Lyndon LaRouche to La Sapienza University: 'What Is Creativity?'

During a visit to Rome, Italy June 18-19, Lyndon LaRouche addressed a seminar at the Physics Department of La Sapienza University, organized by Prof. Bruno Brandimarte; the lecture was attended by between 20 and 25 professors and students. (See the July 4, 2008 issue of EIR *for an overview of Lyndon and Helga LaRouche's activities in Rome.) Here are LaRouche's opening remarks to the seminar. Subheads have been added.*

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Lyndon LaRouche addressed the Physics Department of Rome's La Sapienza University, on the principle of creativity, which underlies the greatest Classical art, poetry, and science.

Professor Brandimarte: [via interpreter] I have the pleasure of introducing Lyndon LaRouche, whom I've known for 25 years. I'm very happy to be able to have him at this very historic university in Rome.

Lyndon LaRouche: Well, some years ago, back about 1970, I found a significant interest among young people in universities at that time. You won't find the same thing today in the United States, because there's been a significant degeneration in the quality of education and life among young people in the United States, since 1970.

Today, as a result of that, we have a significant movement, it's a political movement; it's of young people generally between the ages of 19 or 20 to 35 years of age, young adults actually at that point. And the problem we face, for these younger people, is that the universities in the United States are decaying, in terms of their content of education. You will find the subjects which you see on the university curriculum did not exist ten years ago, and those that did exist ten years ago, have disappeared. And since the young people associated with me are people who are likely to become leaders of some kind in society, it was my concern that we develop a capability for their education, largely by themselves.

Our program largely is involved with Classical music with emphasis on the singing voice on the one side, and on the other side, the history of physical science from Pythagoras, the Pythagoreans, to the present time. In the more recent period, we had educational programs, discussions, the usual kind of thing, on the Pythagoreans, Plato, and so forth, in physical science. But then, a few years ago, we took a serious program of attack, on redoing the experience of Kepler in the discovery of gravitation and related things.

And, as here in Italy, as also in the United States, despite the fact that we have people who have come from many countries and cultures around the world, predominantly, the culture of the United States is European. And European culture, as a culture, essentially came into being about the 7th Century B.C. when the culture of Egypt allied itself with the Etruscans and the Ionians, against Tyre. So you have this culture which was actually the original culture in Italy, the dominant one was Etruscan. The Italian language was also another culture then; actually, Italian is older than that, as Dante Alighieri emphasized. So these language-cultures which are interacting around a maritime culture, the Mediterranean maritime culture, created a very specific culture, with a specific history, which we can call European civilization, European culture.

'Irony' and the Concept of 'In-Betweenness'

As I'm sure some of you know, that when you're dealing, especially, with creative work, you re-access powers of the mind, which pertain to ideas and concepts from a long time ago in history. For example, you have a famous writing about 1820 by the great English Classical poet, Shelley. This was not a poem, this was a writing on "In Defence of Poetry." And he addressed the most crucial aspect of Classical poetry, which is what we call "irony." And the irony, of course, in the language of poetry or in Classical musical composition and performance, is actually this concept, this concept of in-betweenness. For example, in the case of Classical music, you will find that the Lydian modality, which was developed actually by the Ionians, the Ionian sector, is a crucial part of Classical musical composition, as for example, illustrated very simply by the *Ave Verum Corpus* of Mozart, which is one of the most perfect examples of the Lydian modality in composition.

When you wish to communicate an idea which is a creative act of communication, you are forced to do something which the ordinary use of the language does not allow you to do. And what you will often do, in the case of a poet, a Classical poet, is, you will draw up something from the past, in terms of usages or terms, or concepts, or words, or special use of words, which startle the attention of the mind, and enable you to convey a question: "What do they really mean by this?" And it's the function of irony in composition in Classical art, in poetry, which expresses the creative mood, the creative state of mind.

But the easiest way to present this in a way which forces an understanding, is in mathematical physics. Actually, there is no real dichotomy between Classical art and Classical poetry, Classical drama, and good physics. It's just that the connection is rarely understood. So my approach is to promote and encourage the development of mastery of Classical music, particularly from the standpoint of singing, and at the same time, have these science programs which go to fundamentals, and assume that people will eventually come around to understanding that what we do in physical science has a correlation in things like great Classical musical composition. I can report that we tend to find some success in that. Not as much as I would like, but the progress is good, even if it's not as much as you would like. I presume some of you who teach know that problem. You try to get across much more than the students actually get, but you're satisfied that they get halfway. And you just keep pushing them, and encouraging them and hope that something happens—the fruit drops from the tree.

But the big question is, and it's a difficult question in a sense, is, what is creativity? You can get a sense of creativity, from creative activity around you. You can sense real creativity in Classical poetry, or certain pieces of Classical poetry. Once you know how to listen to music, and hear a good performance, you can find, where the creativity is—and that can be shown. Then they say, "Yes, I agree with you, that is unquestionably creativity. But what is it?"

The 'Fire' of Promtheus

Now the problem is, essentially, that we live in a society, in which, as the great Aeschylus pointed out with his *Prometheus* trilogy, the policy of society is to keep most people in society stupid, which is what the Olympian Zeus threatens Prometheus with: "Don't know what fire is! Don't tell people what fire is!" Well, fire is actually not just fire; it's knowledge of creative powers, as in scientific creative powers, the discovery of a scientific principle as an actual discovery, not a description.

I'll give you an example for a typical mathematical physics class: You've got a professor who goes to the blackboard, and somebody asks, "What's a principle?" and he writes out a mathematical formula. And then, he looks around and expects the students to say "Amen!" But he didn't present the actual physical principle! Would you accept footprints, for your dog? When someone says, "Bring me my dog," do you want them to bring you a set of footprints? You want the dog! Well, a mathematical formula is a footprint, it's not the dog! So, the point is, how do we get the dog to come to life, not just the footprints. And it's easier to do that in physical science, because of the formalities of physical science, more than anything else.

Now, the first expression of the solution for this problem in modern history, was posed by Nicholas of Cusa in connection with his *De Docta Ignorantia*. And, as you probably know, directly, or indirectly from experience, you had a famous attempt at the quadrature of the circle and the parabola by Archimedes. And Cusa rightly said, this is wrong. It's not true. You can never generate a true circular path by quadrature. That point was first proved as a physical experiment, by Johannes Kepler, in his *New Astronomy*.

Kepler was the most thorough and honest of all modern scientists. If you read his works, and then look at how the works were crafted: He writes in his new edition of his work—in rewriting his work—he writes the same paragraph that he'd written before; then he adds another paragraph: "Well, what I said here was so forth, but here's what was wrong with it." And then he does it again, at later point! So, he never tries to cover his tracks on his process of thinking. And that's the most beautiful thing about Kepler's writing.

Now, Kepler was influenced by his predecessor, Cusa, whom he followed, and was very emphatic about the fact that he's a follower of Nicholas of Cusa. And Cusa insisted that Archimedes was wrong: You can not generate the track and construct the track of the circle or parabola by quadrature.

The Kepler Revolution

Now, it's very interesting as to how Kepler confirmed that. And that there are crucial aspects of his two most famous works, that is the actual theoretical works, as such, in the *New Astronomy* and then, on the question of the *Harmony*. What Kepler did, in the work reported in the *New Astronomy*, is actually prodigious: This is one of the most exhaustive pieces of work on science you can imagine. Everything he had to work with was generally a mess. There is really no creativity in Copernicus. There never was a Copernican revolution in science. It was an interesting innovation, but it addressed *no physical principle*. They gave you the footprints of a dog, but it was not the dog, and it was the wrong dog.

So what he did, essentially, by exploring exhaustively—and his work *is* exhaustive, with many successive approximations and corrections of his own errors, so that you can track what his mind is doing, in every part of this process of development—and that's what you want in any course in education; if you are teaching or a student, you want to go through the experience of discovery, *not learn how to repeat* what passes for the discovery. Not find the formula, but *make it your own*!

If you take a team of people who have some previous scientific skills, and can work through these things, with knowing enough mathematics and physics to get through them, and work through the *New Astronomy* into Kepler's, first of all, discovery of the nature of the Earth's orbit. Now, he discovered in the process, as he reports, there are certain aspects about what he has constructed, that trouble him. And he was working with very difficult material, for his time, with the equipment available. But he was tenacious. What he did, is he made more and more measurement with greater and greater precision. And then, he realized what the determination of the Earth's orbit is, with the respect to the Sun and with respect to Mars.

The result sounds very simple: Equal angles, equal areas. Now, what does that mean? Say let's construct an elliptical orbit, which conforms to this principle, equal areas, equal times. Construct, measure, calculate. What are the intervals—take any two points on the pathway, the elliptical pathway, what is the interval? In other words, try to do it by quadrature: You can never do it! Huh? Now, this was the demonstration of the existence of a physical principle, which is not mechanical: Because there never is an interval small enough, to be measured with the equivalence of being a mechanical construction. Because no matter how small the interval is, it's always changing. It's changing in direction, it's changing in physical magnitude, magnitude of action; the rate of action is changing.

Now therefore, the interval exists ontologically, but it's always so small, that it never has a simple Euclidean content. In other words, that is a physical experimental demonstration of Cusa's rejection of Archimedes' quadrature of the circle. Because even a circular action, even though the intervals can be defined, as not changing in rate of development of the interval, yet the action is always infinitesimal.

So this discovery of this character of the orbit proved, first of all, that you had something which lies outside representation by Euclidean or similar geometry, outside any concept of physics based on consistency with Euclidean geometry. And Kepler is very, very savage on the subject of both Aristotle and on the subject of Claudius Ptolemy on this issue. And he's also critical of Tycho Brahe and Copernicus on just exactly that issue.

As Einstein said later, Kepler was the first modern scientist, and he said, also, that the universe is Riemannian in its characteristics. And in these two respects, no one ever got further in astronomy than the principles of Kepler. Many things were discovered in astronomy, but this foundation provided by Kepler, was original from the standpoint of Einstein's evaluation of its implications.

Now, then, you come to the second point, which comes up in another volume of the work of Kepler: It's the question of what is the principle of gravitation which determines the relative ordering of the planetary orbits? Now, in this case, something much more interesting happened, than even in the question of the discovery of the orbit, Earth's orbit. And this is one of the great, fun things about good science. It sends the pedants screaming into something-or-other.

Because, in the case of the quantification of the relations of the planetary orbits, including Kepler's specification of a missing planet which had been there, but had disintegrated, in an orbit between Jupiter and Mars—later discovered to be the Asteroid Belt, which had gone a bit crazy in the process of breaking up, and is still throwing stones at us on Earth over that incident. So, how'd he make this discovery? He's explicit on it: exactly how he made the discovery!

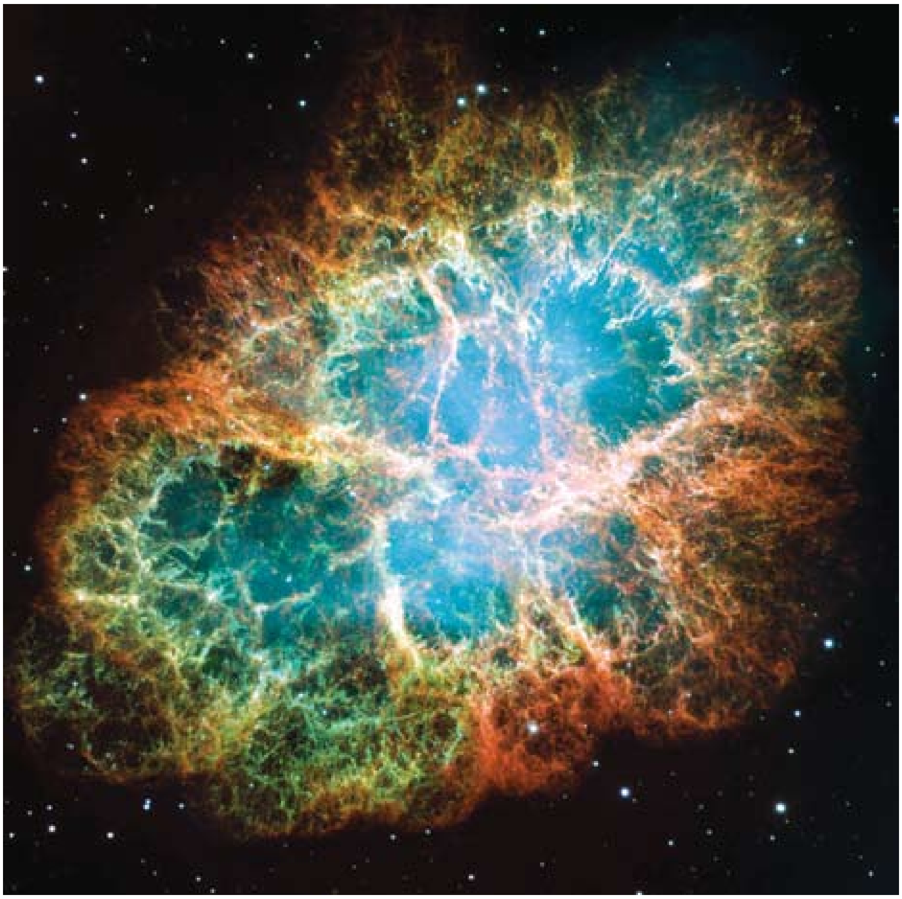
See the normal, quasi-Euclidean approach to looking at astronomy is done through the telescope—until modern physics. It's done through the telescope, and what are you using? The function of vision! So you either take the function of actually seeing as through the telescope, or you use the mental image of the act of seeing, as the way in which you map your phenomena, map your data. But it doesn't work! When you come to trying to determine the location, the orbital positions, and the rate of change of the orbital position for the planets within the Solar System, that doesn't work! Ahhh! Music does!

Sense-Certainty Is Nonsense

Now, music is something which Max Planck, if he were alive today, would insist on saying, is actually the same thing as Planck's approach to the quantum. What's that? That's the function of hearing, isn't it?

So now, you have the function of vision and the function of hearing. And Kepler solved the problem from the standpoint of the function of hearing. You can find, on this particular part, you can find the things that I've said so far, are heavily documented on the LYM [LaRouche Youth Movement's website [http://www.wlym.com/~animations/], on the experimental website, which you've got a copy of the address here. We worked through this, the team worked through this, and they worked through it for about a year. And they worked through the entire work of Kepler in this procedure, and they documented, and they constructed the graphs—all the work is done there. So if you want to know Kepler, you can go to that, and you will get a primary education in the work of Kepler there.

What follows from that? What comes out of this, is the fact that sense-certainty is nonsense. What you think you see, what you think you hear, is what? What's the comparison for the faculty of sight and the faculty of hearing? Not just the physical effect as such: What is the mental process which is associated with vision and hearing? Obviously, they're different. One, you think is linear. The other is by no means linear.



NASA

"We have to understand what creativity is, by understanding something about the mind," LaRouche said. "You have to abandon the idea of confidence in sense-certainty. . . ." Shown: a mosaic image of the Crab, taken by NASA's Hubble Space Telescrop.

Now, if you want to have some fun, you skip ahead to Max Planck, and take the difference between Max Planck's definition of quantum of action, and the fake version which was cooked up first by the followers of Ernst Mach—that was in the World War I period, and then later, by the followers of Bertrand Russell, in the 1920s, at the Solvay Conferences. And then you go back to Max Planck's own work—two completely different things! No relationship between the two! The Machians and the Russellites are frauds. And this was something that was emphasized by Albert Einstein.

But! The same thing arises there. That when you try to impose an idea of statistical mathematics, based on the concept of vision, on the phenomena Planck is dealing with, you end up *wrong*. How large is the nucleus of an atom? How can you *see* inside the nucleus of an atom? How do you observe many things in the universe, on the macro scale, including on the universe scale, the galactic scale, or the subatomic scale? What do you use? You use *instruments*! Do the instruments tell you, show you, what's there? If they don't show what's there, are they useless?

Now, you have the case of vision and hearing, as two senses; and remember that seeing is a function of the brain, not just the act of exposure to a stimulus. Hearing is also a function of the brain, not something just external. It's not self-evident. Now, when you construct a laboratory experiment, you use what? Instruments. What do you use? You use a battery of instruments. You use the contradiction between two kinds of instrumentation, or among three kinds of instrumentation.

The Case of the Crab Nebula

Take the case of the Crab Nebula, a real fun thing! Now, the Crab Nebula has been known for a long time. It was known in China, at the time the great explosion occurred, or when the Chinese observed it at their point. A scientist, who was a friend of ours in Germany, a leading nuclear physicist, reported to us on some work being done in his vicinity, up there in northern Germany. And they had built up a phased-array device to do, actually cosmic-ray studies and things like that. And then, we confirmed that this was radiation coming from the Crab Nebula explosion! This section of the Earth gets a shower of cosmic ray radiation coming into the atmosphere from there, on a regular schedule—bang, bang, bang, bang! Train arriving!

Now, this was a large phased-array scheme that they had in northern Germany. There was smaller phased-array arrangements which they had in England. And the two coincided on the basis of the basic information about this cosmic ray radiation from the Crab Nebula. This cosmic ray radiation, by the way, determines much of the climate of the Earth. Because the cosmic ray radiation interferes with the Solar radiation, and is a partial regulator of Solar radiations.

Now, then, you look at the studies of the Crab Nebula image. They're completely wildly different! You take different instrumentation, they're completely different pictures, on different frequencies. You can get a half-dozen of these things, each different!

So, it simply points out, that we have to understand what creativity is, by understanding something about the mind: You have to abandon the idea of confidence in sense-certainty, to realize that, just as for Kepler, the comparison of a visual image of the orbits or visual form image, and a sonic or harmonic form of the image, two different things, which are different forms of instrumentation, which determine what the reality is, of the action which we're observing with our instrumentation, either vision or hearing, or things which take the place of vision or hearing.

Then, you think you come to a point in this way, in following this track, where you get to a definition of creativity. It's not a complete definition of creativity, but it's a good instrumentation, a multi-phased instrumentation of the phenomenon you're looking at. And Einstein pointed to this, in his commentary on the implications of Kepler, and the implications of Riemannian physics, physical geometry, for reading Kepler's significance. And essentially, obviously, from that, not only is Kepler competent, not only is his discovery competent, against the opposition, but that he defines a universe which is finite. Einstein says, "and not bounded." Now, I would change that, meaning the same thing; I believe that Einstein meant that the universe is finite, but *self*-bounded.

Now, this is already implicit, in the discoveries of gravitation and orbital patterns by Kepler, which Einstein insists upon, and says that Kepler's conception of physical science, and physical astronomy in particular, is the only valid one. Even though it may not be adequately developed for a modern standpoint, in principle, it is the valid one. Why? Essentially, because you take a principle like gravitation, as Kepler described it even in his *New Astronomy*: there is no instrument which is so fine, which could ever see, directly, and isolate the phenomenon of gravitation.

And the problem is not fineness, the problem is bigness. When you observe something, which is never changing, how do you sense it? You may sense the effect, but you don't sense the cause of the effect. What Einstein is insisting upon, which is not original to him, but it's an original insistence by him: *That universal physical principles can not be sense-experienced, in the sense of being isolated to particular phenomena.* You can only demonstrate them, by the same kind of methods that were used by Kepler to define gravitation. You could define the effect, the effect is demonstrated by the orbit itself. Which means that you're seeing the universe, which is *bounded* by a principle, which is reflected as the phenomenon of gravitation as an orbital gravitation relationship.

So, the universe, in a sense, is finite, *because there's nothing outside universal physical principles in it.* And for various reasons of argument, there's nothing outside it. So you're talking about a universe which is *self*-bounded, in terms of things that we can demonstrate to be universal physical principles.

The Human Mind, Itself

Now, at that point, I shift gears: Instead of looking at the effect of what the human mind can do, in terms of creative investigation, now let's look at the human mind itself, from the standpoint of its function *in* making creative discoveries. And you're looking at the fire of Aeschylus' *Prometheus Bound*. Because any principle of investigation involves the same thing. And what we can show, and have shown, in the program we've done both on the Kepler and on the Gauss, and related subjects, is to, in a sense, look at the mind, the human mind, which is successfully solving the challenge presented by Kepler, or by certain things by Gauss. The subject of science is not what man can see: The subject of science is what man can do, because of what the mind of man can do.

Now you can go back to music, you go back to Classical art of various forms. You can go to the question of great poetry, great drama. And you realize that, for example: If you're familiar with a musical composition, and particularly, a particular performance of that composition, as, say, a recorded performance; for example, if you get a good recording of a musical performance of the work, by the same performer, as I did in an incident in a military camp in India, at the close of the war, when I was coming back from service in Burma. And some friends of mine there were looking for some music—we'd had no music in the jungle, except that provided by a few wild animals, and drunken soldiers—amazing that people can find something to drink under those kinds of circumstances!

There we are—some of these are professional musicians who had been military service, or were still in military service, we're in a Red Cross base in a replacement depot camp outside of Calcutta: How can we have some music? Not this noise—music! So we went, and we raided the stock in the Red Cross center, and got the appropriate instrument to perform the recording. We were pleased and so forth. And then we got a Tchaikovsky recording there, conducted by Wilhelm Furtwängler! I was transfixed! I had never heard such a good performance of conducting by anybody! Tchaikovsky is not my favorite composer. Often he attracts more pity than admiration. He has a certain skill and so forth, but Furtwängler transformed this Tchaikovsky symphony into something remarkable.

So what did I do? I heard it, again, and again, and again! And then, when I got back to the United States, I began hearing everything from Furtwängler, again, and again, and again! Because, in order for me to try to find out, what is it about this man's conducting, which is so different? And gradually I found out. He had a creative aspect to his mind, which is lacking in virtually all other conductors. Obviously, this creativity already existed in Tchaikovsky, but more remotely reflected. And then you would find, in all great Classical compositions, all great artworks, the same thing.

You look at, again and again, at Rembrandt's painting of, shall we say "The Bust of Homer Contemplating Aristotle." Because, the eyes of the bust of Homer, are looking with contempt at Aristotle, who's staring off in the distance. Aristotle is almost like the image of Frau Merkel, the Chancellor of Germany. She's looking off in the distance, while Germany burns. And you have the bust of Homer, and this is intentional! Rembrandt is notorious for what he does with eyes! And in this, you see an expression of his creativity and how it works, especially in the eyes, many of the eyes of the people in the figures of his paintings.

Just like the question of Kepler's discovery of the principle of gravitation, there's something so small that it can not be seen, the same thing as the principle of the Leibniz calculus, the same thing as the principle of the Riemannian physics. *This*: It's in the very small, which reflects the very large. And you know, you have this fellow, Andras Schiff, a pianist, a very capable fellow—quite fashionable today, but he's quite capable—he's done a Beethoven series, I haven't heard the whole thing completely; I've heard sections of the whole thing. I met him a couple of times, and I know something about him. And I know what he's doing. It's a rigorous—also he has tremendous physical skills, precision, a highly trained person, very learned. But he uses that power of performance, to express things in a creative way. I know what he does: He does Bach all the time—his basic routine for his practice is Bach: Creativity. And it's always located in the very small things that most people overlook. It's always like something out of the corner of your eye.

And what you have to do, is what our young people are doing: Is you have to go through, as we're doing in this program, from the Pythagoreans, through Plato, through Cusa, through Kepler, through Leibniz and so forth. And by doing that, reliving that, you learn to look out of the corner of your eye at what creativity is, and when you're trying to educate people, you do the same thing: You try to look out of the corner of your eye, from this kind of experience and concentration, and you recognize what the difference is between man and an animal, man and a beast. And you try to reach that in your audience, or your class—or yourself!