March 15, 1987

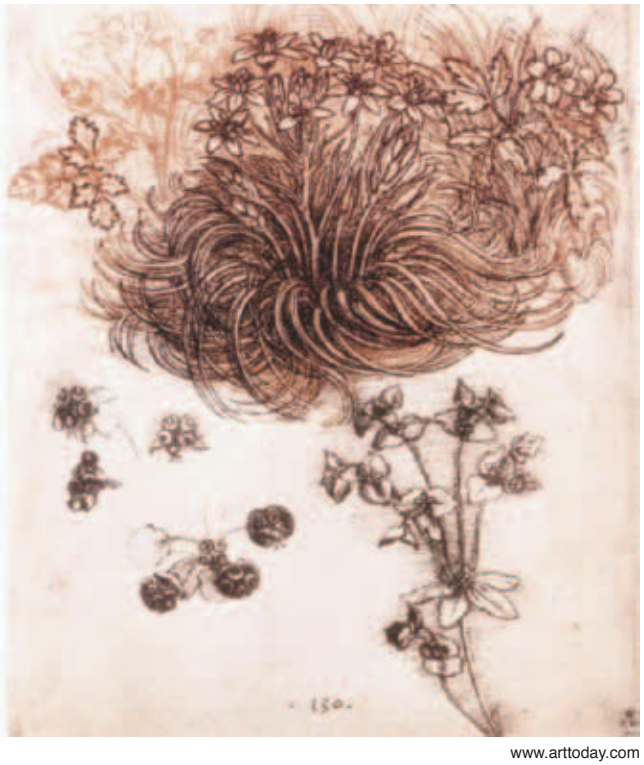
Remarks on Gurwitsch's Method

by Lyndon H. LaRouche, Jr.

I have just read a review of Alexander Gurwitsch's work presented by one of the great biologist's former students [Michael Lipkind]. Gurwitsch's method has striking resemblances to the notion of living processes which I developed as a criticism of *Mathematical Biophysics* of Chicago's Nicholas Rashevsky, at the close of the 1940s, a criticism which aided me greatly in effecting my discoveries in economic science.

This is, I think, no mere coincidence; at the beginning of the present century, the Pasteur Institute exerted important influence on certain leading circles of Russian science, both in biology and the nuclear physics of fission. The case of Academician Vladimir Vernadsky is exemplary. Also, although my friends and I have so far failed to uncover relevant aspects of the Pasteur Institute's work, some associated with that Institute showed variously the direct and implicit influence of Bernhard Riemann's method, in their approaches to biological and biogeochemical processes. My own work has also been influenced very strongly by Riemann, notably in treating the processes of social reproduction (Leibnizian physical economy) as coherent with principles otherwise characteristic of living processes.

Hence, my own work on non-linearity of development of physical-economic processes sheds this sort of light on some of the methodological approaches which the reporter [Lipkind] identifies in Gurwitsch's leading work.



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"Modern science has known, since the collaboration of Luca Pacioli and Leonardo da Vinci, that healthy living processes are characterized by a kind of harmonic ordering." Here, Leonardo's Star-of-Bethlehem and other plants.

What is Life?

Despite the recent hegemony of molecular biology, modern science has known, since the collaboration of Luca Pacioli and Leonardo da Vinci, that healthy living processes are characterized by a kind of harmonic ordering, consistent with the derivation of Kepler's astrophysical laws, coherent with the construction of the circle's Golden Section, a construction cohering with the uniqueness of the five platonic solids within the ordinary discrete-manifold space of faith in naive sense-perception.

Editor's Note: An edited version of this text appeared in two parts, in *21st Century Science & Technology* magazine, Vol. 11, Nos. 2 and 3, Summer and Fall 1998, available at http://21sci-tech.com/Subscriptions/Archive/1998_S.pdf and http://21sci-tech.com/Subscriptions/Archive/1998_F.pdf. Further articles on the subjects of Gurwitsch and his work are in those same two issues of *21st Century Science & Technology* magazine.

It is demonstrable, that, excepting the extremes of astrophysics and microphysics, any process which exhibits these harmonic morphogenetic characteristics is either a living process or a special case of activity by a living process.

This was emphasized already in Plato's dialogues, the *Timaeus* most emphatically, but the appreciation of such harmonic orderings antedates Plato in such respects as the original design of the Athens Acropolis and the early forms of well-tempering in classical Greek music. This standpoint was revived, most notably, by Louis Pasteur's work on optical activity of living processes. Advances in quality of spectroscopy's instruments have lately promoted the specialized form of optical biophysics known most commonly as "non-linear spectroscopy."

Friedrich Gauss (1799-1855)

Bernhard Riemann (1826-1866)

The eruption of the global pandemic, AIDS, has placed great importance on study of the spectroscopy of the mitotic processes, work in which Gurwitsch was a pioneer. However, the practical implications are much broader, including relevance to cancer research, and studies of the diseases of aging of tissues more generally. A. G. Gurwitsch was a true pioneer in development of the optical biophysics which promises now to dominate future leading work in biology.

The standpoint in mathematical physics most appropriate to these lines of research is that of Carl Gauss and such among his scientific heirs as Dirichlet, Weierstrass, Riemann, and Cantor. Where the method of Pacioli, Leonardo, and Kepler, was derived from Nicolaus of Cusa's rigorous treatment of isoperimetry in such locations as his *De Docta Ignorantia*, Gauss reworked the leading accomplishments of Kepler, Leibniz, et al., superseding simply isoperimetric notions of least action with a notion of conic, self-similar-spiral action as the elementary form of least action in the universe. The work on mathematical physics by Gauss, Weierstrass, and Riemann, must be examined from the vantage-point of a synthetic (radically constructive) geometry, without employment of the axiomatic-deductive forms of mathematics of a (Cartesian) discrete manifold.

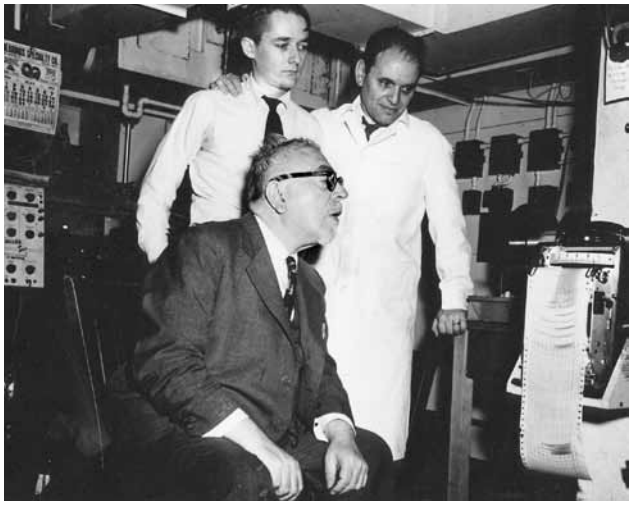
This Gauss-Riemann approach accounts uniquely for the common harmonic orderings in astrophysics and living processes, and implicitly demands that the microphysical domain be treated from this same methodological standpoint. A mapping of principal features of the microphysical domain from this standpoint is already in progress, with some experimental proofs of this already supplied. This obliges us to supplant the notions of "negentropy" associated with the standpoint in statistical mechanics characteristic of the work of Ludwig Boltzmann et al., with the definition of "negentropy" first elaborated by Pacioli and Leonardo, and asserted by Kepler. The Gauss-Riemann standpoint in radically constructive physical geometry of conic self-similar-spiral least action, provides us a vastly more adequate view of this matter.

This also signifies fundamental, ontological as well as methodological flaws of assumption in the definitions of "cybernetics," derived from Boltzmann et al., as supplied by Norbert Wiener et al. If the astrophysical is ordered as Gauss's reconstruction of Kepler's laws indicates, then the elementary laws of the universe are "negentropic," not "entropic" in form. Similarly, the discrete manifold is to be viewed not as ontologically elementary, but as a projection of a higher-order continuous manifold, such that ontological elementarity lies in the physical geometry of a continuum described by a Gauss-Riemann construction of the complex domain.

Such was the standpoint of my own discoveries of the early 1950s. A brief summary of key points indicates the relevance of my own work to a reading of Gurwitsch's work.

The point of departure for my discoveries was my rejection of Norbert Wiener's definition of "negentropy" in human behavior and "information" transmitted by this behavior. Like Immanuel Kant's *Critique of Judgment*, Wiener's approach insisted that true synthetic judgment (creative discovery) was accomplished by an unknowable process. Wiener went further, to insist that such synthetic judgment was non-existent. Since the progressive

evolutionary development of the biosphere exhibited a characteristically creative process of morphogenetic development, and since the increase of demographic potential of the human species exactly paralleled such evolution within the biosphere, the cause of human creative thought must be a special sort of development of the same kind of negentropic principle characteristic of living processes. I.e., that the physiology of the human brain's function must provide the efficient substrate for higher manifestations of human intelligence.



The MIT Museum

Norbert Wiener in 1955, studying the record of his brain waves emerging from a new device developed at Massachusetts General Hospital. The device compares brain waves in one time period with those which preceded them. Wiener's cybernetics denies the existence of human creative discovery.

In other words, mentation must not only be rooted in the mechanisms of reproduction of cells, but must be subordinated to the same, subsuming morphogenetic principles of (Riemannian) potential which delimits the cell-production processes to the effect of producing a definite member of a definite species.

The convergence of my own approach with that of Gurwitsch is already suggested strongly.

In physical economy (ignoring superimposed monetary processes), the characteristic event is the increase of the society's potential population-density, which has increased by about three orders of magnitude since the upper limit of a 10 millions human population estimated for pure hunting-and-gathering society. The source of this increase in population potential, is the generation of those modifications of social and individual behavior we associate today with scientific and technological progress.

Although the development of the individual scientific discoverer is socially determined, each discovery is the product of an individual mind, although the realization of that discovery is, again, socially determined. It is in the power of the individual to generate discoveries, or related acts, which transform the potential population-density of society, in which the efficient connection between the individual (microcosm) and the society (macrocosm) is directly exhibited in physical-economic processes.

The causal connection between such advances in technology, generated by individual discoveries, and a resulting increase of the productive powers of labor (potential population-density), served thus as the most convenient point of reference for a necessary and sufficient refutation of Wiener's *Cybernetics*.

My concern was the feasibility of measuring this causal connection, such that technological progress, measured from the standpoint of Gaussian notions of least action, enjoy a measurable connection to ensuing increases of the productive powers of labor. On condition that Gauss-Riemann physics is comprehended in terms of the indicated synthetic geometrical elaboration of conic least action, the methods appropriate to solution of the problems of measuring such a "nonlinear" process-connection were implicitly available.

By virtue of the derivation and elaboration of this hypothesis, what is shown to be characteristic of physical-economic processes in the most elementary terms, is also a reflection of that which is true elementary in living processes. On this basis, during 1973, I outlined to my associates a project for estimating the impact of continued, then-prevailing trends for collapse of human population-potential upon the proliferation of new and old varieties of epidemics and pandemics. During 1974, it became clear that continuation of mutually reinforcing monetary-policy and Malthusian trends would bring mankind to the threshold of proliferating entirely new kinds of pandemics, as well as reviving old ones.

The projection made by my associates at the close of 1974, aptly forecasts the epidemiological developments of the 1980s, approximately on schedule. Although the original generation of human AIDS is unresolved, the conditions have developed which would tend to suffice to have generated such a new pandemic in nature. Whether or not AIDS is the product of accidental recombinations occurring in cancer research on human tissue, during the 1960s or later, the conditions for its proliferation were fostered by a lowering of the standard of life.

Excepting pockets of anomalous behavior (homosexuals and drug-users), the evidence is that the rate of proliferation of the infection among normal portions of populations varied according to the misery index

among compared populations. Homosexuals and drug-users have had the special significance of rapidly building up a reservoir of carriers among industrially developed regions of society.

This point of view requires us to examine the way in which a rapid lowering of the potential population-density of populations, to levels below existing population-density, may cause human bodies to generate new forms of diseases, especially viral diseases. This requires mastery of the mitotic processes, treating the existence of parent and daughter cells as special aspects subsumed by a determining, morphogenetic function of mitosis. For known reasons, this requires a concentration on the spectroscopy of such mitotic functions.

The relation between the processes of the brain's cortex and the possibility of human synthetic judgment as an activity coherent with such cortical processes, becomes a central concern. The spectroscopy of these functions, from the vantage-point of mitosis in general, defines the general approach under which investigation must be broadly subsumed.

Therefore, the work of Gurwitsch is properly of extraordinary interest.

The Transfinite As Ontologically Existent

Gurwitsch apparently first elaborated the approach of most specific interest to me in a 1929 paper, "Der Begriff der Äquipotentialität in seiner Anwendung auf physiologische Probleme." In this, the reporter emphasizes, "the notion of 'brain continuum' was suggested and considered with incredible profundity so characteristic of A. G. Gurwitsch.

> According to this concept, the cortex presents a three-dimensional continuous non-structural constellation and all the structural histoelements are plunged into it and 'impregnated' by it.... However, the continuum state is determined by excitations of the related neurons only to a certain degree, since the excitation corresponding to the "perception of the whole" of the "image perception" ("Gestalt") cannot be considered as an associative connection of the excitations of the neurons. The evidence is that the elementary excitations flow into the continuum as a common reservoir.

This is precisely what is readily demonstrated for the function of creative scientific discoveries within the developmental processes of entire economies. This can be no mere coincidence, since it is precisely the highest order of brain functions which determine this relationship of microcosm to continuum (macrocosm). The reporter continues:

> The above abstract conception of the brain continuum was revived and concretized when the theory of the vectorial biological field was established (A. G. Gurwitsch, 1944). In light of it, the cell field as a dynamic principle, spreading over the cell borders to intercellular space, continuously constitutes current connection between the cells and the resulting integral field, in a single general indissoluble, continual whole, interspersed with "points of condensation," or maxima, which are the intracellular areas of the cell fields. [An interesting observation, respecting recent researches into AIDS dementia] The actual integral field of brain areas is now the expression of the above abstract continuum. It has constant (invariant) characteristics, which finally are suggested to determine the general character of the individual organism, including physiological manifestations.

My own epistemological investigations into memory and the Riemannian physics of ordering of technological advances, suggests that human memory is essentially geometrically holographic, rather than "digital." We do not "recall" a particular memory, but, rather, regenerate (reconstruct) that which is presented as a recollection, holographically. This brings us to another of the reporter's key points.

> Strictly speaking, the psychical sphere, although closely related to (being an attribute of) the physiological activity of the brain cortex, does not belong to reversible processes, as [do] other functional activities of the cortex or any other physiological system. Indeed, the irreversible psychological "maturation" continues during all the individual's life-time.

From my standpoint in physical economy, the reporter's description of Gurwitsch's concept echoes my own knowledge of the role of culture in the technological progress of society. The individual's development is shaped by culture, but the individual who contributes or otherwise distributes valid scientific-technological progress, modifies the culture of the society in that respect and degree. The individual's ability to modify the culture in this way is conditioned by the culture; the

modification of culture so effected, determines the behavior of the society thereafter.

Cultures which are transformed in a way corresponding to increase of potential population-density, manifest what might appear to be a directed series of cultural transformations, each associated within a corresponding enhancement of potential population-density. Culture defined in terms of such interaction of microcosm and macrocosm, corresponds to the unifying morphogenetic principle of Gurwitsch. Culture is to society, in this respect, what Gurwitsch's principle is to the continuum of brain-function.

The reporter emphasizes that the empirical study of brain functions from the vantage-point of Gurwitsch's principle must take into account two distinguishable classes of phenomena.

> The first one, is the connection between the external stimuli and the psychical manifestations which can be designated as feelings. The second one, concerns the current, incessant stream of chaotic thoughts, which is a certain background for all the other psychical activities. [for broad purposes of description, I would not introduce a quibble—LaR] These two, evidently quite different phenomena have a common basis, which is as follows.
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> Analysis of both the cases inevitably reveals what is designated by A. G. Gurwitsch as "the break of continuity," or "the gap in the entirety": these are, perhaps, imperfect translations of the notion introduced by A. G. Gurwitsch, in Russian, in the original manuscript (Analytical Biology, unpublished). This "break of continuity" is meant to occur while analyzing the somato-physical and psycho-somatic chains of the process: such a chain is considered to be continual as soon as at least once parameter is common for both its parts—somatic and psychical. Both the "classical" and Gurwitsch's points of view accept as evident "the break of the continuity," but both differ in principle in the further analysis.

Here I introduce an important qualification. Where the reporter writes "the gap in the entirety," I read "singularity" in the sense of Riemannian physics. Where he writes "the break of continuity," I read "discontinuity" in the sense of Lejeune Dirichlet's principle of Gaussian topology, and as defined by Karl Weierstrass: another aspect of singularity.

One of the convenient measures of "negentropy," as I choose to define it in physical economy, is as an increase of the density of discontinuities per interval of action. The relevant Cantorian theorem, on enumerability of discontinuities within an arbitrarily small interval of action, applies; this Cantorian theorem must be read not only from the standpoint of Weierstrass, but as a proposition in Riemannian potential theory, as viewed, generated from radically constructive Gaussian synthetic geometry.

This has a simple demonstration in physical economy, where the structure of the division of labor becomes richer in singularities in correspondence to raising of the level of technology and productivity, and where the density of such singularities of process-structure diminishes under influence of economic devolution.

The remainder of the reporter's account of this matter, respecting Gurwitsch's work, speaks for itself. With one important exception, to be stressed next, my views are already implicitly identified above, or else the report is of such a nature that I should add no embellishment to it. There is one subsumed point, on the subject of "feeling," in which the reporter's account oversimplifies the problems to be considered.

The Matter of 'Feeling'

The classical Greek recognizes two distinct qualities of "feeling." This is typified by the use of two different terms, "eros" and "agapē," to correspond to the domain of one English term, "love." In reality, a purely contemplative form of knowledge does not exist. All thought pertaining to the quality of rational knowledge involves what are potentially extremely strong degrees of emotion. All thought is a disposition either for action, or relative inaction. It is the "feeling" aspect of thought which supplies the quality of action or inaction. The most important feature of this connection of thought to "feelings," is the proper discrimination among the two qualities of feeling available.

The woman challenges her lover, "Do you love me for my body or my mind," and should be quite sorely disappointed—sooner or later—if either option is strictly the case. "Male chauvinism" is a product of the preponderance of the former, "eros," and nothing but "agapē" brings the woman's recommendation that her mate might be happier in celibacy.

A certain combination of both is required, but such that the former feeling is altogether dominated by the latter.

This issue bears most directly on the reporter's portrayal of Gurwitsch's views, when we pose the distinction in a more universal frame of reference. The domina-

tion by a compulsion akin to "eros," is the prototype of irrational behavior, just as efficient action promptly subsumed by rational thought, is the hallmark of the rational, socially responsible personality. The relevant question, is whether the individual locates his emotional sense of personal identity more efficiently in "eros," or in "agapē." This has direct bearing on reading the account of Gurwitsch's treatment of "Psychical Indeterminism." My point here, is to show that what appears a moral distinction, must also be a physiological distinction, bearing upon the self-developing continuum-principle of morphogenesis of development of the human mind.

The rational person is, first of all, a patriot, but also a "world-citizen," without there being any contradiction between the two. The mortal individual's circumstances are such, just because his mortal individual existence is a brief and fragile one, that he must depend upon his society to foster, and give meaning to the good he contributes through his life's work. He also requires, that as he, as microcosm, should be a positive factor in the relevant macrocosm, that his nation, as microcosm, finds true meaning in its contribution to the advancement of civilization. Thus, the proper policies of his nation, assure the merit of world-citizenship to the outcome of his otherwise fragile, individual existence.

To be a person for mankind's advancement, causes a shift in the sense of personal identity, from the erotic individualist, to the agapic sense of patriotism and world- citizenship. The person who retains an infantile sense of personal identity, the erotic one, will select his feeling for certain choices of action, and of personal self-development, accordingly. The same is true of the person who rises out of the infantile-erotic sense of identity, to the agapic. These are two distinct kinds of continua of morphogenetic development of the personality. As such, each must have its own peculiar physiological substrate.

I read the account of Gurwitsch's "psychical indeterminism," to signify that the morphogenetic process is "non-linear" in the Riemannian sense, as the notion of a "Riemann Surface," for example. This signifies, axiomatically, that no mechanistic determinism prevails, for reasons already stipulated by Riemann in his 1854 inaugural dissertation, "On the Hypotheses Which Underlie Geometry." Or, as in the case of the famous 1859 paper, "On The Propagation of Plane Air Waves of Finite Magnitude," the driving of a process to its apparent discrete-manifold limit, defines a singularity which transforms the terms of statement of the continuing action relative to the discrete manifold. Both Riemann references are essentially equivalent, and are classic illustrations of truly non-linear processes.

This may be restated. The emergence of higher physical states, generates behavior which is not comprehensible, determined in terms of a discrete-manifold representation of the preceding state. This does not imply "indeterminacy" in the familiar sense of Bohr-Heisenberg, but only that higher states of discrete manifold are not comprehensible in terms of the lower ones. This seeming paradox is removed, by recognizing that an ordered succession of higher-order phase-spaces is itself a continuous function, but one "transfinite" with respect to each and all of the discrete manifolds associated with the successive phase-spaces.

In consequence of this fact of ordered states, we must shift causality from the discrete manifold to the higher domain which continuously subsumes the successive lower, discrete-manifold states. This shift in the elementary location of efficient causality demands a corresponding shift in the location of ontological reality, away from the discrete (Cartesian or quasi-Cartesian) manifold, to the continuous, transfinite manifold. This admits of empirical demonstration, just as the Riemann Surface has empirical demonstrations.

There is nothing mystical in the notion of "vitalism" attributed to Gurwitsch. If the matter is stated in the proper terms of Riemannian physics, the definiteness of its causal and ontological efficiency is located in the well-defined transfinite domain.

A most attractive feature of Gurwitsch's reported work deals with the nature of the kind of "memory" which guides an embryo to produce the proper form of its species. This is not a discrete memory, simply genetic-mechanical, but rather some developmental impulse within the living process which follows a least-action pathway in respect to its relationship to its own previous development and its setting. This, again, is precisely what we find in physical economy.

Conventions of language oblige us to use either such terms as "potential" and "equilibrium," or to resort so such qualifying neo-logisms as "meta-potential" and "meta-equilibrium." The phenomena are more or less readily demonstrable, and their demonstration obliges us to find new, more precise terms to distinguish these phenomena. Perhaps, if we but define the proper, Keplerian-geometric meaning of the phenomenon of "negentropy," and construct our functions and experiments to reflect such Gauss-Riemann definitions of negentropy as the proper definition of a universal principle of least action, the formal representation of these conceptions were better accomplished.