum for the school, he asserted that:

> " [L]inear perspective ... is calculated mathematically, [but] aerial perspective ... can only be grasped by the *sentiment.* By comparing these two sciences, where one is sensual, the other ideal, the methodical course of one will help penetrate the mysteries of the other. ... [Aerial perspective is] the art of generating ideas by means of the senses, of acting on the soul by the organ of vision. It is in this way that it acquires its importance – that it competes with poetry, that it can, like poetry, enlighten the mind, warm the heart, excite and nourish higher emotions. We shall emphasize the contributions that it can bring to morality and to government; and how, in the hands of the skillful legislator, it will be a powerful means of instilling horror of slavery and love of the fatherland, and will lead man to virtue."[12]

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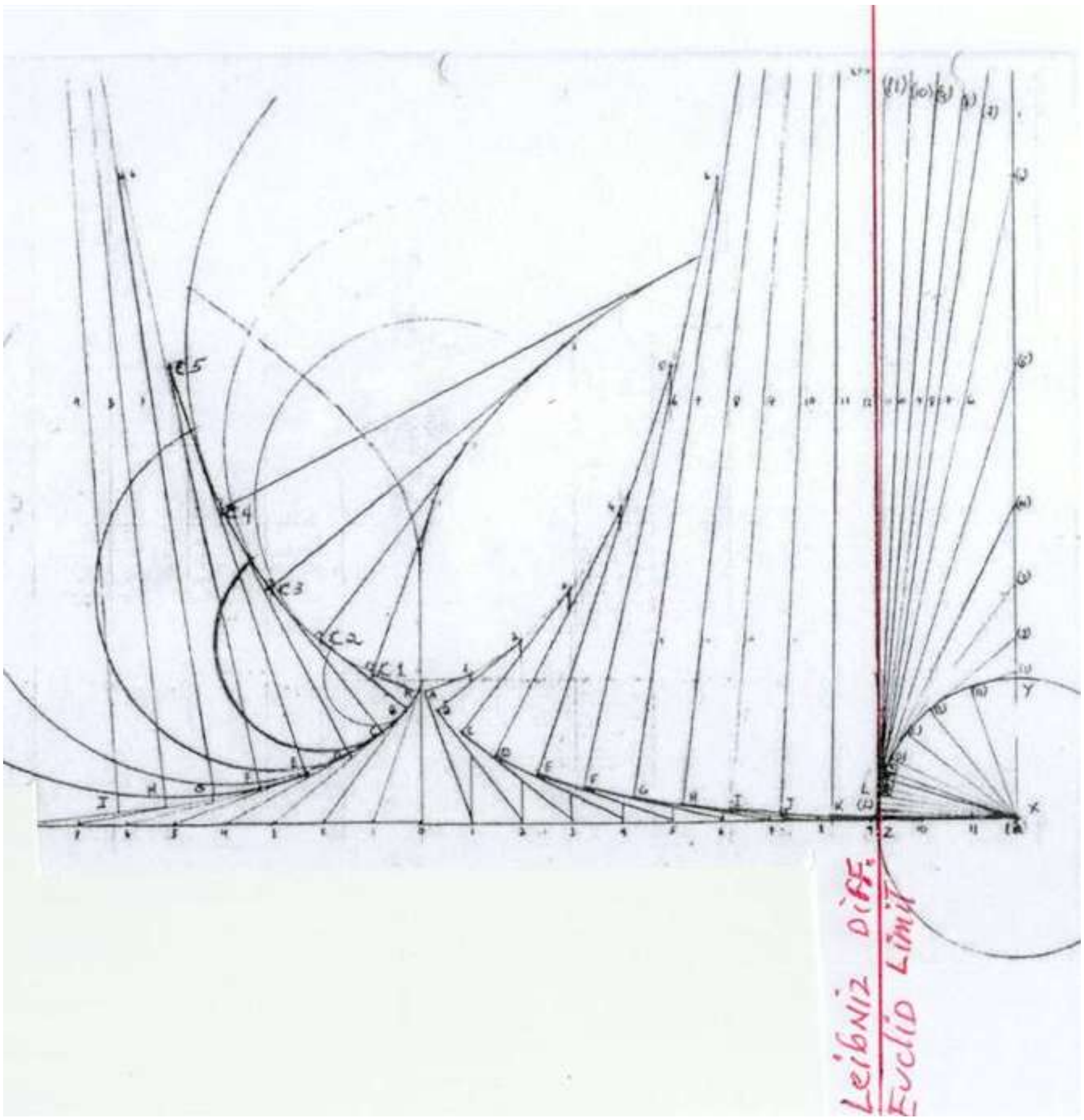
[10] Monge was the first modern geometer to develop such envelopes of negative curvature at the Ecole Polytechnique. During the September 1794 period, Monge assisted in the creation of a new form of public school in Paris called the Central School for Public Works (Ecole central des travaux publics), which was renamed a year later, the Ecole Polytechnique.

[11] See Solidarité & Progrès, ***L'Ecole polytechnique et la science de l'éducation républicaine*****.**

[12] Lazare Carnot, from the "Drawing" section of the Public Works curriculum, Ecole Poytechnique, 1794. See my report, *The Metaphor of Perspective: The Geometry of the One and the Many*,

THE ELEMENTARY CATENARY-TRACTRIX AND THE LYDIAN SPIRALS



The construction of the catenary-tractrix based on the axiomatic transformation of the inversion of tangents and normals between the two axiomatically different domains of positive curvature and of negative curvature. Construction by Pierre Beaudry.

Lydian exercise by Pierre Beaudry

Keeping within the purview of Lyndon LaRouche's principle of axiomatic change, I propose to you, here, my own catenary/tractrix construction, using the Leibniz method of inversion of tangents and normals, including the axiomatic change between Euclid and Leibniz. Construct such a curvature yourself and apply the same principle to the lydian exercise which accompanies it.

Note how all of the radii (normals) and tangents of the quarter-circle (lower right corner) are moving from right to left (counterclockwise) with twelve unequal positions touching the surface of the circle from 12 noon to 9 o'clock, and from 9 o'clock up the vertical red line going to infinity (Minimum-Maximum). It is through the *inversion of tangents* at that region of singularity that the locus of the future catenary and tractrix curves are being forecasted to appear as a pathway resolution of the dissonance of double directionality of negative curvature by way of a *coincidence of opposites*.

The whole thing hangs from an invisible sky hook located outside of the construction at the top of that red line going to infinity. Who would have thought that you could generate a catenary and a tractrix from only a quarter of a circle and a sky hook?

Rotate your mind around the last tangent (12) beyond infinity and come back down from sky-hook onto the base-line to the left side of the Leibniz differential/Euclid limit, using the opposite sides of the tangents and normals at right angle, in order to keep moving toward the left to locate the placement of the catenary and the tractrix curves. Apply a similar elementary process of placing a changing of keys within the twelve tone musical system and you will have a similar effect.

The discovery, here, is not a discovery of new curves or new musical ideas; it is the discovery of the transformative process of placing new curves and new musical key signatures through a change of axioms. In other words, it is not the destination that is important, here, it is the pathway of how to get there. In my mind, the catenary-tractrix construction raises the same four questions about the continuous motion of change expressed in the lydian cycle exercise. You cannot have a full sense of this connection unless you play this exercise on a keyboard:

1- Is the catenary-tractrix principle of construction not the same as the cyclical principle that Bach used for changing keys in his First Prelude in **C** Major? Is this not also how changes take place in Bach's Chromatic Fantasy, in Beethoven's Piano Sonata Opus 27, No.2, and in Mozart's Fantasy K. 475?
2- Is this not an axiomatic process of change similar to the discovery of a Lattice B beyond Lattice A that LaRouche identified in the action of moving to a higher manifold?
3- Is this not also how the human voice must cross over the barrier of the register shift in order to go to a higher or lower register, through the lydian singularity?
4- Is the pedagogical example significant for understanding the ABC of how an axiomatic transformation takes place in science more generally and in epistemology more specifically?

I am thankful for Fred Haight's explanation of the musical implication of such a lydian musical construction. This is how he improvised the above exercise with piano and violin: pierre.wav , and this is what he wrote to me about it:

"Kepler, for whom my respect constantly grows, criticized the ancients for ignoring what their ears told them, and basing musical harmonies purely on mathematical ratios. At first, I thought he meant sense perception, but for him, hearing was the judgement of the mind. I submit that what helped you reconstruct it (beyond the fact that you were re-creating your own work), was that, in many places, you could ***hear*** that ***no other tone would have worked***.

"Forgive me if I belabor the obvious, but here goes. Your exercise works, because you constructed it well. Each of the 4 seven-note bass line phrases descends by two half tones, and a whole tone; then ascends by two half tones and a leap of a perfect 4th. The key change/wave break always occurs between notes 6 to 7, which always consists of a movement from dominant to tonic: **B-E, D-G, F-Bb, G#-C#.**

"That is the bedrock of establishing a key. Remember last time, how I cited how if I alternated from **C** to **G**, and left it on **G**, then asked the kids to sing the final note, they all sang **C**, without any knowledge at all? It seems simple, but is profound.

"Why does this happen? Kepler said that the cause of the intervals is mind, not numbers. Why does that motion, dominant to tonic, not only sounds lawful, but establishes a sense of key in our minds, so much so, that we can anticipate it, sing it? I never stop marveling over this, and I still do not know why it works!

"As you reconstructed the piece, take for example mm 6-7, the perfect 4th, **B** to **E**, if you had tried **B-F**, or **B-D#**, it would have sounded horrible. Only one interval would work. You could hear that. That helped you reconstruct it.

"Even better, the dominant-tonic resolution is strengthened, when preceded by the sub-dominant, and that is what you did. Your carefully designed phrase descends to the sub-dominant of the next key, then ascends to the dominant. In the first phrase, **C#** descends by two half-steps, then a whole step to **A**, as a pivot point; it then ascends by two half-steps to **B**, followed by a perfect 4th leap up to **E**. Thus you have sub-dominant, dominant, tonic, in the key of **E: A B E**. The same holds true for all four bass lines.

"The four keys shape a double lydian spiral. That is also by design. You designed the first one to resolve a minor third higher. Another unique choice, is that your next phrase does not begin on another tone. The last note of one phrase serves as the first of the next. Phrase 1 ends on **E**. Phrase 2 begins on **E**. Following the same sequence of intervals guarantees that the next key change will also be a minor third higher.

"You could design it another way, say **C E G# C**. Some intervals would not work at all. Thus your mind shapes a work, according to axiomatic motions."[13]

Key changes and curvature changes follow similar pathways of construction. This is the construction of an instrument to be used for shaping ideas in a composition. It's the sharpening of such an instrument which Bach constructed in the First Prelude in C Major. *That's the idea where tangents and normals become opposites at right angle to one another as do the double overlapping lydians of* ***C-***

[13] Personal correspondence with Fred Haight, December 24, 2019.

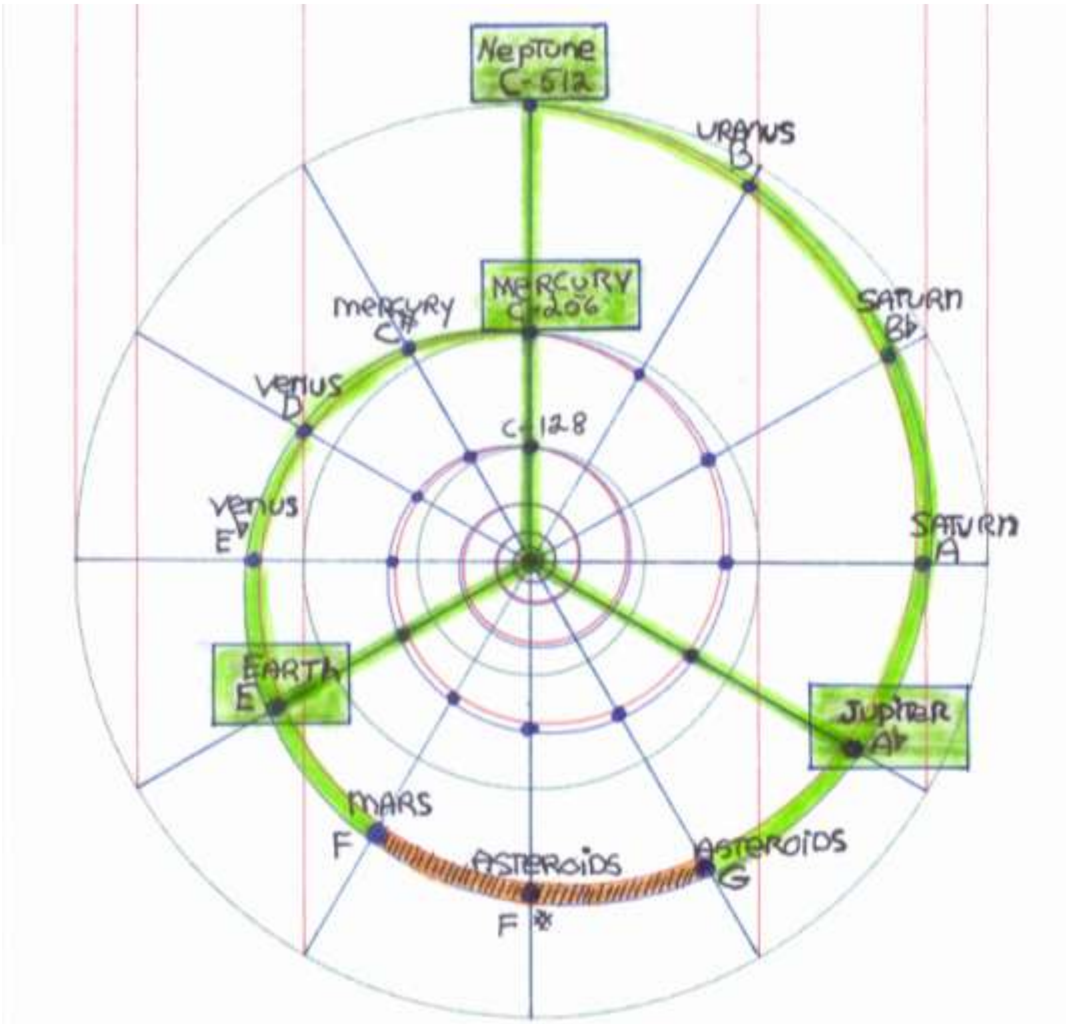
F# and Eb-A. That is how you use the lydians to shape an idea, an emotion, as Marian Anderson does, for instance, in "*They Crucified My Lord*." Such lydian dissonances become less acute when the four tones are played as an overlapping spiral cross-rotation like **C, Eb, F#, A** at right angle to one another. Then, and only then, such four tone series become resolved through *coincidence of opposites* by forecasting the existence of four "unheard" different other keys coming from the future.

MULTIPLY-CONNECTED SPIRAL ACTION

The mixed dissonances become resolved when the lydian reciprocals exceed ninety degrees of rotation and the new coming note is heard without making a sound through the extensions of the dominant and sub-dominant. For example, **C, Eb, F#, A** becomes resolved into **Bb, D, F, Bb**. As Kepler demonstrated, this process also applies to the relationships of the planets inside of the Solar System. Project this view of the solar system onto a plane circle:

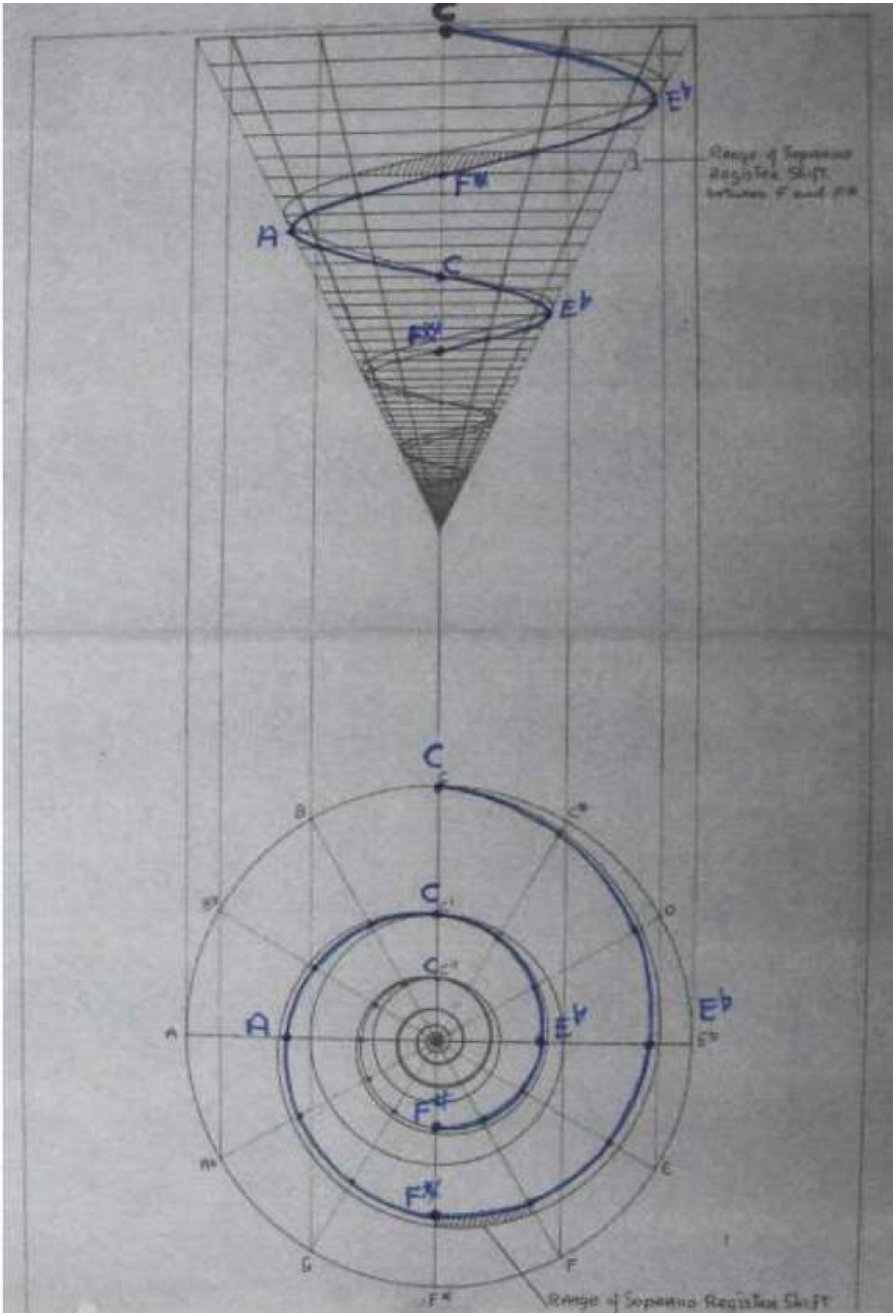
THE PLANETARY ORBITS AND THE EQUAL-TEMPERED MUSICAL SYSTEM
by WILLIAM BOHDAN

PLANETS	ASTRO. UNITS	Log. 10X	ADDED CONSTANT	MULTIPLE CONSTANT	CYCLE EQUIVALENT	MUSICAL CYCLES	PLANETS
MERCURY	(P) 0.310	0.5086	+2.496	x 128.8	255.97	C = 256	MERCURY
MERCURY	(A) 0.470	0.3279	" "	" "	279.25	C#=271.22	MERCURY
VENUS	(P) 0.715	0.1457	" "	" "	302.72	D = 287.35	VENUS
VENUS	(A) 0.725	0.1397	" "	" "	303.49	Eb =304.44	VENUS
EARTH	(P) 0.983	0.0074	" "	" "	320.52		EARTH
EARTH	(A) 1.017	0.0073	" "	" "	322.42	E = 322.54	EARTH
MARS	(P) 1.379	0.1396	" "	" "	339.46	F = 341.72	MARS
MARS	(A) 1.661	0.2204	" "	" "	349.86		MARS
ASTEROIDS	(P) 2.2	0.3424	" "	" "	363.32	F#=362.04	ASTEROIDS
ASTEROIDS	(A)3.6	0.5563	" "	" "	393.13	G = 383.57	ASTEROIDS
JUPITER	(P) 4.95	0.6946	" "	" "	410.95	Ab=406.37	JUPITER
JUPITER	(A) 5.45	0.7364	" "	" "	416.33		JUPITER
SATURN	(P) 9.006	0.9545	" "	" "	444.43	A = 430.54	SATURN
SATURN	(A)10.074	1.0032	" "	" "	450.69	Bb=456.14	SATURN
URANUS	(P) 18.288	1.2622	" "	" "	484.05	B = 483.26	URANUS
URANUS	(A) 20.092	1.3030	" "	" "	489.31		URANUS
NEPTUNE	(P) 29.799	1.4742	" "	" "	511.36		NEPTUNE
NEPTUNE	(A)30.341	1.4820	" "	" "	512.37	C = 512	NEPTUNE



The projection shows how two Lydian divisions **C-F#** and **Eb-A** partition the Solar system into four parts between **C-Mercury** and **F#-Asteroid Belt** and between **Eb-Venus** and **A-Saturn**. The Neptune, Jupiter, Earth and Mercury partitioning reflect the values of the Doubling of the cube. Construction by Mark Fairchild.

This lydian question is in congruence with LaRouche's idea of anti-entopic development of the human mind, which itself is based on the increasing of relative population density. The increase in power of the human mind can be expressed metaphorically by the lydian principle of the voice register shift in bel canto singing and constructed geometrically with the Gauss arithmetic/geometric mean of the conical spiral action.



Right angle Lydian divisions of the arithmetic-logarithmic spiral: **F#ACEb**. Spiral construction by Mark Fairchild.

The logarithmic and arithmetic spirals correspond to Gauss's idea of the Arithmetic/Geometric Mean as applied to the voice register shift of the Soprano and tenor voices. There are three such right angle spiral divisions in the well-tempered musical system corresponding to the six human voices, taken two by two: **F#ACEb** (Soprano-Tenor), **GBbC#E** (Alto-Baritone), and **AbBDF** (Contralto-Bass).

From the vantage point of geometry, the Dominant-sub-dominant-tonic application of the three lydian spirals come from the three circular mean proportionals: the geometric, arithmetic, and harmonic means. Their epistemological and reciprocal values are to set the pathway for the creative process in both art and science.

What happens in this Lydian process of transformation is what Lyndon LaRouche and Gottfried Leibniz called the "dynamics" of joy, or Felicity; that is, the *vis viva* transformative effect of how an idea impacts and changes human society as a whole. As Percy B. Shelley identified in his "Defense of Poetry," the joyous living force of an axiomatic idea is capable of making the whole of mankind change for the better in spite of its backward tendencies.[14]

CONCLUSION: LAROUCHE'S PRINCIPLE OF MULTIPLY-CONNECTED CIRCULAR ACTION

Finally, ***what happens to the human mind during an axiomatic change?*** For example, what happened in the mind of Lyndon LaRouche when he discovered Norbert Brainin's "*motivfuhrung*?" Brainin had done to LaRouche what LaRouche had done to Riemann; he made him discover how to produce an axiomatic change in the geometry of the musical composition. In other words, a transformation in the previous set of axioms changes everything inside of your mind. As LaRouche put it: "Any change within the set of axioms associated with a specific hypothesis, produces a second hypothesis which is absolutely inconsistent with the first."[15]

[14] See my report of last July: LEIBNIZIAN OPTIMISM AND THE SCIENCE OF FELICITY
[15] Lyndon H. LaRouche, Jr., *Norbert Brainin on Motivfuhrung*, EIR, Vol. 22, No. 38, September 22, 1995, p. 53.

This means that the *coincidence of opposites* changes everything I knew before. It also means that the introduction of a new hypothesis eliminates all forms of axiomatic belief by means of a circular inversion, without introducing a new axiom. Circular action is not a new axiom; it is a principle.

There may be other opposite lydians throughout the Bach Prelude, but I do not hear their dissonance. Therefore, I am not affected by them. What I am looking for is the means of resolving those lydian dissonances I am affected by. This is why I am trying to figure out how, from the standpoint of epistemology and geometry, the lydian dissonances get resolved when you have two pairs that overlap. What happens when two pairs of lydians overlap each other? How do they get resolved? There may be other ways they may be combined, but to me, the overlapping is the most obvious form. For example, Beethoven's Moonlight Sonata, Opus 27, No. 2, measures 32 and 33, where the two lydian intervals of **C-F#** and **A-Eb** of measure 32 turn the dissonance into the key of **C# Minor**; that is, where **/F#, C, A,/Eb, C, F#,/ Ed, A, F#,/ C, A, Eb/** generate **/E, C#, Ab,/ E, C#, Ab,/ E, C#, Ab,/ E, C#, Ab.** Why is this key of **C# Minor** generated by such a right angle overlapping combination of opposites?

The point is not that you have created new axioms. The point is that a *coincidence of opposites* resolved previous oppositions that existed in your mind before. This also means that the introduction of a new axiomatic hypothesis creates a new form of elimination of all previous axioms, simply by means of a circular inversion. As a result, you have increased your power of making new combinations.

Such lydian combinations are also represented in classical painting, as in Tintoretto's *The Entombment of Christ*, c. 1540. Tintoretto represented such a *coincidence of opposites* on a surface of negative curvature, as both Mary and Jesus have the same pathway characteristics while moving in two opposite directions at the same time: one is being carried into the tomb and the other is being pulled away from death; one is being directed toward immortality while the other is being pulled back to life.

Tintoretto, *The Entombment of Christ*, c. 1540

As I have demonstrated in the catenary-tractrix, the region of transformation of negative curvature is everywhere expressed by means of the opposite directions of tangents and normals; the same process takes place in all living processes, in life as in death. The surface of negative curvature is touched everywhere by tangents and normals, as the center of an infinite circle is everywhere and its circumference nowhere.

Similarly, LaRouche identified how a composer has to choose a specific key for a song because each human voice has a precise natural range in which the singer must discover the precise location where his voice changes from a lower or a higher register of transformation.

Why is the human voice so biologically ordered? It appears that God created the human being as a creative individual whose mind and voice are able to express different ranges of emotions and ideas at different times and different multiply-connected levels of understanding which are based on different underlying principles in the physical simultaneity of eternity. LaRouche identified this capability as follows:

> "These voice-registration considerations must be superimposed upon the doubly-connected domain identified above. In the language of constructive geometry, the most rudimentary classical counterpoint is already triply-connected.
>
> "In the cases of the instruments, we must expand the notion of counterpoint, without changing any underlying principle. We must treat each instrument as a species of singing voice, and view its intrinsic registral characteristics accordingly.[16]

What are these doubly-connected and triply-connected levels? Think of them simply as different dimensional levels of circular action; that is, similar to what are generally understood to produce as single, double, or triple dimensional object by least action. For example, a Moebius strip is a single dimensional object, a circle is a double dimensional object, and a sphere is a triple dimensional object. Then, ask yourself: how can all three of those objects be constructed without any other principle than circular action and a sky hook?

FIN

[16] Lyndon LaRouche, Op. Cit., p. 37.