A REPORT FROM THE 'BASEMENT TEAM'

# Human Creative Reason As a Fundamental Principle In Physics

*by Sky Shields*

*Bring back the concept of cognition as an independent organizing principle in the universe!*

*Bernhard Riemann at work, as depicted by Basement team member Peter Martinson, in the LYM video "The Matter of Mind" (larouchepac.com/news/2008/12/15/lpactv-matter-mind.html), which elaborates the ideas in this article.*

**EDITOR'S NOTE**

Lyndon H. LaRouche, Jr. commented in depth on this report in two articles published in the Oct. 17, 2008 issue of *Executive Intelligence Review,* which also featured Sky Shields's article. The LaRouche articles are "How the Human Mind Works (The Sight and Sound of Science" (www.larouchepub.com/eiw/public/2008/2008_40-49/2008-42 /pdf/15-19_4135.pdf), and "Why the Economists Failed: Economy & Creativity" (www.larouchepub.com/eiw/public/2008/2008_40-49/2008- 42/pdf/04-12_4135.pdf).

LaRouche wrote that "the emergence of the role of actual creativity within the work of the LaRouche Youth Movement, especially the 'basement operations,' is of the greatest significance for treating the crisis which menaces all of mankind at the present moment." The "basement" refers to the location in Northern Virginia of the LaRouche Youth Movement team examining Kepler and his scientific followers.

A 45-minute videotaped interview with Shields can be viewed at www.larouchepac.com/news/2008/12/11/lpac-tv-sky- sheildss-report-basement.html.

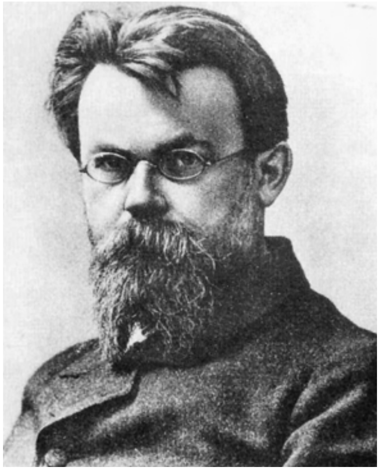
In the course of recent work preparing a translation of a piece by V.I. Vernadsky on the historical evolution of the concept of physical space-time (i.e., the concept that space and time as such do not actually exist, except as shadows of the physical processes which seem to occur within them), we encountered an interesting reference which may help in shedding further light on the ontological significance of the concept of *potential*, as investigated successively by Gauss, Dirichlet, Weber, and Riemann. Most significantly, it indicates avenues along which we may continue the same conceptual approach which Riemann took to this subject in his so-called philosophical fragments. The reference, taken from a 1931 written speech by Vernadsky entitled "The Problem of Time in Contemporary Science," runs as follows:

> Christian von Ehrenfels in Prague, a psychologist who is currently living, has pointed out, on the basis of study of the psychological life of the individual, a lawful, spatial manifestation in this domain, of phenomena which have long stood outside of scientific work. He has shown the necessity of recognizing certain geometric gestalts,

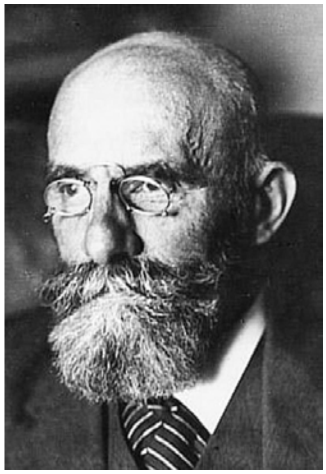
> or structures for visual space, for melodic tones and other similar types of phenomena connected with structure of the spatially and temporally identifiable cognitive apparatus. These notions of psychological gestalts were extended to phenomena of zoopsychology and physics by Berlin professor Wolfgang Köhler. They led to a new scientific expression of physical space and to an entirely new current in philosophy, studying the laws of cognition—to "Gestalt Psychology."

This reference by Vernadsky was curious for a number of reasons. First, because the thesis of the essay up until this point had been a demonstration that the concept of the unity of physical-space-time was not unique to Einstein's general relativity. This notion, he says, had existed already with the ancient Greeks, and it was only with Descartes, and then Newton, that the fallacy of absolute space and absolute time as independent, self-evident entities had been introduced. In Vernadsky's view, it was the work of physical experimentalists—in particular in this speech, he cites the experimental work of Pasteur and Faraday—which first began to force the necessity, in the modern period, of breaking from this Newtonian conception of empty space. He cites both Kepler and Leonardo da Vinci as conceptual predecessors to this break, because of their work on symmetry and the Golden Section, but oddly enough neglects to mention Riemann in this connection. Instead, he cites the mathematician William Clifford (who was responsible for the first English translation of Riemann's *Habilitationsschrift*), and it is in this context that he makes the mention above, regarding Ehrenfels, Köhler, and gestalt psychology. The idea that gestalt psychology represented a revival of the concept of a unified physical space-time was new to me, because of how little I knew about the subject. The fact that Vernadsky was following Köhler's work as a contemporary also struck me as interesting, so I decided to follow up on Vernadsky's reference.

I was happy to discover that, as Vernadsky implies in his quotes, Köhler's work on animal psychology was, for him, a secondary project which only resulted from the fact that Köhler was stuck on a research island full of apes for seven years because of the outbreak of World War I, and therefore had only apes as experimental subjects for those years. His original, and subsequent, work was on examining the human thought process, and in particular Classical artistic composition (he was noted for his dislike of Wagner). It was from this research that he derived his concept of the gestalt—the fact that the human mind operates solely on the basis of whole ideas, which are not composed of parts. The *organization* of the parts is itself a self-subsisting principle, independent of those parts. This represented a revival in modern form of Leibniz's monad, as applied to human cognition, and consequently it also represented a revival (whether Köhler himself was aware of this or not) of Riemann's Herbartian (i.e., Herbart's Leibnizian) concept of the "thought-object" (*Geistesmasse*), as presented in the philosophical fragments.



*V.I. Vernadsky (1863-1945)*



*Christian von Ehrenfels (1859-1932)*

*Wolfgang Köhler (1887-1967)*

*In a 1931 speech, Vernadsky commented on the importance of psychologist Ehrenfels's recognition of geometric and psychological gestalts and their elaboration in psychology by Wolfgang Köhler. Vernadsky's remarks piqued author Shields's pursuit of the background involved, including Köhler's correspondence with his teacher, physicist Max Planck, whose work is discussed in this issue in an article by Caroline Hartman.*

This alone would have been interesting enough, but the next item to deepen my curiosity considerably, was a reference by Köhler, in a 1959 speech titled "Gestalt Psychology Today," to discussions which he had engaged in with Max Planck. This reference occurred in the context of his discussing the tendency of physicists to mistreat their mathematical formulae:

> When reading the formulae of the physicist, one may emphasize this or that aspect of their content. The particular aspect of the formulae in which the gestalt psychologists became interested had, for decades, been given little attention. No mistake had ever been

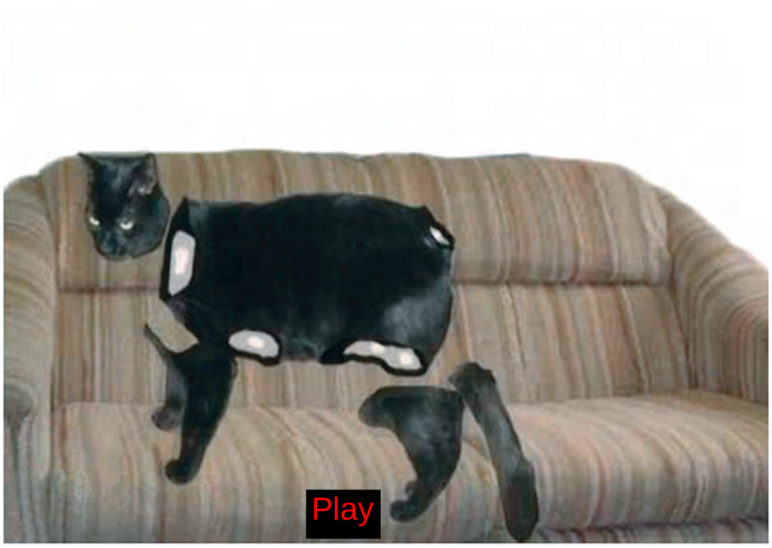
made in applications of the formulae, because what now fascinated us had all the time been present in their mathematical form. Hence, all calculations in physics had come out right. But it does make a difference whether you make explicit what a formula implies or merely use it as a reliable tool. We had, therefore, good reasons for being surprised by what we found; and we naturally felt elated when the new reading of the formulae told us that organization is as obvious in some parts of physics as it is in psychology.

Incidentally, others were no less interested in this "new reading" than we were. These other people were eminent physicists. Max Planck once told me that he expected our approach to clarify a difficult issue which had just arisen in quantum physics if not the concept of the quantum itself.

Again, this opened up a number of interesting avenues to pursue. Only four pieces of correspondence exist between Köhler and Planck, because most of their discussions occurred in person, while Köhler was Planck's student in Berlin, so it has been difficult to locate material containing the exact content of their discussions on this topic. But despite that, given the work that the LaRouche Youth Movement has already done on Kepler's *Harmony of the World*, it will not be hard for us to guess what the gist of those discussions must have been, as I'll discuss below.

First, however, more on the significance of Köhler's work to what we are now investigating in Riemann's works. In a footnote in Köhler's 1939 book, *Dynamics in Psychology*, in the context of discussing which fields of physics he thought would be most fruitful for investigations in gestalt psychology, he writes:

> Apart from physical chemistry and electrochemistry, the most important discipline which will have to be included in the list is *potential theory*, the theory of macroscopic self-distributions. Unfortunately this field shares the neglect in which many parts of Classical physics have fallen since atomic physics came into the foreground.




*The human mind operates solely on the basis of whole ideas, gestalts, which are not composed of parts, and the organization of those parts is itself a self-subsisting principle, independent of those parts. Our cat illustrates this point.*

*Bernhard Riemann (1826-1866).*

*Johann Friedrich Herbart (1776-1841).*

Library of Congress

*Gottfried Wilhelm Leibniz (1646-1716).*

*Riemann's concept of the "thought object" (*Geistesmasse *in his philosophical fragments, revived Herbart's view, which itself had revived Leibniz's conception of the monad, applied to human cognition.*

This reference was certainly a surprise, considering that I had not expected this side project to intersect with the work in which we are currently engaged in the Basement: investigating Riemann's work on potential theory in order to gain a better grasp of his application of Dirichlet's Principle to Riemann surfaces and the higher transcendentals, elliptical and Abelian functions. Suddenly, an aspect of the political significance of Riemann, Dirichlet, Gauss, and Weber's treatment of potential became clear. To explain this, some history of the concept is in order.

**The Concept of 'Potential'**

The mathematical expression which is popularly referred to as the potential function (though this name was only given to it later, by Gauss), and the differential expression now called the Laplacian, arose during Lagrange and Laplace's attempts to untangle the mathematical mess they created while attempting to apply Newton's inverse square law to the real universe—the three body problem in planetary perturbations. The ontological significance of potential, however, was denied by both Lagrange and Laplace in their attempts to cover up for the inverse square law, and was treated instead as an artifice—a useful tool for resolving a difficult problem of analysis. That this mathematical expression is, however, only the mathematical shadow of a principle, was a fact recognized by Gauss, Weber, Dirichlet, and Riemann. The actual ontological significance of potential goes back to (and is really identical with) Leibniz's concept of dynamics.

The fact that all processes in the universe must be conceived of as governed by universal principles which exist only as wholes, which have no component parts, is expressed in their physical manifestation by:

(1) the fact that universal physical principles, although themselves not existing at any specific point in space or in time, exist as though outside of but tangent to every point and every moment in a physical process, no matter how small a division of that process is taken (the ontological infinitesimal of Leibniz),[1] as well as

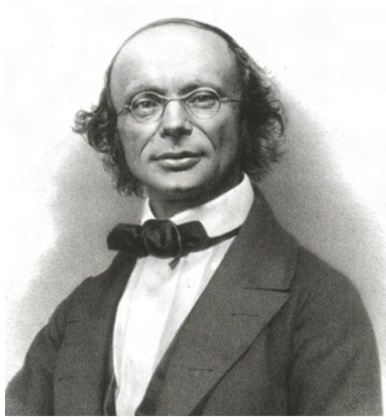
(2) the fact that the future state of any process is what governs its present (i.e., that intention exists as a governing principle in the universe).

These two facts combine to provide us with a notion of the ontological significance of potential, understood in the sense of Leibnizian dynamics. This concept of potential is exactly what Isaac Newton was created in order to attack—hence the notion, inserted into the famous scholium of his *Principia*, that "I don't frame hypotheses," really, as is clear from both that scholium, and Roger Cotes's introduction to that book, "the act of hypothesis is impossible, because in the universe only facts, not reasons are knowable."[2]

It is significant that Vernadsky makes exactly this point about Newton in

*Johann Peter Gustav Lejeune Dirichlet (1805-1859).*

*Carl Friedrich Gauss (1777-1855).*



*Wilhelm Weber (1804-1891).*

*Dirichlet, Riemann, Gauss, and Weber all pursued the idea that universal physical principles govern the processes of the universe, and that the future state of any process governs its present. This Leibnizian concept of potential is the opposite of the Newtonian empirical view.*

1. This is despite the reductionist's insistence, which is not validated by experiment, that an atom, say of carbon, within a living organism, is essentially the same in its internal characteristics as an atom of carbon outside of a living organism. I.e., that there exists no independent principle of life which cannot be reduced to non-living—abiotic—phenomena.

2. Cotes writes in this introduction, in response to Leibniz's observation that the idea of the "force" of gravity is an occult quality, and that the reasons for universal gravitation and the organization of the Solar System must be knowable:

"He who is presumptuous enough to think that he can find the true principles of physics and the laws of natural things by the force alone of his own mind, and the internal light of his reason, must either suppose that the world exists by necessity, and by the same necessity follows the laws proposed; or if the order of Nature was established by the will of God, that himself, a miserable reptile, can tell what was fittest to be done. All sound and true philosophy is founded on the appearance of things; . . . These men may call them miracles or occult qualities, but names maliciously given ought not to be a disadvantage to the things themselves, unless these men will say at last that all philosophy ought to be founded in atheism."

*Lagrange and Laplace denied the significance of potential and instead created a mathematical formula to be used in calculations.*

*Joseph Louis Lagrange (1736-1813).*

Posthumous portrait by Madame Feytaud, 1842

*Pierre-Simon Laplace (1749-1827).*

The approach taken by Gauss, Dirichlet, Weber, and Riemann therefore represented a counter-reaction to this attempted reduction of all physical phenomena to attraction and repulsion between hard balls.

We ourselves, in this current Basement team, initially became interested in Riemann's work on potential because of his treatment of the subject in his philosophical fragments. There, he himself draws an analogy between the processes of thought and the phenomena of gravitation, electricity, and magnetism—the three phenomena which may be mathematically represented by forces acting with an intensity of effect which is inversely proportional to the square of distance. In the context just laid out, this approach of Riemann, along with the fragments taken as a whole, takes on a significance to which Lyndon LaRouche has been repeatedly pointing in recent days—that the concept of potential understood ontologically is not a mathematical principle, although it has significant mathematical corollaries when applied to physical processes. It is, rather, necessary to study all three phase spaces of the physical universe, first and foremost the cog-

the speech with which we began this paper, including the point that Newton's views as popularly distributed were a product synthesized by both Cotes and Samuel Clarke in that edition of the *Principia*. Vernadsky states:

> It [the concept of the force of gravity] was introduced into scientific thought in 1713, in the foreword to the second edition of *Philosophiae Naturalis Principia,* a foreword written by Cambridge professor Roger Cotes, editor of this second edition, as one of the notions which could be logically connected with the mathematical results of Newton.
>
> Newton highly esteemed Cotes, who was soon to die young, but he, at least officially, never read his foreword.
>
> I can not here enter into an explanation of the reasons for this relationship of Newton to the appearance of an idea, which he always contradicted, in the foreword to his work. The idea, however, of universal gravitation, having placed its mark on all scientific thought of the following two centuries, was accepted as a consequence of the achievements of Newton—as a Newtonian idea.[3]

From a portrait by John Vanderbank, 1725

*Isaac "I don't make hypotheses" Newton (1642-1727)*

---

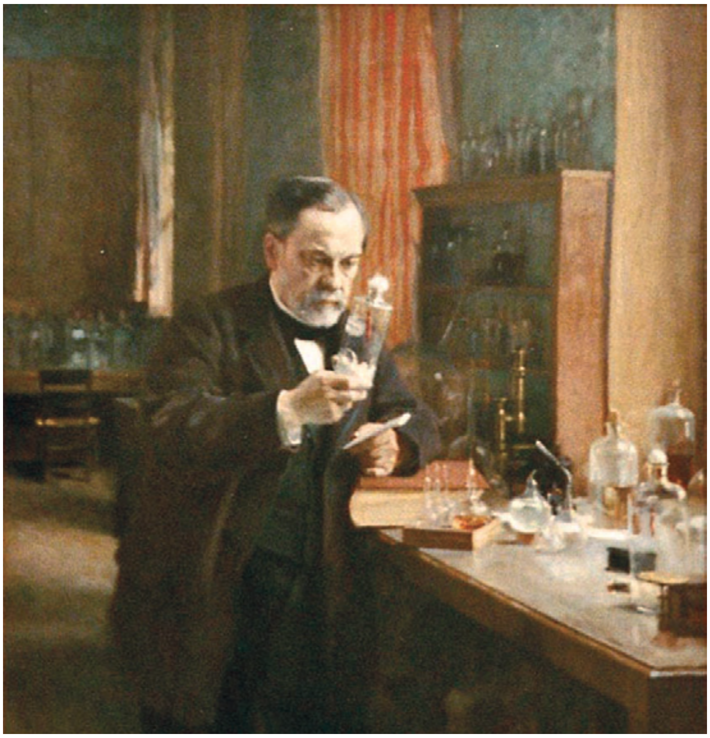
3. This same denial of the human capability for discovering truth, the source of the idea of absolute space and absolute time existing as *a priori* concepts, is what underlay Newton's fabrication of the occult idea of "force." As reported by Newton's successor in his mathematics chair at Cambridge, William Whiston:

"It will not be unfit also, with regard to myself, nor unuseful with regard to the Publick, if I take notice here, that during the time of my Acquaintance with Him [Newton], He did always own the impossibility of solving Gravity mechanically, because it was ever proportional to the *Solidity* of Bodies, and equally effectual in the very middle of solid Bodies, as on their superficial Parts: whereas all mechanical Powers act only on their *Surfaces*: and he seemed to me always firmly persuaded, that this *Gravity* was deriv'd from the immaterial Presence and Power of the Deity, as it pervaded all the solid Parts of Body, and operated on them all. . . .

"I well remember also, that when I early asked him, Why he did not at first draw such Consequences from his Principles, as Dr. *Bentley* soon did in his excellent Sermons at Mr. *Boyle's Lectures*; and as I soon did in my *New Theory*; and more largely afterward in my *Astronomical Principles of Religion*; and as that Great Mathematician Mr. Cotes did in his excellent *Preface* to the later Editions of Sir *I.N.'s Principia*: I mean for the advantage of Natural Religion, and the Interposition of the Divine Power and Providence in the Constitution of the World."

nitive and the biotic, as independent principles of which the abiotic phenomena of electricity, magnetism, and gravitation are simply sub-processes. It is cognition which governs the world of phenomena, and cognition is best studied by a direct investigation of the human creative process in both science, and in Classical artistic communication of profound ideas.

It is significant to note that this was exactly the approach of Riemann in his so-called philosophical fragments. An examination of the original manuscripts of these fragments reveals that their classification into the separate categories given in Heinrich Weber's edition of *Riemann's Collected Works* was accomplished only by the removal (perhaps accidental, perhaps intentional) of certain key paragraphs which demonstrate that Riemann's investigation of thought objects (*Geistesmassen*), his study of potential, and his critique of Newton were all part of the same thought process.



From a painting by A. Edelfeldt, 1885

*Louis Pasteur (1822-1895). Pasteur's experimental work forced a break with Newton's idea of empty space.*

A version of the fragments containing these missing paragraphs will be released soon. In the meanwhile, a study of the intellectual and social environment in which Riemann was immersed (detailed reports are forthcoming) ought to provide us a clearer picture of Riemann's influences in the area of human psychology and human creativity in general. These influences, as Riemann states in his philosophical fragments, gave rise to the method with which he approached these subjects of physical science, human creativity, and the higher transcendentals. His description of the phenomena of gravity, electricity, and magnetism, taken from those fragments goes as follows:

> Thought is a process within ponderable matter. Our external experience, the facts of our external perception, which must find their explanation in the processes within ponderable or gravitating matter, are
>
> 1. universal gravitation
> 2. the universal laws of motion.
>
> Something lasting underlies each act of thought, something which, however, is manifested only under the specific occasion of memory as such, without exerting any enduring influence upon phenomena. Therefore with each act of thought, something lasting enters our soul, something which exerts no enduring influence upon phenomena.
>
> On the other hand, our external experiences about ponderable matter can be explained if it is assumed that a homogenous substance fills the whole of infinite space, and constantly flows into ponderable matter and vanishes.[4]

We are already familiar with this method—of taking the principles of human creativity as primary—from our study of Kepler's *Harmonies*. The study of harmonics as presented there, and as expressed in the organization of the Solar System, exists only if the uniquely human concept of beauty is treated as a self-evident, experimentally validated fact, independent of the abiotic


*Kepler understood that the concept of harmony guided the organization of the Solar System as a whole.*

4. www.wlym.com

*Leonardo da Vinci (1452-1519), in a self portrait.*

*Johannes Kepler (1571-1630), in a 1630 portrait.*

*Both Leonardo and Kepler understood the principle of human creativity as primary. Unlike Newton and his slavish empiricist followers, they also understood that space was not empty.*

phenomena which mediate its expression at any given time. As Kepler demonstrates, the concept of harmony as it is expressed in the Solar System—although it agrees with expressions in geometry and elsewhere—is neither derivable from them nor reducible to them. This concept of harmonics, not capable of investigation outside of an investigation of the creative human individual, is what is then applied, directly, as the principle which guides the organization of the Solar System as a whole.

From this, it is clear that the concept of potential, as a unified process governing the apparent forces of universal gravitation, was already recognized as a principle cognate with that of human creativity at its inception, with the scientific work of Johannes Kepler. This methodological approach to potential was continued in the work of Leibniz on dynamics, and in the work of Gauss, Dirichlet, Weber, and Riemann on attempting to undo the damage done to science by Newton's religious dogma.

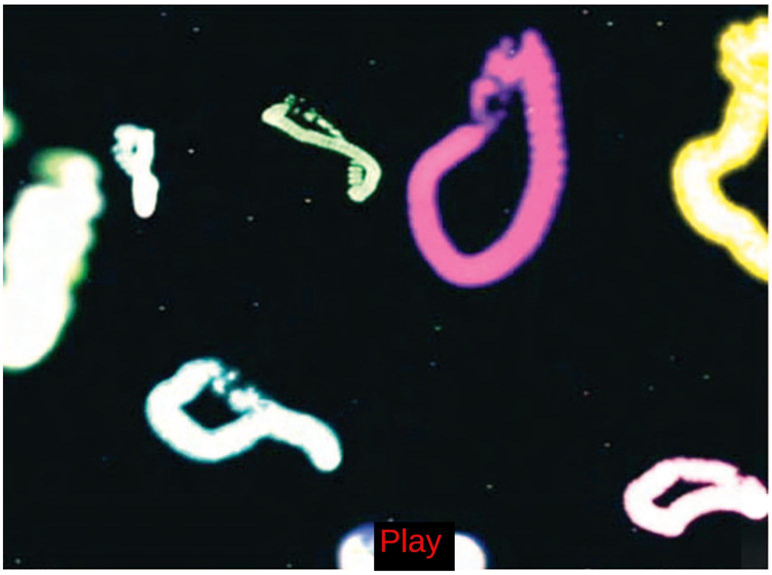
*Author Sky Shields in a video grab from an interview in which he discusses the ideas in this article. The 45-minute interview can be viewed at www.larouchepac.com/news/2008/12/11/lpactv-sky-sheildss- report-basement.html.*

In that context, I can feel comfortable including a rather lengthy citation from Köhler, which, despite certain shortcomings in other respects, does give some insight into the political fight around scientific method in which he and Planck were engaged during the first half of the 20th Century, as well as into possible avenues of investigation for us to take up today, respecting the ontological significance of Dirichlet's principle and the concept of potential. Taken from his *The Place of Value in a World of Facts*, it reads:

> Experimental physics is not particularly interested in the study of such continuous macroscopic states. As the conditions under which self-distribution may be varied freely, an infinite number of macroscopic states is possible in each class: the hydrodynamic, the electric, and so on. The investigation of a number of individual cases would add little to our knowledge of basic physical facts. Besides, what could the experimentalist do? In order to know the distribution of a steady current inside a given volume he would have to measure the rate and direction of flow at as many points as possible—a thoroughly tedious occupation. At the same time this task would be awkward enough, since, at least in many cases, the very attempt to measure local flow will lead to interference with the distribution itself: The approach and the insertion of a measuring device would generally mean the introduction of new conditions to which the macroscopic state can respond only by a change of distribution. Satisfied that no essentially new facts are to be discovered in this field, the physicist will moreover give little time to macroscopic states in his teaching. This is why one can learn a good deal about practical physics without ever hearing much about this section of science. As a matter of fact, the investigation of self-distribution in continuous media has become a task for mathematicians rather than for physicists. The general rule which macroscopic states must fulfill is easily formulated in mathematical terms. A single differential equation, named after Laplace,


NASA

*Human creativity (above) vs. statistical gobbledeygook: "Our task as a movement must be to revive actual human creativity as a matter of practice, and to make this revival the basis upon which we, as a culture, find our way out of the mess into which we've gotten ourselves over these recent decades."*




will apply to most cases. Unfortunately, however, this equation does not express much more than that in a steady state the forces and the flow at each point should not alter this steady state. Just what distributions would, as a whole, correspond with this condition in a given case is the question which the mathematician tries to answer. No direct and simple mathematical procedure is available for this purpose. During the 19th Century the invention of solutions for even comparatively simple cases occupied some of the best mathematical minds. The Dirichlet problem and the Neumann problem, formulations of this mathematical task for two slightly different sets of conditions, are noted for their tremendous difficulty. . . .

This is not a branch of physics with which other men of science, philosophers and the public will become familiar through popular books. If they did, the belief would not be so general that physics is under all circumstances an "analytical" science in which the properties of more complex extended facts are deduced from the properties of independent local elements. The thesis that analysis, at least in this sense, does not apply to macroscopic dynamic states is borne out by the predicament of mathematicians who must find the steady distribution as a whole if they are to tell us what the steady flow is in a part of the system.

Our task now is clearly to further this conceptual approach to science and art. The concept of the human mind—cognition—as an efficient, independent organizing principle in the universe has been lost, in many cases intentionally eliminated, and that loss has brought humanity to a series of conceptual dead-ends. Science struggles between mindless statistical models and an equally mindless determinism; artistic expression has been reduced to the simplest expression of debased emotional states; and the organization of human society has merged both of these disasters to create the greatest abomination of them all: an economic system which blends the mindless mathematics of statistics with the irrational rule of utterly undeveloped human emotions—free trade.

All of this is now collapsing, and we have reached the point where human society can progress no further while maintaining the presently popular forms of belief in science and culture. Our task as a movement must be to revive actual human creativity as a matter of practice, and to make this revival the basis upon which we, as a culture, find our way out of the mess into which we've gotten ourselves over these recent decades. Economics must again become the science of human progress, on the basis of human creativity.

---

*Sky Shields is a leader of the LaRouche Youth Movement in Los Angeles, currently working on the "basement" team.*