An open dialogue in the world of new ideas

On ne doit pas écrire que pour faire connaître la verité (Nicolas de Malebranche).

(One must not write, except for making known the truth).

Introduction: preliminary thoughts and a new message

This is an experiment in the laboratory of the development and growth of new ideas. Two scientists, in search of new ideas and better interpretations, a generation apart, and independent of each other, equipped with different tools of analysis, came to final results which, in important aspects, are touching each other at a tangent for sure but perhaps deeper as this dialogue may prove.

One is using strict logical reasoning but in the context of a new version, in fact a *sui generis* synthesis between classical and modern logic, called integrated logic. The other is laboring mostly with tools of modern, symbolic, formal, mathematical logic.

This exchange of views is not a battle between two thinkers of different points of view and the expectation that in the end one will win a trophy of success with the recognition in the profession. If, however, on this common undertaking an insoluble argument may develop, then the two sides and the two solutions will be identified clearly and simply and the final word will be left to the reader and the judgment of history in the world of ideas.

Our utmost desire is to cooperate and invite other partners to join our undertaking with the ultimate goal being to push one step further into the kingdom of the unknown for the methodological unification of all sciences (both natural and socio-economic) and, if possible, to include also the arts. The whole world, humanity, is at a crossroads! Blind forces of history (globalization) and vested interests in business, finance and certain intellectual circles – regardless of whether by intention or not – are pushing hard toward a great transformation in the wrong direction: a (global) centrally-planned and controlled economy, and society and public opinion are not informed properly.

The voice of true and independent science has become, under the existing conditions in the world, a historical necessity. The voice of science, unfortunately, is divided, both in the natural and in the socio-economic field. To a certain extent politics has invaded the sanctuary of science. Max Weber warned us about this danger as far back as 1904 (see Weber, 1904). But even the good Weber did not offer the proper cure to extricate science from militant politics. His law of complete "neutrality of a scientist", or "value free science", did not work in practice but an amended neutrality can work (see Rugina, 1984).

At the time when Max Weber wrote his principle of neutrality of a scientist which requires: "There is no place in science for values and value judgments", practically there was no way to distinguish – in the name of science – between positive (equilibrium, right) and negative (disequilibrium, wrong) values and value-

judgments. Thus, Weber had a case, but it was not in an absolute form. However, the Weberian principle being amended correctly by the distinction between positive (equilibrium, true, right) and negative (disequilibrium, false, wrong) values and value-judgments, remains valid in science, beyond any shred of doubt.

The master logician Ludwig Wittgenstein, a little bit later, in his correspondence with Bertrand Russell (November 1913), wrote in regard to bipolarity (misprinted in a previous letter):

> What I mean to say is that we only then understand a proposition if we know what would be the case both if it was false and if it was true (Wittgenstein, 1997, p. 33).

Even though Wittgenstein too did not solve the problem of values and value-judgments in science, nevertheless, the evidence from the above quotation speaks clearly that he saw the direction where the solution was residing.

It took 71 years until in 1984 this author, through the application of a new research program, respectively, the simultaneous equilibrium versus disequilibrium approach in logic and all other sciences, fulfilled the dream of Wittgenstein. This was realized by uniting true and false functions in developing an orientation table for logic. In continuation we extended the dream of Wittgenstein in uniting positive (equilibrium, right) and negative (disequilibrium, wrong) aspects, values and value judgments and constructed a similar orientation table for any other science.

With the application of the new research program we came to astonishing, one might say revolutionary, results: modern and classical logic, in a new version of "integrated logic", do not appear contradictory but complementary. By the same flight of thought, modern science, usually concerned with the study of disequilibrium aspects of empirical reality, and the classical science, concentrated on the study of ideal, purely analytical equilibrium conditions of the same reality, by definition are not and cannot be contradictory but rather to the full extent complementary.

With these results, we are convinced – *jusqu'à la preuve contraire*, as the French say – that the great argument of the twentieth-century modern science against classical science is solved adequately for good and forever. In the same fashion we hope that the other most important issue raised by Max Weber, that is, of the neutrality of a scientist, is also solved adequately in the sense that a man of science not only has the ability to distinguish the difference between what is true and what is false (through his professional training), but also carries the moral responsibility toward the society in which he lives, and not less to humanity, to tell the scientific truth and only the truth, irrespective of any militant politics, with the obligation to present a logical and when possible an empirical proof in support of positive, equilibrium, true and right values and value-judgment, i.e. respecting the amended Weberian principle in science. Then he or she is fulfilling his or her extra duty as a scientist and citizen of a civilized world.

For the rest, we want during this open dialogue to follow and respect the wise advice by the French philosopher de Malebranche[1]:

> One must not write except for making known the truth.

A new research program based on a simultaneous equilibrium versus disequilibrium approach – integrated science

The first seeds for the inclination to be aware of the importance of methodology in science came from my beloved teachers and mentors at the Academy of Economic Studies (Academia de Studii Economice) of Bucharest, Romania: Victor Slavescu, Nicolae Iorga, Virgil Madgearu, Ion Raducanu si Cesar Partheniu.

The first grown spiritual plants appeared from auditing the seminar of Professor Ernst Wagemann at the Institut für Konjunktur Forschung at the University of Berlin and subsequently from attending lectures and seminars of my illustrious teacher, counselor and friend in the world of new ideas, Professor Walter Eucken, at the University of Freiburg i. Br. where, due in particular to my friendship with Eucken, I was blessed – as the Nobel Laureate Ragnar Frisch would say if he were alive – to discover and work with a new economic light, respectively the new research program which I applied in a long manuscript: *Geldtypen und Geldordnüngen. Fundamente fur eine Echte Allgemeine Geld- und Wirtschaftstheorie* (1949), pp. 352 + xvi. The concept of the orientation table, under a less developed form, was used in this book as a "schema of a systematic arrangement of organically linked "*Ordnungen*", a term dear to Eucken (pp. 328-9).

Eucken promised an introduction to the book but, when the manuscript was at the printers, he received an invitation to deliver a lecture at the London School of Economics. Upon his return I expected to receive the introduction, since the galley of the front page was ready. Unfortunately, my beloved spiritual mentor Eucken never came back alive from London. The Good Lord called him early at the age of only 59 years old and Germany lost, without any exaggeration, the greatest living economist at the time.

Professor Dr Oswald v. Nell-Breuning from Frankfurt a.M., who was one of a few people who read the manuscript and a friend of Eucken, after the sad news arrived from London, agreed to write an introduction in a rush so that the publication of the book was not delayed. When I remember back in 1949 the commotion and the dilemma I was in, under the pressure put by the printers, I do not have enough choice words to express my gratitude to Professor v. Nell-Breuning, who for me at that moment represented the spirit of the humanity for those who are in need.

The appearance of the book *Geldtypen und Geldordnungen*, was good; because of its existence I received an invitation to teach at an American institution – the University of Portland in Oregon – where I arrived in May 1950, and I started to teach in the fall of the same year. I left the University of Portland after two years – the limit of my contract signed from Europe – because I was homesick for Romania, where my parents were still living under a harsh Communist regime, and in addition I felt that I could not continue my research about the new economic light I acquired working with Eucken.

In June 1952, from the cold water of the Pacific Ocean and the beautiful City of Roses – Portland, Oregon – I returned to the warmer water of the Atlantic ocean. It was a good move with unexpected opportunities to continue my research.

On the road to the East with the help of a blue Ford which carried also my personal library I made a stop in Chicago where a pretty well established Romanian-American community existed. Here I attended my first meeting of the American Economic Association (AEA), and I had the good luck to meet in 1953 Professor Friedrich A. Hayek, later Nobel Laureate and a good friend of Walter Eucken. He was also in transition from the University of Vienna to the London School of Economics and now invited to the University of Chicago. He did not seem to be too happy in the American environment and from him I learned the advice and lesson of "how not to be!", i.e. how to preserve independence in thinking and judgment in science. I was not surprised when after a few years he was called and accepted to take the Chair of Walter Eucken at the University of Freiburg i. Br. where he received the Nobel Prize.

Owing to a generous recommendation by a Romanian scientist also in exile – Dr Sabin Manuila – I received a scholarship for one year from the Mid-European Study Center in New York City in order to prepare a study of the Romanian economic and financial system before the war. Thus I moved from Chicago to Washington DC where for one full year I did nothing but research at the Library of Congress, Federal Reserve, US Treasury Department and the International Monetary Fund. As a former member of the Central Bank of Romania – Banca Nationala a Romaniei – any time I entered the Federal Reserve Building I thought of those wise members of the BNR who in the midst of a war sent me for post-doctoral studies at the University of Berlin and Freiburg i. Br.

In 1954 I received a position to teach economics and finance at Niagara University, right there at the gorgeous Niagara Falls, a beautiful spot to teach, to meditate and to live. It was here where, after the rewarding experience in Washington DC, I was proud in 1955 to become an American citizen. And also here in 1958 I was happy to make a partner for life, Aurelia Irene Rugina, a good co-worker and critic. It was on American soil, after I met Hayek in Chicago, after the valuable experience in Washington DC and after I settled in Niagara Falls with the privilege of being able to attend professional meetings at Cornell University and New York City, including the weekly use of the Lockwood Memorial Library in Buffalo, NY, I began to feel that my spiritual plants from Freiburg i. Br. now were growing to become trees, producing new knowledge.

An event of great importance for the further development of the new research program was the participation at the First Congress of the International Economic Association held in Rome, Italy, for five days in September 1956. I took the podium three times to call to the attention of the profession that something was not in order in the house of economics. As a matter of methodology, there was a contradiction or a paradox between what the prevailing theory was affirming and what the practice or the implicated realities of everyday life was saying loudly and visibly for those who wanted to listen and see. This was valid for both the Western and the Eastern world. The contradiction between theory and practice actually was the reason why so many social and economic problems were not solved properly and fully. The major papers presented at this congress and the interventions raised, including ours, were subsequently published (see Hague, 1958, pp. 35-6, 143-4, 250-2).

What I have said related more to "instability" and visibly it was "against the stream" – as Nobel Laureate Gunnar Myrdal would have said but he was not present. The first paper was presented by Sir Dennis Robertson and carried the title: "Stability and progress: the richer countries' problem". Sir Dennis was at that time a sort of dean of the world economic profession and many eyebrows were raised when I attempted to say that there was and must be a methodological loop-hole in the science of economics when such a paradox between theory and practice is evident. Sir Dennis looked intensively but did not say anything. After the meeting some colleagues from the USA and Germany came to me and expressed regrets about what I said because Sir Dennis was like a demi-god in the world of economics.

In the afternoon of the same day, there was a visit planned for a delegation to visit Pope Pius XII at Castel Gandolfo. I asked Professor Gottfried Haberler of Harvard University, who was the first president of the Association and who knew that I was a former student of Eucken, if I could join the delegation and he answered that it was free. Outside there was a line waiting to take the bus for Castel Gandolfo. When entering the bus, I noticed Sir Dennis ahead of me and did not know how to avoid him. He sat down and there was a seat free. I wanted to go to the next row but he invited me to sit along with him, which I thought was unusual after what I had done just one hour before. He asked me the country of my origin and with whom I studied economics. I told him that the first doctorate I prepared was with Victor Slavescu in Bucharest, Romania and the second with Walter Eucken. He knew nothing about Slavescu but he knew who Walter Eucken was.

After all this he said: "I listened to what you said this morning; after all it is the duty of any scientist to listen to what the critics have to say and reflect. Then, he is free to follow or not to follow." We arrived at Castel Gandolfo and the conversation stopped. Not too long after arrival in the USA I received a card from Sir Dennis with greetings from the UK.

How wrong were those who expressed regrets that I criticized the assumed demi-god of economics. The attitude of Sir Dennis gave me the courage to do the same thing with Professor François Perroux and his paper, "The quest for stability: the real factors" on the third day and with Professor Erik Lundberg with his paper, "International stability and the national economy", during the fifth day.

Sir Dennis Robertson taught me another important lesson: we are all born and live under the same universal law of human imperfection and therefore subject to error or misinterpretation. We have to listen to whatever criticism we may be faced with and reflect more on the subject-matter to see whether it deserves attention, correction or more clarification.

After returning to the USA from the great rewarding congress in Rome, I decided to concentrate for a while on the relationship between the social sciences, including economics and the natural sciences, in particular physics, logic, ethics and philosophy.

I re-examined the contribution of Lord Keynes, Alfred Marshall, Leon Walras, Vilfredo Pareto, Knut Wicksell, John Stuart Mill, David Ricardo, Thomas

Malthus, J.B. Say, Adam Smith, François Quesnay and some of contemporary Nobel Laureates: Paul Samuelson, Kenneth Arrow, James Tobin, Lawrence Klein, Herbert Simon, Ragnar Frisch, Friedrich A. Hayek, Gunnar Myrdal, Jan Tinbergen, Milton Friedman, Wassily Leontief, Sir John R. Hicks, Robert Solow, Franco Modigliani and Robert Lucas plus Joseph Schumpeter; and from physical sciences: Sir Isaac Newton, Antoine Lavoisier, Charles Darwin, Dmitri Mendeleyev, James Clerk Maxwell, Max Planck, Albert Einstein, Niels Bohr, Werner Heisenberg, Enrico Fermi, Sigmund Freud, Karl Marx; and in philosophy, Aristotle, Immanuel Kant, René Descartes, Benedictus Spinoza, John Locke, John Stuart Mill, George E. Moore, Karl Popper, Bertrand Russell and Ludwig Wittgenstein, Thomas Kuhn and Henri Guitton among others.

Working on all these original thinkers, my major concern was to find a line of thought which in terms of methodology would unite them all, including all others contributors, known or unknown to this author, but otherwise preserving their identity. First, I thought to examine the *History of Economic Analysis* by Joseph A. Schumpeter (1954) which is fairly well comprehensive for the social-economic and philosophical field, combined with *The Structure of Scientific Revolutions*, by Thomas S. Kuhn (1962) but it did not work. It was like looking into a rich and dense forest where you could not see any road or discern any limits.

Then I turned my thinking back to the University of Freiburg i. Br. when working with Walter Eucken. It was there that I felt the discovery of a new economic light, by the application of a bipolar technique. But only the application to money and banking was my own product. Otherwise the technique actually was inherited from Eucken, who applied it only in general economics. Here he analyzed practically any problem in a bipolar fashion simultaneously for the case of free markets (*freie Verkehrswirtschaft*) versus a centrally-planned and controlled economy (*Zentralgeleitete Planwirtschaft*). All I did in my German book was to extend his bipolar technique to the field of money and banking and construct what I thought was "a true general theory in economics", as used in the title of the book: "*eine echte allgemeine Geld- und Wirtschaftstheorie*", in a way, in contrast – at least, methodologically speaking – to Keynes's *magnum opus*, *The General Theory of Employment, Interest and Money*, by now (in 1957) three decades old and expanding fast into a global intellectual movement that Nobel Laureate Paul Samuelson, with his introductory text in economics (Samuelson, 1973) made popular, as did his student Lawrence Klein, who later also received a Nobel Prize with his book on *The Keynesian Revolution* (Klein, 1947).

This "contrast" with Keynes, and no doubt also with Marx, was and still is interpreted as a negation of the Keynesian and Marxian doctrine, which is absolutely not true and a great injustice for which I paid dearly in a country supposedly having "free markets of goods" and "free markets of ideas", but in reality it is not so, at least not from the personal experience of this author. I could not publish important articles in the major journals in the profession and thus I was forced to appeal to European publications, and even there I was

faced with similar resistance in the name of the same misinterpretation as if my results were negating Keynes and Marx and, I repeat, this was and still is absolutely not true. In the name of justice I should mention that there were a few places where my contributions were welcome, as in: *Revue d'Economie Politique* in France as long as René Courtain and Henri Guitton were Chief Editors; *Rivista Internazionale di Scienze Economiche* when Tullio Bagiotti and Aldo Montesano were editors; *Economia Internazionale* with its editor Orlando d'Alauro; in the UK, the *International Journal of Social Economics* with its editor Professor John C. O'Brien and the Director of the International Institute of Social Economics Professor Barrie O. Pettman, and in Greece the journal *Spoudai* with its editor Stylianos Sarantides and my colleague and old friend Professor Lazaros Houmanidis.

The truth, the whole truth, is that from both John Maynard Keynes and Karl Marx, I learned a lot and I respect them for their performance: Marx for raising the problem of social justice for the masses, which were in his time and still are cheated not only under capitalism but also under socialism (see Rugina, 1988); Lord Keynes for raising the otherwise obscure problem in the literature, namely of "involuntary unemployment", to the rank of a first rate issue in economics.

This does not mean that we should blindly accept anything that Keynes or Marx and for that matter any other economist has said, or says today or will say tomorrow, as being indisputably true for all times. This would mean to forbid *ab initio* any progress in science, and that is what my critics wanted and tried to do! Professor *Henri Guitton*, the only economist-philosopher and historian who was President of both L'Institut de France (Academy of Sciences) and, Academie des Sciences Morales et Politiques, in his book: *Le Sens de la Durée* (1985), devoted a whole chapter on the subject, "There will be always scientific revolutions" (pp. 191-201). In fact Guitton characterizes any progress in science by the simple question: "Can we not think differently about a particular issue?" How right he was!

The answer to our critics can be expressed also in just one sentence. With the help of the new concept of "integrated logic" our original contribution lies in saying what Keynes, Marx and other great predecessors did not say so explicitly or not enough, but now, under the present-day conditions of global disequilibrium, it must be said if we want to work out appropriate and efficient solutions to the problems of our time, both in analysis and practice.

1. The universal hypothesis of duality

The universal hypothesis of duality says:

> The physical universe where we are living and human societies including economies are composed of stable (equilibrium) and unstable (disequilibrium) elements, forces, values, institutions, behavior, arranged in various proportions, depending upon the time-space framework.

This is a self-evident truth which can be recognized by our direct and indirect senses, in other words, by both pure and practical reason in the Kantian sense. We call this Axiom 1. Without this axiom we cannot fully explain why both in

Nature and human societies, we may find at times situations of relative harmony, whereas at other times we may be faced with significant irregularities, disequilibrium conditions, crises.

This is one and the first principal pillar on which the new research program is constructed. How are we so sure that this concept of duality can and will stand the scrutiny in the foreseeable future of scientific inquiry when probably the majority of men of science alive share strongly the monistic philosophy, including even Einstein when he was young, but not later in life?

A. The universal hypothesis of duality in physics. Here are the reasons why we believe also strongly in the dualistic philosophy as being as true as the Archimedes principle, that is, containing more truth than in the old monistic philosophy. First of all, we did not invent the universal hypothesis of duality as such. We only formulated it as a principle after we looked carefully at the physical, social, spiritual, intellectual, moral, religious and even artistic world, that is, reality actual and potential, and we found it to be really dualistic, a self-evident truth and therefore an axiom, outside of any possible paradox.

That is not all. To our surprise we found the real father was nobody but that great British genius Sir Isaac Newton, who in the preface to the first edition of his *Principia* wrote:

> . . . For I am induced by many reasons to suspect that they (the phenomena of Nature) may all depend upon certain forces by which the particles of bodies, by some causes hitherto unknown, are either mutually impelled towards one another, and cohere in regular figures, or are repelled and recede from one another. These forces being unknown, philosophers have hitherto attempted the search of Nature in vain; but I hope the principles here laid down will afford some light either to this or some truer method of philosophy (*Principia*, 1962, Vol. 1, p. xviii).

What are the particles which are "mutually impelled towards one another, and cohere in regular figures" but the 92 stable (equilibrium) elements classified in the Mendeleyev table? And what are the particles which "are repelled and recede from one another" but the transuranic, radioactive elements?

In short, the physical universe in which we live is composed of:

(1) stable matter or equilibrium particles connected with the 92 elements included in the Mendeleyev table governed by the law of stable equilibrium or the law of gravity in the Newtonian sense; and

(2) unstable matter or disequilibrium particles connected with electro-magnetic fields governed by the law of unstable equilibrium or stable disequilibrium known as quantum mechanics and quantum electro-dynamics.

During Newton's time there was no technical instrument to detect the phenomenon of radioactivity or electromagnetic fields characterized by the law of dispersion, in contrast to Newtonian gravitational fields characterized by the law of attraction.

In a way, Newton was forced by the scientific environment of his time to leave out the unknown (at that time) transuranic elements and concentrate on stable, equilibrium elements, so his contribution remains true forever, if we

relate it only to stable matter. But even if Newton had known the dual nature of the physical universe, the now developed "integrated logic" would have forced him to separate stable from unstable matter if he wanted, as he did, to construct a logically and empirically consistent Universal Law. And the term "universal", has to be interpreted correctly as relating only to "stable matter", that is, the 92 elements from the Mendeleyev table.

In this matter, it was the observation of another genius – Albert Einstein – who later in life proclaimed that gravitational and electromagnetic fields, in his own words, were "two logically" and – we may add also empirically – "unconnected parts." And unconnected parts they are according to our universal hypothesis of duality (Einstein, 1950, p. 102).

There is a great lesson here for contemporary physicists who are feverishly working to develop a final Grand General Theory to explain the nature and the functioning of the physical universe where we are living, without separating the gravitational from the electromagnetic fields (see Weinberg, 1992).

In conclusion, our physical universe is composed actually of two different worlds:

(1) one stable and visible by our senses in a state of stable equilibrium which is sustaining the whole mixed entity; and

(2) the other part unstable, disequilibrium and invisible matter, not of immediate danger because through the Act of Creation, from the beginning, it is in a state of unstable equilibrium or, perhaps better said, stable disequilibrium, that is, an organic static position, which from time to time is disturbed partially and then we have an open disequilibrium, a temporary physical crisis like earthquake or hurricanes.

Our good luck is that such disturbances are temporary. This suggests that the proportion of stable versus unstable matter in our physical universe must be very high, probably around 90 percent or even higher. If that is the case, then the Newtonian model was and still is realistic. Indeed, astronomers and geologists assure us that the sun has preserved its present size for the last 500 million years; that the shapes of the continents have remained unchanged and only the circumference of the earth has shrunk by about 5 percent over the same period of 500 million years, as the UK astronomer Fred Hoyle reports (see Hoyle, 1950, pp. 30-31).

The universal hypothesis of duality brings for discussion a new vision of the physical world, more optimistic than the one created by almost exclusive research on the nature of unstable matter (radioactive elements and electromagnetic fields) in quantum mechanics and neglecting almost totally the study of stable matter.

Unfortunately, so far no physicist, to our knowledge, has been able or has attempted seriously to gently cut through an atom of stable matter (in the Newtonian sense) without damaging its real structure and functioning. Of course, with the enormous progress in technology (but not in pure science!), nowadays, with the help of powerful cyclotrons, stable matter can be

bombarded by another unstable element at an artificially accelerated speed and in this way be disintegrated. But in that case the real structure and functioning of stable matter are damaged beyond recognition. In fact, it is converted into unstable matter.

By following the disequilibrium procedure of today in using only unstable elements in current experiments, we shall never be able to know the real structure and functioning of stable matter which forms the core (90 percent or more) of our physical universe. An eminent scientist from the Institute of Advanced Studies – Freeman Dyson – describes very well the situation we are in but not the problem raised here:

> . . . In the 1920s and 1930s it seemed that the landscape of physics was almost fully mapped. The world of physics looked simple . . . Now we know better. After we began seriously to explore the valleys in the 1950s, we found in them flora and fauna as strange and unexpected as anything to be seen in the valleys of the Amazon.
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> Instead of three species of elementary particles which were known in the 1920s, we now have 61. Instead of three states of matter, solid, liquid and gas, we have six more. Instead of a few succinct equations to summarize the universe of physics, we have a luxuriant growth of mathematical structures, as diverse as the phenomena that they attempt to describe. So we have come back to the rain forest, intellectually as well as geographically (Dyson, 1988, p. 7).

The good Professor Dyson, whose power of expression is formidable, is not disturbed by the fact that the number of particles has increased from three to 61 and that the number of equations to describe the simple essence of a particle, mathematically expressed, becomes more and more complicated. In Newton there were only two types: stable and unstable. Now there are 61 sub-atomic families and increasing, and all unstable, in the Newtonian sense. No surprise that Einstein, later in life, was not satisfied with the results of quantum mechanics.

What conclusion does Professor Dyson draw from this strange situation? Here are his words:

> What philosophical lessons arise from the recent discoveries in physics? The main lesson to be learned is that nature is complicated. There is no such thing as a simple material universe . . .
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> When we examine matter in the finest detail in the experiments of particle physics, we see it behaving as an active agent rather than as an inert substance. Its actions are in the strict sense unpredictable. It makes what appear to be arbitrary choices between alternative possibilities. Between matter as we observe it in the laboratory and mind as we observe it in our consciousness, there seems to be only a difference in degree but not in kind . . .
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> We stand, in a manner of speaking, midway between the unpredictability of matter and the unpredictability of God (Dyson, 1988, pp. 7-8).

We are now in a territory of complete indeterminism. How to explain this practically hopeless situation in modern science? If we introduce the universal hypothesis of duality, then the explanation is simple and well founded.

The end product of complete indeterminism is due to the fact of using in laboratory experiments all over the world only unstable (disequilibrium) radioactive elements, which have a very weak natural parameter and, therefore, are exposed to decay, i.e. to being automatically converted from one state of disequilibrium (unstable equilibrium included) into another state of the same nature, exactly as it happens during a chain reaction.

The well-known British physicist-philosopher Paul Dirac jokingly predicted that the more experiments on this issue, the larger the number of discovered sub-atomic particles, until the experimenters suspect that the number of sub-atomic families may grow so much as to clearly indicate infinity. By that moment the physicists would be so upset with the negative results of their work that finally they might lose their minds, and that would be the end of research to find the ultimate structure of matter. Using the terminology of my colleague Smarandache, this is a paradox with real meaning for the present and future generation of physicists.

A few years back, I had the opportunity – at least so I thought – to have an open dialogue with a recognized historian of science by the name of Thomas S. Kuhn, who published a book very well received by the scientific community, *The Structure of Scientific Revolutions*, International Encyclopedia of Unified Science, University of Chicago Press (1962), 1970. I approached him after a conference held at Harvard University and all went well until I asked him specifically: do you still believe, as you wrote in your book, "Einstein's theory can be accepted only with the recognition that Newton's was wrong"? (p. 98). He asked me what I was teaching and I answered economics. Then he said: "Forget it!" and left with the excuse that he had another appointment. He is no longer alive and I do not want to appear as if I were avenging a grievance. In fact I tried to approach other physicists on the same question and I received about the same answer as that given by the master historian Kuhn.

We decided to include this personal experience here in order to touch on two points. First, the subject of the relationship between natural and socio-economic sciences is in dire need of more communication. The economics profession is greatly indebted to natural physical scientists. Newton, as we shall see immediately, influenced the good sense of the term, classical economics. Albert Einstein and Werner Heisenberg among others have influenced Lord Keynes and the Keynesian revolution. In order to be heard by the community of natural scientists, economists need deeper, more frequent communication with them, but at this time this door seems to be closed (see Rugina, 1989).

The second point is the query: why was such a drawn-out detour necessary with natural sciences when the subject proper was socioeconomic sciences? It was, and still is, our position that the new research program can be applied in both natural and social sciences. In other words, we are looking for a common foundation for both – which is integrated science. And the entire project stands or falls on the universal hypothesis of duality.

As to the development of economics in particular as a science, the evidence is clear that the concept of the universal hypothesis of duality was known from the beginning with the contribution of Adam Smith and François Quesnay.

B. The universal hypothesis of duality in economics. The influence of Newton, with his concept of equilibrium versus disequilibrium approach, and the existence of natural laws, is evident in classical economics. The mathematical proof used in Newton came just a century later in the contribution of Leon Walras, who formulated first the law of general equilibrium, albeit not in a finished form but nevertheless true as far as it was covered (Walras, 1954).

When François Quesnay, the first father of economics, and his disciples identified the distinction between "*le droit naturel*" (natural law) and "*le droit positif*" (positive law), they did nothing but conceive the simultaneous equilibrium versus disequilibrium approach, even though actually they did not follow rigorously a complete analysis (Quesnay, 1758; 1894).

After visiting and exchanging views with Quesnay and his disciples, Adam Smith published in 1776 his book, *An Inquiry into the Nature and Causes of the Wealth of Nations*, where he meticulously and systematically devoted the whole of, Chapter 5 to a correct, although not complete, analysis of the real and nominal (money) price of commodities, which was simply the application of a simultaneous equilibrium versus disequilibrium approach, a novelty for his time.

When Thomas R. Malthus observed the existence of "general gluts" and became involved in an argument with the French economist J.B. Say, who defended the opposite view that "supply creates its own demand", this was singularly the issue of simultaneous equilibrium (Say) versus disequilibrium (Malthus) conditions (see Say, 1820).

When Karl Marx, in the first four chapters of his *Das Kapital*, Vol. 1, analyzed the problem of what determines the "objective values" of commodities, he came to the conclusion that there was a gap between "money that is money only" and "money that becomes capital" parallel to a gap between the "simple circulation of commodities" and the "inverted order of circulation". In this way he too continued and improved the classical methodology by clearly distinguishing between the equilibrium and disequilibrium concept of money and exchanges or markets. In those first four chapters, Marx had all the elements for formulating the law of general equilibrium in economics a decade ahead of Walras, but he did not! Actually in Marx there were two personalities: (a) Marx No. 1 the classical thinker in terms of stable equilibrium in the first four chapters, and Marx No. 2, the revolutionary, the political activist, the modern thinker in terms of disequilibrium which begins in Chapter V entitled "Contradictions in the general formula of capital". Unfortunately for his own family and the destiny of humanity, Marx No. 2 prevailed (see Rugina, 1983).

Leon Walras, in 1874-77 with his formulation of the law of general equilibrium, made a clear distinction between the economics of stable equilibrium, which he called Pure Economics, associated with a definite market force he called pure competition and a definite type of real, fully covered money he called "numeraire" and the rest of what later was called modern, Keynesian economics of disequilibrium (the correct denomination for Keynesian Revolution), leaving out the Marxian economics of total disequilibrium or revolutionary economics.

The prominent Swedish economist Knut Wicksell with his distinction between the natural, real and the nominal, artificial (official) rate of interest, a masterful observation for understanding the mixed, inconsistent nature of modern capitalism, respectively the cumulative price fluctuations known as the "Wicksellian effect", continued and improved the old classical methodology. It was Wicksell who, in addition to the heritage from Eucken, moved this author

to use in his German book *Geldtypen und Geldordnungen* (1949) the distinction between natural, real, fully covered currency like gold or silver money and nominal, artificial currency like paper money and monetized bank-credit.

Lord Keynes too by the distinction between "equilibrium at full employment" and "equilibrium with unemployment" (more correctly to be called "unstable equilibrium with unemployment"!) showed his intellectual roots in Marshallian economics, still visible in *A Treatise on Money* (1930). It was the classical heritage. Only in *General Theory of Employment, Interest and Money* (1936) did Keynes shift from the classical methodology of equilibrium to the modern methodology of disequilibrium, distancing himself from the Marxian methodology of total disequilibrium.

Professor Walter Eucken was the initial intellectual force who moved this author to think about the more comprehensive methodology based on the equilibrium versus the disequilibrium approach (see Eucken, 1939; 1944).

All these prominent thinkers of the past, and many more not mentioned, had the exact meaning of the universal hypothesis of duality but none of them formulated it as an explicit principle. What is even more important, none of them, to our knowledge, explored further consequences leading to the construction of the orientation table and other principal pillars of a new integrated science of economics, and all other social sciences and beyond to natural sciences. Among the most prominent contemporary economists who recognized the full value of the new research program and the new integrated methodology was my good friend and supporter Henri Guitton, former President of l'Institut de France, who in a chapter of his book *Le Sens de la Durée* (1985) announced "La Troisième Revolution selon Rugina", pp. 196-9.

2. The general possibility theorem says:

> Given the duality (equilibrium-disequilibrium) in the composition of economic and financial realities, including the physical universe, it is logical to conceive that theoretically an unlimited number of possible combinations or systems can exist.

Since we cannot work with the concept of "unlimited combinations", that is, infinity, all the possible combinations can be reduced, for study purposes, to seven basic models. What is called "unity in science" can be equated with seven basic models, but never with just one single model. Axiom 1 forbids and justifies this last conclusion.

3. The concept of the orientation table for economics

A rigorous and systematic application of the general possibility theorem leads to the construction of a methodological map of all possible systems or models, which for study purposes can be reduced to seven basic models. The building blocks necessary to construct an orientation table for economics follow (Table I):
The equation of unified knowledge: $S = f(A, P)$ shows the relationship between empirical (practical) and theoretical knowledge:

Models
M_1 = A system of 100 percent ($Co + Nu$) + R_1 This is the Walrasian model of general stable equilibrium at its limit of perfection and in its more complete form. It is immune to anomalies, relativity and uncertainty. This is the "economics of pure and perfect competition" (certainty)
M_2 = A system of 95 percent ($Co + Nu$) + 5 percent ($Mo + anti\text{-}Nu$) + R_2 This approximates to the model that Quesnay, Adam Smith and other classical thinkers up to Marshall included, have used in their analysis. It may be called the "economics of classical laws" with minor deviations. This is the area of weak minor disequilibria
M_3 = A system of 65 percent ($Co + Nu$) + 35 percent ($Mo + anti\text{-}Nu$) + R_3 This is a mixed economy where equilibrium elements still prevail but relativity begins to play a significant role. It belongs to the "economics of simple relativity" or relativity I. This is the area of strong minor disequilibria
M_4 = A system of 50 percent ($Co + Nu$) + 50 percent ($Mo + anti\text{-}Nu$) + R_4 This particular combination represents a mixed economy of static nature and hidden stagnation. It is the true model that Keynes improperly called "equilibrium with unemployment". Actually it is the domain of the "economics of unstable equilibrium". In his dynamic analysis Keynes left out the limit 50:50 and dealt with the "economics of relativity" in general terms. Modern capitalism moved up and down around Model M_4 or between Models M_3 and M_5 and thus Keynes' observation of "involuntary unemployment" was correct empirically and analytically. This is the area of weak major disequilibria
M_5 = A system of 35 percent ($Co + Nu$) + 65 percent ($Mo + anti\text{-}Mu$) + R_5 This is a mixed economy where disequilibrium elements prevail. Below this line the business cycle becomes unmanageable. It is the domain of what may be called the "economics of compound relativity II". This is the area of strong major disequilibria
M_6 = A system of 5 percent ($Co + Nu$) + 95 percent ($Mo + anti\text{-}Nu$) + R_6 This is the model of a decaying mixed capitalist economy in a country where a Marxist or fascist revolution succeeded in overthrowing the old system and instituted a brand new socialist or fascist regime. It is the domain of the "economics of compound relativity III" or more explicitly, the "economics of a centrally planned and controlled economy and society"
M_7 = A system of 100 percent ($Mo + anti\text{-}Nu$) + R_7 This is the limiting Marxian model of total revolution, disequilibrium and uncertainty which requires a government of absolute powers to hold the system together. It is the domain of the "economics of pure and perfect state monopoly" (uncertainty)
Notes: Building blocks necessary to construct the Table: Co = pure conpetition; Nu = numeraire-currency; Mo = pure monopoly; $anti\text{-}Nu$ = anti-numeraire-currency (paper-money and monetized bankcredit); $R_1, R_2, R_3 \ldots R_7$ = the institutional and legal framework consistent with each model

Table I.
An orientation table for economics

S = the practical *solution* to a given problem;

A = the *actual*, existing realities when in a state of disequilibrium; and

P = the *potential*, future realities under the best possible conditions of general stable equilibrium.

Adequate policies, reforms, regulations (*S*) have to carry on actual realities in disequilibrium (station *A*) to the final destination (station *P*) where the problem is solved properly and fully without additional difficulties.

Albert Einstein faced a similar methodological problem in physics which he expressed as follows:

> In order to construct a theory, it is not enough to have a clear conception of the goal. One must have a formal point of view which will sufficiently restrict the unlimited variety of possibilities. So far this has not been found; accordingly, the field theory has not succeeded in furnishing a foundation for the whole of physics (Einstein, 1950, p. 100).

That is what the great Einstein thought when he was older, more exactly five years before he died. Almost half a century passed before his dream was fulfilled, not by a physicist but by an economist. Would the physicist community accept this result or stick with the conservative position of Thomas Kuhn regarding the economic profession? An even more intriguing question is: would the economics profession itself accept this result as a conquered bastion in his own territory and defend it in a future open dialogue with brothers in the natural science community? That is a question that only time will answer!

What Einstein had in mind when he wrote the above statement was no doubt about his own project of a "unified field theory" which was supposed to be a single general theory in physical sciences. This too remained an unfulfilled dream, which, however, has been solved or can be solved through the new research program. We shall return to this issue.

Our orientation table for economics includes all possible models, to repeat, for study purposes reduced to seven basic models. Two more questions remain to be answered. How was it possible that Einstein could formulate a General Theory of Relativity? Exactly the same question can be raised in economics: How could Lord Keynes write *A General Theory of Employment, Interest and Money* (1936)? In both cases there was a methodological maneuver, first used by Einstein and then by Keynes, which to our knowledge was never discussed openly and to which we shall return.

4. The universal law of the natural parameter

The universal law of the natural parameter (NaPa), conceived as Axiom 2, says:

> Any system, composed of many parts, in the physical universe as well as in human societies and economies, in order to reach and maintain a position of stable equilibrium, i.e. stability from-within-the-system, must have a very strong (at the limit 100 percent) natural parameter, that is, a constant (more or less perfect) axis or center of weight, which in conjunction with a suitable force and an adequate environment (space-time framework) holds the whole system together.

The natural parameter (NaPa) is not just an assumed "constant" (1), as in pure mathematics, but rather a concrete, really constant magnitude, institution or social value, which in real life may not beat the limit of perfection (100 percent) but as much as humanly possible, close to it. This is true not only for human societies and economies but also for Mother Nature. As a concrete example for

nature, the anomaly of planet Mercury can be mentioned with the NaPa being the sun. But our solar system has not been disturbed and exists with the anomaly in question, unchanged for at least 500 million years. This confirms a previous statement that within Mother Nature the stable equilibrium elements and forces must prevail to a large extent over the unstable disequilibrium ones for a long time, if not from the beginning, as a new book forcefully and systematically tries to prove and which is good news in the physical sciences. (Overman, 1997). For the first time, the big-bang theory or, better said, hypothesis, which is taken for granted by many scientists, is questioned seriously and systematically.

For a national economy, the NaPa is the numeraire or 100 percent-backed commodity money, associated with 100 percent real credit backed by numeraire or other real commodities traded in an open market. It would be, therefore, a gross methodological mishap if one were to use it – as many do – by treating the NaPa as a simple mathematical constant (1) which does not change the rest of reasoning in a problem. This probably is the main reason why many mathematical economists find faults with the Walrasian model. It is also true that Walras did not explicitly determine the second function of numeraire currency as a shock-absorber of possible deviations in a dynamic economic system. For information, the first function is to provide a strong axis capable of holding together a dynamic economic and financial system in action.

In the physical universe where we are living, the NaPa's two functions have been fulfilled faithfully for at least 500,000,000 years (see Hoyle, 1950, pp. 9, 30-31). On the subject of the stability of our physical universe we need more investigation.

5. The universal law of general consistency

The universal law of general consistency, conceived as Axiom 3, says:

> No force in any system, related to Nature or human societies, can act in such a regular way as to produce and maintain over time a position of stable equilibrium or stability-from-within the-system without the existence of a suitable milieu or space-time framework.
>
> In human societies and economies, there is the requirement of an adequate institutional and legal framework consistent with the NaPa of the numeraire-currency and pure, fair competition.
>
> In our physical universe the NaPa and the space-time framework or suitable milieu are given, are implanted so to say in Nature by the Act of Creation.

This fundamental third factor identified on the orientation table for economics as R_1, R_2, R_3, ... R_7 is missing from the Walrasian law of general equilibrium and we added it to make it more complete. It is good to be aware of the fact that NaPa of *Nu* and the force of competition in economic and social life cannot function properly and fully except in conjunction with a suitable milieu, i.e. factor "R_1" in pure theory and factor "R_2" in practice.

Here lies the explanation of the economic and financial drama of the East European countries, including the former Soviet republics after 1990. Foreign economic experts from the West consulted have recommended the application of

reforms called the "shock-therapy", which consisted of what a "Polish sociologist" called "wild capitalistic markets" combined with drastic austerity measures. This happened at a time when national economies were in distress through the fall overnight of the previous state planned and controlled society and economy. Nobody thought that what was needed was not "wild free markets" but a comprehensive and consistent set of reforms to shorten the transition period to one single D-day by introducing a system of general stable equilibrium conditions with a suitable institutional and legal framework. This author worked such a program for Russia, Poland and Romania, which were sent to the proper authorities, but domestic councillors on the advice of foreign experts took care that the program never reached the eye of those in power to pass the final decision.

Even though the conditions are different, nevertheless the same economic and financial drama is playing now for the second year in Southeast Asia including Japan, and now it has just started in Brazil. The diagnostic all over is the same: application of disequilibrium tools of analysis and policies instead of an equilibrium versus disequilibrium approach with an adequate stable equilibrium institutional and legal framework according to the general consistency theorem. The responsibility for the failure, which is evident with the prolongation of the crisis, rests entirely with the amalgam of internal and external expertise.

6. The compensatory law of real investment, output, income and full employment

The compensatory law of real investment, output, income and full employment says:

> In a system of general stable equilibrium, the aggregate volume of real investment, output, income and employment can never shrink haphazardly, as under a mixed modern capitalist or socialist regime, but will always adjust in a synchronized manner according to the real, existing conditions in the economy and society until and around a position is reached where the effective supply and demand are equal.
>
> *Reason*: In this system, where all conditions for general stable equilibrium are fulfilled, it is impossible by definition that the business cycle may develop. The Walrasian law of general equilibrium (Model M_1 = 100 percent (*Co* + *Nu*) + R_1 in pure analysis and Model M_2 = 95 percent (*Co* + *Mo*) + 5 percent (*Mo* + *anti-Nu*) + R_2 in practice (see the orientation table).
>
> The possible fluctuations are simple and temporary (finite) so that for practical purposes can be ignored. The limit of 5 percent disequilibrium can be reduced to 1 percent or less. In this environment the much debated Say law of the markets (supply creates its own demand) is proved to be true, both in theory and in practice.

The compensatory law has to be viewed also in conjunction with the second function of numeraire-currency. We must be aware of the fact that in a regime of complete stable equilibrium as envisioned here, there is a double circular flow of real investment, output, income and employment that moves back and forth between the non-monetary (so called "real") and monetary sector of the economy. This is possible because the numeraire-currency is a special commodity (gold, silver, etc.) selected to serve as a monetary standard and, in

order to produce it, full cooperation of the same factors of production (nature, labor, capital, management and government as an indispensable social organization) is required.

In the course of daily economic activity, at times it may be more profitable to produce any other commodity or service, whereas at other times it may be more beneficial to invest in the production of the numeraire-commodity. Yet, the final decision in a regime of general stable equilibrium will not be manipulated or managed by the government, central bank or large corporations (national or international) but rather it will result from free, voluntary economic activity under conditions of really free but fair competition, each economic agent (in the form of a small, medium or large enterprise) trying to achieve the highest possible degree of efficiency and utility for his or her own benefit, and simultaneously for the highest possible increase of the gross and net social product.

Without any exaggeration, this is the unique case when and where the dream of the "invisible hand" by Adam Smith from theory becomes reality. When so many social and economic experts and politicians have nothing to offer but the idea that government is the key to so many unsolved social and economic problems, it is worthwhile to recall the wise, simple but truly useful thoughts by the first master of economic analysis, Adam Smith:

> By preferring the support of domestic to foreign industry he (the unknown citizen and business man) intends only his own security; and by directing that industry in such a manner as its produce may be of the greatest value, he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. Nor is it always worse for the society that it was no part of his intention. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it.
>
> I have never known much good done by those who affected to trade for the public good. It is an affectation, indeed, not very common among merchants, and very few words need be employed in dissuading them from it.
>
> The statesman, who should attempt to direct private people in what manner they ought to employ their capitals, would not only load himself with a most unnecessary attention, but assume an authority which could safely be trusted, not only to no single person, but to no council or senate whatever, and which would nowhere be so dangerous as in the hands of a man who had the folly and presumption to fancy himself fit to exercise it (Smith, 1776 and 1937, p. 423).

This long quotation should not be interpreted as the last word on this issue but at least as a warning signal of decency to those politicians and advisors (domestic or foreign) who, on the basis of some esoteric mathematical formula put into computers, could have the courage to present such formal (actually lacking true content) solutions in the name of science to be applied and affect in a negative way millions and millions of innocent and industrious people. Certainly, we are not advocating here the old concept of *laissez-faire* capitalism, whose initial meaning by the French physiocrats has been altered to suit the British merchants of Manchester during the nineteenth century. Nor do we consider the rudimentary, even though true, model of reasoning used by Adam

Smith as being complete. Even the most refined model used by Leon Walras in formulating his law of general equilibrium, although in itself also true, was not complete.

By the reproduction of the long quotation from Adam Smith we want to sound an alarm to the profession about the application of the monetary and fiscal policies, including austerity measures recommended, and in a way forced upon countries which have financial problems, since otherwise they will not receive foreign loans they need from the International Monetary Fund, World Bank and other financial organizations, namely, that these policies do not and cannot work efficiently to solve properly and fully the given problems. It is a losing battle with the impossibility theorem in practice to which we shall return.

It is a disturbing and immense international problem: The foreign and domestic experts insist on every occasion that the macro monetary and fiscal policies will work (if we have enough patience but without specifying for how long) whereas the people (think of Japan which was supposed to be the second most powerful economy in the world) bitterly complain that they are losing their jobs and income, they are consuming their life-savings, they are in despair and nobody does anything. How long should they suffer? Who will reimburse them for the loss? Foreign experts or institutions? Whom should we believe? The experts who travel free constantly and are well paid or the millions who suffer?

There is here a social injustice of immense proportions! Someone who has the money should sue the responsible individuals and institutions for this tragic state of affairs at the International Court of Justice in The Hague or the United Nations. If this means global capitalism, it should be reformed according to true scientific principles.

7. A constitutional law for social and economic justice or the law of "Omenia"

Under modern capitalism of the *laissez-faire* type, during the last two centuries, a sort of morbid spirit in business developed, i.e. a misinterpretation of the sacred principle of freedom in society, where a business man or corporation is allowed to charge a price with no limit, as high as the sky – as they say – if or when the market can take it. We want the reader to be patient and to read the whole argument further. It is a problem of social and economic justice and in no way does this author want to condemn business in the Marxian sense.

During my professional training in the old country of Romania, I grew up with this conception until I started to work with Professor Walter Eucken at the University of Freiburg i.Br., specifically when I began to envision that it is possible to develop a free, just and stable society and economy. At the beginning I could not convince my mentor that there was here an important problem to discuss. He was in favor of free business in the sense that "business is business" and without profit it is not free business. Later he accepted the view that there is a difference between normal, natural, equilibrium profit and the actual business profit.

Analytically, the concept of profit can be divided into two parts:

(1) the natural, equilibrium rate of profit determined by the cost of management (the opportunity cost);

(2) extra, differential or disequilibrium rate of profit, over and above the natural, equilibrium rate. In a mixed, unstable capitalist regime there is justification for the existence of an extra, differential profit to cover the additional risk in the system.

In a regime of general stable equilibrium there is no additional risk and therefore no justification for a differential profit. In such a regime the differential profit, at the limit in Model M_1, equals zero. This is what Walras had in mind when he formulated his law of general equilibrium, but he did not point out explicitly the difference between the (1) and (2) type of profit.

In order to dissipate the inclination or the social psychosis under capitalism for pursuing an extra differential profit, it is necessary, even after all conditions for general stable equilibrium are fulfilled, to introduce also a constitutional law for social and economic justice according to the following principle:

> Any kind of commercial business transaction, irrespective of size and according to law, has to be concluded at real, equilibrium prices calculated in such a way as to include in principle paid or imputed: rent, wages, interest, normal profit and taxation. Severe penalties should be imposed upon those individuals or firms – domestic or foreign – when this law is broken.

Two important problems would be solved through this law. One is implanting a self-regulating mechanism into the production process in order to take care of an equitable distribution of national income and wealth. The second important problem is automatically solved and at no extra social cost, namely, the pernicious issue of monopoly power, domestic and foreign. This will stop further illegitimate concentration of economic and financial power, the present-day fever of mergers at the global and national level.

We called the constitutional law for social and economic justice also the Law of Omenia. Romanian language is a romance language and Omenia, a popular expression, means: one should behave in such a way as not to offend or harm another person or society in general without any discrimination, that is actually humanity. Consequently, the calculation of real, equilibrium prices is included in the Romanian Omenia.

8. The impossibility theorem in analysis (theory)

From the orientation table we can formulate the impossibility theorem in analysis which says:

> It is impossible by definition to construct one single general theory, capable of explaining all possible systems or combinations expressed by the seven basic models identified on the table.

Reason. Any general theory developed to include all possible models on the upper part of the table would be refuted logically and empirically by its counterpart on the lower part and vice versa, and there is no way to avoid this antinomy.

Nobel Laureate Paul Samuelson thinks in the introduction to his enlarged edition of *Foundations of Economic Analysis* (1983, p. xxvi) that what he kept in mind in preparing this edition "was the success it could achieve in formulating a general theory of economic theories". This conclusion, differing from ours, was possible because his model of thinking, like that of Keynes, does not include all possible models as our orientation table does.

The same question can be raised in regard to Lord Keynes: how could he use the title of "general theory"? But let us start first with Einstein because he has priority in the use of the same methodological technique. If one would take the time, he or she could construct easily an orientation table for geometry by using the universal hypothesis of duality, in this case the Euclidean axiom: two parallel lines on a plane surface never meet. We make this the equilibrium, stable type of geometry, or Model M_1 in geometry, which has been used for 2,000 years and is still used with precision. Then, by using Professor Smarandache's[2] technique we can reverse Model M_1 and convert it into Model M_7 where the Euclidean axiom is totally negated and we have the Smarandache paradox or anti-geometry.

In between we can construct M_2, M_3, M_4, M_5, M_6 and M_7 and the orientation table for geometry is completed. The specialists can try to find a place for Riemannian geometry where the surface is curved, but the curvature could be of various degrees, and with that in mind we can integrate those degrees in M_2, M_3, etc.

What did the great Einstein invent or imagine in order to land into the territory of relativity? Let him say in his own words:

> The question of the "truth" of the individual geometrical propositions is thus reduced to one of the "truth" of the axioms. Now it has long been known that the last question is not only unanswerable by the methods of geometry, but that *it is in itself entirely without meaning* (italics are ours).
>
> We cannot ask whether it is true that only one straight line goes through two points. We can only say that Euclidean geometry deals with things called "straight lines", to each of which is ascribed the property of being uniquely determined by two points situated on it.
>
> The concept "true" does not tally with the assertions of pure geometry, because by the word "true" *we are eventually in the habit* of designating *always* the correspondence with a real object; geometry, however, is not concerned with the relation of the ideas involved in it to *objects of experience*, but only with the logical connection of these ideas among themselves (italics are ours) (see Einstein, 1952, Part I, p. 2).

What can we say about this explanation from the horse's mouth, as one might say? Of course, Einstein did not know the concept of the orientation table and was not aware of "truth in the abstract" as in Models M_1 and M_7 and "truth in the concrete" as in the rest of other possible models. But the orientation table explains clearly what he did. In one sentence: Einstein left out Model M_1 and with this operation he was free in the territory of relativity, but he had no way to envision with precision that relativity was valid over a vast area, more specifically a great ocean of possible minor disequilibria (the upper part of the table) versus another great ocean of possible major disequilibria (on the lower part of the table) plus in between another ocean of frozen calm waters in a neutral position of unstable equilibrium, or better said "stable disequilibrium" in Model M_4, an organically

static model like the electro-magnetic fields in our physical universe. He was correct with the special relativity theory, which in itself is close to, if not the same as, the relativity theory that Newton formulated and which is not mentioned at all in our time. But with the general relativity theory as formulated by Einstein there is a problem of strict methodology which cannot be taken here.

A few more clarifications are required by the long excerpt given above. Because Einstein did not make a clear distinction between "truth in the abstract" and "truth in the concrete", he failed to see that Euclidean propositions were not in themselves "entirely without meaning" but on the contrary they have full meaning in the sense of truth in the abstract from which truth in the concrete derives and vice versa, depending on the British school of empiricism and/or the French and German idealism. But in reality, truth in the abstract and truth in the concrete are, according to the new integrated logic, organically united: one could not be scientifically conceived without the other. This is what Einstein did not see when he wrote that "the word 'true' we are eventually in the habit of designating always the correspondence with a real object". His general relativity theory is in need of a revival, not in the sense of negation but rather to establish scientifically more stringent conditions for its proper and more precise validity.

The great contribution of Einstein lies in the logical and methodological discovery that if we change the framework or model of reasoning then automatically the solution of the same problem also changes, becomes relative. However, the concept of relativity cannot be perceived at its foundation without the knowledge of truth in the abstract, more specifically Model M_1 of absolute truth in the Newtonian sense. In other words, in historical and conceptual terms, Newton is first and Einstein after, without any intention to diminish in any way the original contribution of Einstein. Here, it is only the quest for, and the moral duty, as a scientist, to establish and clarify, the truth and nothing else of a habitual or human nature.

Let us look quickly at how Lord Keynes proceeded when faced with a similar situation and dealing with the same problem of feeling free in the use of the term "general". The answer is immediately available: Keynes used absolutely the same technique of pushing aside Model M_1 (Walras) in pure theory (the equivalent of Euclid and Newton) and Model M_2 (the equivalent of Adam Smith, Alfred Marshall and other classics) in the concrete and then he felt comfortable with his mode and model of reasoning, which at the limit was Model M_4 or a regime of "unstable equilibrium with unemployment" (properly defined).

Here is the technique in his own words:

> I have called this book the *General Theory of Employment, Interest and Money*, placing the emphasis on the prefix *general*. The object of such a title is to contrast the character of my arguments and conclusions with those of the *classical* theory of the subject ...
>
> I shall argue that the postulates of the classical theory are applicable to a special case only and not to the general case, the situation which it assumes being a *limiting point* of the *possible positions of equilibrium* (italics are ours).

> Moreover, the characteristics of the special case assumed by the classical theory happen not to be those of the economic society in which we actually live, with the result that its teaching is misleading and disastrous if we attempt to apply it to facts of experience (see Keynes, 1936, p. 3).

There is not much to be said in addition to the voice of Keynes. He is refuting the classical theory of Model M_1 and M_2 in much sharper language than Einstein did with the Euclidean geometry. Since Keynes did not have the concept of the orientation table he could not envision how far away his model of reasoning was located on the map of all other possible systems. His sharp remarks about the classics, including his teacher Alfred Marshall, whose name was mentioned in a footnote on the same page, are absolutely untenable and not justified. His model of reasoning, M_4, compared with the truly classical ones, respectively M_1 and M_2, is bent 90° and consequently his criticism, with proper explanation, is untenable by any scientific standards. Again this does not mean that the contribution of Lord Keynes, like that of Einstein, was not extraordinary by the rapid influence of changing the economic thinking of his time all over the world. Or that his merit in saving the western world from a potential Marxist revolution during the Great Depression, well fomented by some European radicals who immigrated to the USA in the 1920s and at a time when no other prominent economist provided a positive solution to the crisis, can be diminished. One story circulated at the time that Keynes was at a public gathering and one of his teachers by the name of A.C. Pigou asked him informally: "Why are you so impatient? There were other economic crises in the past and they went away by themselves. This one will follow the same course". After a split-second reflection Keynes retorted: "You mean to wait for the long run?" Pigou made a false step by answering "Yes, why not?" Keynes, in turn, with his specific verve, completed the dialogue: "In the long run we are all dead! What's the use to argue?" This shows the spirit of the time in the profession which, due to Keynes and his followers, soon would change radically.

In retrospect, Keynes as a scientist has fulfilled his duty by telling the truth as he saw fit, as all real scientists do. However, the rising generation of economists in the 1930s and 1940s, after they received the new Keynesian message, failed to ask the master certain questions about the validity of the new theory, especially during and after the mini-crisis of 1938. During those tumultuous times, the avalanche of public spending in the course of preparations for war mobilization due to Hitler's provocation of World War II, the mini crisis was hidden and forgotten.

One single exception could be mentioned, but with no intention on the part of its author to be a critical examination of the "general theory". It was another rising British economist, who later received the Nobel Prize, Sir John R. Hicks, who wrote an article: "Mr Keynes and the classics: a suggested interpretation", published in the *Econometrica*, Vol. 5, 1937. In this article Sir John used the famous IS-LM curves and came to the conclusion that the general theory actually represented the economics of depression. Being good friends, Hicks sent the manuscript to Keynes for possible revision but Keynes answered only with customary thanks and no objection to its conclusion.

There is one correction which should not be missed. Keynes, in the given quotation, speaks of "possible positions of equilibrium" (in the plural) as if there were many. In truth – according to the orientation table – there are only two positions of equilibrium: one in Model M_1 and M_2 or "stable equilibrium with full employment" and the second in Model M_4 or "unstable equilibrium with unemployment".

9. The impossibility theorem in practice

We want to warn the reader that our impossibility theorem in practice is not related directly with the impossibility theorem by Nobel Laureate Kenneth J. Arrow, simply because ours is based upon the application of integrated logic, whereas his is constructed with the help of modern, symbolic, mathematical logic as inherited from the British philosopher and mathematician Bertrand Russell (see Arrow, 1963).

Our theorem is developed from empirical realities filtered through pure analysis. Indeed, a critical examination of the economic, monetary and financial history of modern times, and in particular of the twentieth century after the Great Depression, can and does provide the basis for the formulation of the impossibility theorem in practice which says:

> In a mixed economy, composed of equilibrium and disequilibrium elements, practices, institutions and where paper money and monetized bank credit are used on a large scale, it is impossible by definition to calculate and implement institutionally at any given time the stable equilibrium supply of monetary circulation consistent simultaneously with price stability (neither inflation nor deflation but simple, natural, limited adjustment-fluctuations) full employment (the dream of Keynes), a balanced budget, a balance of international payments in order and a most equitable distribution of national income.

If we follow the daily news in the papers or mass media communications, often we read or hear that it is difficult to control or manage the monetary circulation or a national economy but never is it stated clearly that it is impossible by definition.

What is the basic reason for the existence of the impossibility theorem in practice and not less in analysis? The answer is: paper money and monetized bank credit have an inherent instability that cannot be corrected by any rational policies and all the computers in the world.

The supposedly rational policies, i.e. the now traditional macro monetary and fiscal policies, which are defended so vehemently and so dogmatically, have reached the stage of becoming a disguised "social plague". In the name of science, they are confusing and deceiving not only public opinion in the USA and the rest of the world, but even more the Members of Congress, the President of the United States of America, including the leadership of the Federal Reserve System, the International Monetary Fund, the World Bank and other international financial organizations, but nobody is aware, as though everything were all right. In fact, every single day the press and mass communication media pour out statistics that the economic situation of the USA is the best compared with the rest of the world now under a sort of Damocles' sword of a global crisis. But the same press does not say anything of how artificially and ridiculously lower rates of interest are punishing millions

and millions of senior, retired people and at the same time encouraging an orgy of pure speculations, which not only are initiating a redistribution of national income at the expense of the masses, but even worse are destroying the basis for real capital formation through voluntary savings of the people. This pauperization of the middle class of America through artificially lower interest rates and pure speculations should be a major public issue rather than taking up the time and attention of the public with the view that the children do not learn how to write and how to behave in school, which is a task of local school committees and parents, and not the Federal Government.

The statistics in any matter, and regardless of how elaborate, are nothing but dead letters and figures which cannot talk. The master logician, Wittgenstein, warned us long ago: "The facts all contribute only to setting the problem, not to its solution" (Wittgenstein, 1963, p. 149). Indeed, statistics by themselves cannot talk. It is only theory, pure theory which gives them life and enables them to speak in a clear language.

That statistics by themselves cannot say more about the great storm which came on a black Thursday in October 1929; it is good and useful to read what the famous Harvard Barometer of that time said at the end of August 1929:

> General business continued at a high level, with reference to the estimated normal, during the second quarter of 1929. Month-to-month fluctuations of the business index were somehow wider than during the two previous quarters, but not sufficiently wide to extend beyond the narrow range of variation about a sustained high level, which has been maintained since March 1928 (see *The Review of Economic Statistics*, Vol. XI, August 29, 1929, No. 3).

In the next issue of the same review (Vol. XI, November 1929, No. 4) one can read:

> General business in the third quarter of 1929 was sharply higher than in the first half of the year. The tendency during the quarter, following the swift rise from June to July, was downward; and the decline from July to September was about of the same order as that from March to May.

In one sentence, according to the statistical record, taken before October 1929, the American economy was never so flourishing but also never so sick!

I do not want to appear as a perennial pessimist ferreting out dark spots in the economy. On the other hand, it would be a betrayal of my adopted country if I blindly ignore the warning signs that, on the road we are now on, we shall inevitably reach a critical point of a crisis much more complicated than that of 1929.

By nature I am a realist and I do not want to feel guilty one day that I was going along with the stream, neglecting my moral and professional duty of telling the truth, as I see it, and nothing else. George Santayana, a reputed Spanish American philosopher, used to say: "If we do not learn the right lesson from history, then history will be repeated".

After this detour, let us go back to the issue of "inherent instability of paper money and monetized bank credit". Lord Keynes knew about this kind of instability but he did not take it seriously because he relied on "good judgment" by competent, well-trained economists. Unfortunately, under the given circumstances, good judgment is of no real help, is a fiction, regretfully in the

name of science. The real weakness was not with Keynes, who, to repeat, fulfilled his professional duty, and in addition in "a treatise on money" he called paper money and monetized bank credit "nominal, representative" as distinguished from "real, commodity" money. The real weakness was with the economic profession, in particular neo-classical economists who did not challenge Keynes by reasonable and meaningful questions, when he was alive or thereafter.

What are the practical reasons which justify the veracity of the impossibility theorem in practice? Here they are:

(1) There is no reliable, objective instrument or standard to determine the exact timing when a given monetary policy instituted by the Federal Reserve System or a fiscal policy recommended to Congress by the US Treasury should enter into action and for how long. In practice, the timing is either too late or too early, and in both cases having more complications and leaving the problem still unsolved.

(2) An even more complicated issue lies in the fact that there is no reliable and objective instrument or standard to measure the exact proportion in a given monetary or fiscal policy. Indeed, it is easy to say this: given complaints by the people or business and financial community, for instance about inflationary pressure and the recommendation to raise the official rate of interest manipulated or managed by the Federal Reserve System. But the real, insurmountable difficulty (in fact unsolvable) is the question: how much exactly? 1/4, 1/2, 3/4, 1, 2, 3, etc. percent, in order to fully contain the given inflationary pressure?

Until these two fundamental problems are solved, properly and fully, the macro-monetary and fiscal policies practiced by the Federal Reserve (with all due respect to chairman Alan Greenspan) are condemned to culminate in a fiasco. Absolutely the same thing can be said (with all due respect to the Hon. Michel Camdessus, managing director of the International Monetary Fund) regarding the same kind of policies imposed upon the 182 member countries of the IMF when they are in dire need, but without realizing that these policies do not and cannot work. In both cases we are dealing with a scientific illusion, highly detrimental economically to hundreds of millions of people globally. This ferocious social drama of our time is occurring during a losing battle with the impossibility theorem in practice. Let us hope that the new President of the USA to be elected in the year 2000 will put an end to this painful state of affairs for the good of America and as an example for a better social, monetary, economic and financial order in the rest of the world.

10. The equation of unified knowledge

Just as Einstein attempted to express the relationship of mass energy by the simple formula $E = mc^2$ in terms of the relativity theory, similarly but going beyond relativity, we can identify the methodology for searching consistent and efficient practical solutions to economic, monetary, financial and social problems of our time by using a simple, clear formula called the equation of unified knowledge as

follows: $S = f(A, P)$. This equation says that a solution (S) to a practical problem in economics and the other social sciences is a function of two important elements: factor A, or the consideration of actual, existing realities which, as a matter of fact, are in a state of disequilibrium (otherwise we have no problem) and factor P, that is, potential realities under the best possible conditions. And these cannot be anything else but conditions which satisfy the requirements of general, stable equilibrium in economics, as formulated by Leon Walras, but in an improved, more complete form. In other words, P stands for those conditions when the respective problem does not exist any more; it is solved properly and fully.

The solution (S) represents those practical means (structural reforms, policies or any sort of reasonable and effective regulations) which, put in practice, will carry over or move the existing disequilibrium realities, as fast as humanly possible and with a minimum of social disturbances to a final station – the complete realization of factor P.

The equation indeed stands for unified knowledge since factors S and A mirror practical, empirical knowledge, whereas factor P represents analytical, theoretical knowledge. Factor P serves as a constant guidance or orientation standard in order to avoid mistakes in our practical judgment in search for the best possible solution to the given problem.

The equation is applicable not only in economics and other social sciences, but also in the technology of natural sciences. Let us take a look at what a medical doctor does when he is faced with a suffering patient. Before anything else he will ask a number of questions about the complaints of the sick person. Then he will order a number of tests to be made in the laboratory. In other words, the medical doctor will investigate first the actual, existing conditions of the patient, which is the identification of factor A of our equation.

When all the tests are in, the same doctor has to establish a correct diagnosis of the suffering person. How can he determine a correct diagnosis if he does not carry in the back of his mind a clear image of the ideal conditions of stable equilibrium in a completely healthy individual (male or female) from his professional training? And this is factor P of our equation.

With these two factors ($A + P$) our medical doctor is capable of prescribing or fulfilling factor S by indicating the medicine and/or other recommendations necessary to move the patient from stage A to the final station P, and that is all there is to it. Let us take another example from engineering and mechanics. A certain complicated or less complicated machine does not function properly or stops functioning altogether. A qualified master engineer will be summoned to repair it. The expert in question would never be able to diagnose quickly what is wrong with that machine in disequilibrium if he did not have in the back of his mind a clear and precise image of that machine in a state of perfect functioning, i.e. general stable equilibrium of factor P.

A thorough examination of the malfunctioning machine, which he will do in the first place, represents factor A. The practical solution (S) will be composed of necessary changes (replace some component parts), i.e. to convert the machine from stage A to stage P, and that is it.

All professional men with good training are applying daily the equation of unified knowledge, even though they may not be aware of its existence. We did not invent it by pure abstract reasoning. We used observation and the new integrated logic. Then we formulated it in a clear-cut fashion so that everybody can understand and use it intelligently with more confidence.

Finally we asked: if economics is a science – and we believe it is – then why would not the same equation of unified knowledge be practiced also by the professional economist and other social scientists? A negative answer would not make sense.

On further reflection, a keen observer will notice that factor A includes Keynesian and/or Marxian economics but here limited or restricted to the identification and explanation of disequilibrium aspects of modern economy and society. Institutional, social, evolutionary, historical and cultural economics, all belong to the category concerned with the identification and explanation of disequilibrium problems, that is, factor A.

On the other hand, factor P stands for classical and neo-classical economics, as epitomized by the Walrasian law of general stable equilibrium in an improved and more complete formulation. In other words, factor P serves as a precise and stable indicator for the identification and explanation of the ultimate goals to be followed in any civilized society where the majority of the population want to live in freedom, social justice of equity and monetary and financial stability.

The same equation of unified knowledge, under more scrutiny, can vividly disclose the methodological weakness in both classical and modern revolution in economic thinking. The classics failed because they were reasoning only in terms of Factor P, i.e. the ideal conditions of stable equilibrium (although not complete), but they never showed us how to realize and maintain over time such an ideal regime in practice. This happened during the first classical revolution.

So far the moderns and contemporaries also have failed for the same methodological weakness in reverse, by concentrating exclusively on the existing empirical realities in disequilibrium, i.e. factor A, and neglecting the sense of direction which is given by factor P. This occurred during the second, modern revolution.

The equation of unified knowledge attempts to correct this methodological error of the past and present by offering a *sui generis* synthesis where classical and modern economics no longer appear contradictory or in conflict with, but rather complementary to, modern economics of disequilibrium, and vice versa.

So much intellectual energy and paper have been consumed in vain during the twentieth century to prove that modern economics was negating or disproving the results of classical economics. A more unproductive activity in the world of ideas is hard to conceive, and we paid a steep price. We could not solve properly and fully any of the basic problems in economics, finance and other social sciences.

The new research program of a simultaneous equilibrium versus disequilibrium approach, and in particular the orientation table and the equation of unified knowledge, could become a revolutionary event by opening the road to a third revolution in economic thinking.

11. An orientation table for integrated logic

In previous works I argued that we are going through an intellectual and scientific crisis, being entangled in a complex of arguments when we do not have adequate and sufficient tools to discern and separate clearly and convincingly truth from falsehood, certainty from relativity, determinism from indeterminism, reversibility from irreversibility, symmetry from asymmetry, not to mention the vast oceans of mixed, hybrid situations (models) of minor versus major disequilibria plus, in between, a silent river of a frozen unstable equilibrium, or the pure domain of ambiguities, or Smarandache's paradoxes.

All natural and social sciences went through two revolutions: the classical one, dominated by thinking in terms of stable equilibrium, and the modern one, characterized by thinking in terms of empirical realities which showed particular irregularities, that is, in terms of disequilibrium or unstable equilibrium.

The cultural and scientific course of events in our time would have been, so to say, on the right track if modern thinkers in socioeconomic as well as in natural sciences had specifically pointed out that the new results in science were valid only for deviations from the classical laws, i.e. for a model of disequilibrium and/or unstable equilibrium. That would have preserved continuity in science.

Unfortunately, the new results in modern science, and again in both natural and social sciences, were dramatically presented and interpreted as a refutation of, or as a better substitute for, classical science. Granted, the classics committed a methodological error in presenting their results as if that was the word or the only aspect of human knowledge which might be called science. But that does not change the nature of the argument raised here.

The fundamental question of logic and methodology is this: can the results obtained from the study of a model of disequilibrium be used in theory to invalidate the results from another model of stable equilibrium in one and the same problem? If it were one and the same model viewed in both revolutions, then the matter logically would be simple and clear: the results in one case would be true, right and in the other case false, wrong. But this is not the real situation in the argument under consideration.

Even more unfortunately, the logic, the queen of all sciences, or "the science of science itself", as John Stuart Mill called it, went through a similar irregular pattern of development, and it is no surprise that in the end it was faced with the same dilemma of a conflict or lack of continuity between classical and modern logic.

After 1910, when Whitehead and Russell published their *Principia Mathematica*, the study of logic was never again the same, now for a whole century. Of course, the new direction toward symbolic, nominal or formal logic was prepared by other pioneers like Gottlieb Frege, Giuseppe Peano and George Cantor, but the actual official marriage between formal logic and mathematics occurred in 1910. From then on the distinction between formal logic and mathematics was hardly discernible. Logic lost its independence and the final godfather was Ludwig Wittgenstein with his *Tractatus Logico-Philosophicus* (1921).

Following the same road taken in 1910, Godel in 1931 stunned the scientific community by providing the proof that formal propositions of the *Principia*

Mathematica-type are undecidable, that is, they can be neither proved nor disproved (Godel, 1962). It is a sort of Heisenberg's uncertainty principle, transplanted in logic. In a way, it is a similar phenomenon to the one that the "three species of elementary particle which were known in the 1920s, now have 61" (Freeman, 1988). This information would be enough to make one aware that something is not quite in order in the house of logic.

Later, in the 1940s and 1950s, the formalist revolution from logic and mathematics spread to economics and other social sciences, and in this way a similar marriage between mathematics and social sciences was consummated. A sort of dependence effect (Lazaros Houmanidis) evolved whereby mathematical models and mode of reasoning became visible in the debate of basic economic and social issues.

The results, so far, are not satisfactory – neither in theory nor in practice – so that here too the same problem arises, namely, the quest for independence of economics and other social sciences. Alfred Marshall was right when he recommended that we should use mathematics only as an additional tool to confirm, when necessary, that our logic was correct and sufficient (Marshall, 1952, pp. 850-2).

One thing is sure, the real issue is not to stop or ignore the use of mathematics in economics and other social sciences, but rather to determine in any particular case how far and under what conditions mathematics can be used successfully. This is again a problem of logic and methodology.

We leave further deliberation to Professor Forentin Smarandache[2] who is more knowledgeable in mathematics and the theory of paradoxes. Our further duty is to show the construction and significance of the orientation table for logic.

The construction of the orientation table is a simple but powerful methodological instrument which can help to clarify, at least in principle, a number of important issues, some of them considered most controversial in the past and still continue to be so in the present.

What the table does is to identify the model where such disputed concepts, theorems or interpretations are truly valid beyond doubt. Until we were informed of the Smarandache theory of paradoxes, we were not aware of the fact that half a century of work (1947-1997) was actually devoted to clarifying or solving paradoxes of the second, modern revolution in thinking to end with the conclusion that modern science is not contradictory – as argued during the twentieth century – but rather complementary. And in this way the continuity in science was restored, we hope forever, and to be completed during a coming third revolution.

The orientation table for logic covers the whole of the logical space related to reality (integrated logic), conceived in its broadest philosophical sense, existing or potential, expressed in its conceptual (idealized) and/or empirical aspect.

Since in the real world we are faced with a duality of facts: equilibrium (positive) and disequilibrium (negative) elements and forces, combined in different and changeable proportions, logic, as a science of thought, by necessity must possess a similar structure capable of grasping this duality in all its complexity.

Until this table was discovered there was no way to estimate the logical distance between the case (model) of pure certainty (M_1) and that of pure ambiguity (M_4), or between ambiguity and the case of pure contradiction (M_7).

In science, there was no suitable instrument to show how great was the distance between a position of stable and one of unstable equilibrium, a subject of great significance, not only in social but also in natural sciences (see Rugina, 1989). If Lord Keynes had known about this relationship, then we are sure he would have tailored his general theory with a different perspective and application.

Table II shows the entire theory of probability, reduced to an ex. of two variables (p and q) but carried through seven basic models or the entire conceivable logical space. The truth-functions in question can be tested. The elemental propositions are:

p = a beautiful day (positive fact in Wittgenstein);

q = a rainy day (negative fact in Wittgenstein);

T = truth function;

F = falsehood function.

Before Table II was developed, there was no reliable logical tool to envision or estimate various possible anomalies or disequilibria (minor and major, weak or strong) including the phenomenon of relativity and uncertainty in logic and other sciences.

In the philosophy of science the interminable argument about the law of causality or determinism versus indeterminism could not be solved properly,

Models	p	q	
M_1 =	100% T		*Pure certainty*. In words: it is a beautiful day at its limit of perfection
M_2 =	95% T + 5% F		The case of special relativity. In words: it is a beautiful day with tiny clouds at times
M_3 =	65% T + 35% F		The case of simple relativity of the first order A time of minor disequilibrium in the atmosphere or a day with more sunshine than rain
M_4 =	50% T + 50% F		*Tautology*. In words: it is either raining or not raining (ambiguity)
M_5 =	35% T + 65% F		The case of compound relativity of the second order A time of major disequilibria in the atmosphere or a day with more rain than sunshine
M_6 =	5% T + 95% F		The case of uncertainty with qualification A time of stormy weather, i.e. a day with much rain and very little sunshine
M_7 =		100% F	*Pure contradiction* or absolute or complete uncertainty In words: there is absolutely no trace of a beautiful day; it is actually a rainy day without interruption

Table II.
A orientation table for micro-logic

because of a lack of adequate analytical tools to show unmistakably how far the law of causality or determinism was valid and where the doctrines of indeterminism, irreversibility, or asymmetry begin to be actual. Table III can help in this matter. Building blocks for Table III:

P = all the facts or concepts conceived as true propositions

Q = all the facts or concepts conceived as false propositions

T = truth function

F = falsehood function

Based on the same universal hypothesis of duality, Table III represents the enormous complexity of the real world, in terms of the logical space, by two bipolar categories of facts or concepts which can be further combined in diverse proportions, however, limited to seven, all comprehensive models sufficient to express the whole of the logical space.

In Wittgenstein and Russell, logic appears as a one-dimensional study concerned with atomistic propositions at the same level of abstractions.

With the help of Table IV, logic appears as a multilateral study of propositions and systems of thought, at different levels of abstraction. In particular, this is visible in macrologic. According to the Table, there are at least seven different logical systems possible, each one independent to a certain extent and yet all correlated into a larger unified logical framework, covering all imaginable systems. This is a *sui generis* characteristic of integrated logic.

If we equate or use interchangeably truth and falsehood functions from integrated logic, with equilibrium versus disequilibrium relationships in science, then we find a clear and consistent line of communication between logic and all other sciences. It is the purpose of Table IV to show this property. In other words, there is and must exist a clear, definite and organic relationship between logic and all other sciences. Building blocks for Table IV:

Models	p	q	Description
M_1 =	100% T		The logic of pure certainty or a logical system composed only of truths in the abstracts
M_2 =	95% T +	5% F	The logic of special relativity, i.e. a logical system composed of truths in the concrete of a special kind
M_3 =	65% T +	35% F	The logic of simple anomalies, or relativity of the first order
M_4 =	50% T +	50% F	The logic of tautologies or a logical system based on pure ambiguities of the type "either ... or"
M_5 =	35% T +	65% F	The logic of compound anomalies or relativity of the second order
M_6 =	5% T +	95% F	The logic of special contradictions
M_7 =		100% F	The logic of pure uncertainty or a logical system based on pure contradictions or falsehoods

Table III.
An orientation table for macro-logic

Models	S	U	Description
M_1 =	100% S		A system of general stable equilibrium at its limit of perfection The methodological habitat for truths in the abstract or the pure classical model in science, in the sense of Newton (physics) or Walras (economics)
M_2 =	95% S +	5% U	A system of stable equilibrium but with minor deviations. This is the methodological habitat for truths in the concrete. It is the case for special relativity (Einstein and Newton)
M_3 =	65% S +	35% U	A mixed system of simple anomalies or relativity of the first order. The equilibrium elements still prevail. Habitat for truths in the concrete
M_4 =	50% S +	50% U	A mixed system of unstable equilibrium. In economics it represents the Keynesian model of "equilibrium with unemployment" but adding the prefix of "unstable". It is the usual model in modern science guided by unstable equilibrium or "stable disequilibrium"
M_5 =	35% S +	65% U	A mixed model of compound anomalies or relativity of the second order where disequilibrium elements prevail. A weak major disequilibrium
M_6 =	5% S +	95% U	A borderline mixed system where disequilibrium elements dominate to a very large degree. A strong major disequilibrium
M_7 =		100% U	A system of total disequilibrium dominated completely by pure contradictions, real chaos

Table IV.
An orientation table for any science (natural and social)

S = stable (equilibrium) elements, forces, values, behavior

U = unstable (disequilibrium) elements, forces, values, behavior

This means that for one and the same question (problem) rolled over through seven different systems, in the end we may have seven different answers.

12. The logic of the abstract versus the logic of the concrete

One of the reasons why some previously mentioned problems and a number of others that were not mentioned were not and, in all probability, cannot be solved satisfactorily lies in the fact that we were lacking a clear and generally accepted distinction between truth in the abstract and truth in the concrete. The whole relationship between classical and modern science was and still is often misconstrued or misinterpreted because we are not aware of, or we ignore, the distinction in question.

Model M_1 on the orientation table for logic and/or any other science represents an abstract construction (*Gedankenbild* or "ideal type" in the sense of Weber and, before him, Walras), composed of pure elements. These elements are of the same nature as the Newtonian concept of absolute time, space, place and motion. It does not mean that the concepts are not related to physical realities, but that realities are defined axiomatically in themselves and "without relation to anything external" (Newton, 1962, Vol. 1, p. 6).

We may say in addition that these concepts mirror perfect, stable equilibrium with no trace of deviations from the ideal. They are based on true identities (in form and content) in the Hegelian sense. In the Russell-Wittgenstein sense, the same elements are pure form of symbols, devoid of any content. Modern logic therefore could be represented in just one dimension as a special version of Model M_4 (the case of tautologies as Wittgenstein begins his schema of truth) which, however, can be stretched on a methodological map toward north, i.e. Model M_1 (certainty) or toward south, that is, Model M_7 (contradiction). That is how we see Wittgenstein's schema as a specific segment of our orientation table.

Whatever knowledge we can acquire from the study of Model M_1 represents a truth in the abstract, in the world of new ideas (Newtonian concepts), independent of or parallel to the real world, conceived historically.

One important question can be raised immediately. What is the use of studying a model of pure and perfect concepts or propositions, connected ideally but independent of the real world? The answer is simple but fundamental. Model M_1 is the most important of all possible models because, first of all, here the solution to any problem is clear, simple, determinate and certain. As an instrument of learning how to think logically correct, there is no substitute for it.

The second parallel line of thinking in terms of deviations from the ideal of purity or perfection is, of course, more realistic and also indispensable. But, an important and fundamental logical key to be remembered is the fact that in order to be able to identify scientifically a deviation, relativity, uncertainty, indeterminism, irreversibility or asymmetry, one needs to have a prior knowledge of the pure concepts of perfection, i.e. of logical certainty, determinism, reversibility and symmetry. Even the great Einstein who formulated the law of special and general relativity missed or methodologically was forced to forget about this fundamental logical key in reasoning.

In concluding this issue, we can say with scientific conviction that the road to Einstein, Bohr and Heisenberg in physics and Russell and Wittgenstein in logic was opened and, in a way, prepared long before by Newton, Descartes, Bacon, Kant and Hegel.

The law of causality and the doctrines of rational certainty, determinism, reversibility and symmetry, all represent truths in the abstract, and their methodological, proper habitat without any "ifs" lies in Model M_1. Classical thinkers, therefore, were correct in their reasoning but they lacked adequate methodological tools to determine exactly how far, and under what precise conditions, their results were valid beyond any doubt.

With Model M_2 (and the following M_3, M_4, M_5, etc.) we enter the territory of truths in the concrete, respectively the study of concepts and propositions which can be correlated with the real world as envisioned by the universal hypothesis of duality. The study of M_2 through M_6 included belongs to the logic of the concrete.

If, or when, the content of propositions is no longer assumed to be pure and perfect but exposed to some deviations, even when of a very small magnitude, as in M_2 which can be imagined closer to M_1, then the form of those propositions also must be altered in order to be consistent with their content.

The orientation table shows in a simple but forceful manner how enormously complicated the problem of truth in the concrete may become, not only in logic but in all sciences (natural and social). The much and long disputed law of causality logically is true and valid but only in Model M_1, as a truth in the abstract; in M_2 is still valid but with qualification. From M_2 down to M_3 and M_4, the law of causality still holds but only partially with qualification, that is, being exposed to more and more exceptions and thus becoming more and more relativistic. At Model M_4 the law of causality reaches the status of becoming ambiguous; the answer is: "either, or", negative or positive, no or yes, a tautology or a Smarandache's paradox.

Beyond M_4 the law of causality is no longer operational, theoretically and practically. It is replaced by the law of indeterminism and supplanted by statistical probabilities. In physical sciences it is the territory of quantum mechanics.

13. The impossibility theorem in logic (analysis)

All great thinkers of the past have attempted, or at least were concerned with, developing one single general theory or, as Nobel Laureate Samuelson more recently put it, for economics "a general theory of economic theories" (1983, p. xxvi). It is the quest of searching for one universal theory capable of explaining all possible combinations or systems.

Logic was no exception to this most desirable goal. Wittgenstein, the master logician, thought that it was possible to develop such a thing, in his own words called "the most general propositional form", which was supposed to be the equivalent of one, single general theory. This was the prelude to his truth-schema for modern symbolic logic where truth-and-falsehood functions were arranged in a series of 16 combinations (Wittgenstein, 1963, p. 75). The Gödel incompleteness proof, however, blocked the realization of Wittgenstein's dream.

On our part, if we introduce in logic also the content of propositions as a complementary element to the truth-form, then, independent of the Gödel theorem, the orientation table shows that it is impossible by definition, i.e. *ab initio*, to develop one single, general or universal theory valid for all possible logical systems. In other words, to develop a single theory to cover the whole logical space at the micro- and macro-level.

Indeed, any such theory conceived to include first all models on the upper part of the orientation table would he negated by its counter-companion from the lower part. The final result would be a pure contradiction, or again, the Smarandache paradox.

This is the essence of the impossibility theorem in logic, which says:

> It is impossible by definition to develop one single general theory, sufficient to explain all possible cases or systems, that is, to cover the whole of logical space included in the orientation table, both in micro- and macro-analysis.

Albert Einstein also aspired to attain the same goal of one single theory (unified field theory) in physics but in the end he was forced to acknowledge that it was not possible. Here is his answer:

> Thus the story goes on until we have arrived at a system of the greatest conceivable unity, and of the greatest poverty of concepts of the logical foundations, which are still compatible with the observation made by our senses. We do not know whether or not this ambition will ever result in a definite system. If one is asked for one's opinion, one is inclined to answer no (see Einstein, 1950, pp. 62-3).

In continuation he wrote:

> While wrestling with the problems, however, one will never give the hope that this greatest of all aims can really be attained to a very high degree.

This confirms the opinion that Einstein shared the monistic philosophy in science. He was very close to formulating the impossibility theorem in physics when in the same place he confessed further:

> But it cannot be claimed that those parts of the general relativity theory which can today be regarded as final have furnished physics with a complete and satisfactory foundation. In the first place, the total field appears in it to be composed of two logically unconnected parts, the gravitational and the electromagnetic. And in the second place, this theory, like the earlier field theories, has not up till now supplied an explanation of the atomistic structure of matter (Einstein, 1950, p. 102).

We believe that the same monistic philosophy impeded him from making the last step in formulating the impossibility theorem, which in turn would have changed the direction of research after 1950, i.e. hunting for an imaginary final theory in physics (Weinberg, 1992).

With the help of the new research program, and in particular the new concept of integrated logic, there is a good chance of solving other problems like the Russell Paradox, to clarify the Gödel proof and to determine the line between logic and mathematics (see Rugina, 1998, pp. 291-6). The Gödel proof, for instance, is valid in modern, formal, mathematical logic since here you can form paradoxes at will, so to say, but it is not valid in the new integrated logic where you cannot form paradoxes at will by a simple, nominal inversion of the propositional terms.

14. An orientation table for ethics

Ethics, as an organized study based on concepts and theorems like all other sciences, even though not always clearly identified, went through the same two principal stages: the classical ethics of stable equilibrium, i.e. of certainty (perfection) and the modern ethics of disequilibrium or relativity (imperfection).

In 1903 George Edward Moore published his *Principia Ethica* which, according to the new research program, marked the dividing line between

classical and modern ethics. Bertrand Russell later wrote that "its effect on us (in Cambridge) and the talk which preceded and followed it, dominated, and perhaps still dominates, everything else". In fact, the influence of this book went far beyond the Cambridge circle. Its impact on ethical thinking of his time and thereafter is similar to that of *Principia Mathematica* of Whitehead and Russell (1910), of *Tractatus Logico-Philosophicus* of Wittgenstein (1921), of Einstein's Special (1905) and General Theory of Relativity (1916) and Sigmund Freud's *Lectures on Psychoanalysis* (1933). In reality, the work of these giants divides the passing from the first classical to the modern revolution in scientific thinking.

Principia Ethica of Moore indeed offers substance for further thinking, and it is provocative to a high degree in discussing these issues even when one may not agree with his final results, in point of application and unconditionally, as Bertrand Russell reported. There is no doubt that Moore was a great original thinker. He did not specifically formulate a theorem of relativity in ethics as Einstein did in physics, but he applied it. In fact, what he created was a new "ethics of relativity", corresponding to the spirit of the time when a second modern revolution in thinking took place in almost all sciences, including Lord Keynes with his general theory (1936).

The heart of the matter was the rise of a new development, in a fury of change, a new spirit against the classical ethics oriented at human perfection, unity, harmony and social stability. And this was happening without much concern about the consequences of change at a time when there was nothing better to substitute for the old heritage. It was toward the end of the Victorian age. Intellectuals in all fields of knowledge, including the arts, became interested in any deviations from and exceptions to the classical system and mode of reasoning. Moore was one who joined and pushed the new stream.

Moore's ambition was even greater than the legacy he left behind. In the Preface to the first edition of his *Principia* he wrote:

> One main object of this book may, then, be expressed by slightly changing one of Kant's famous titles. I have endeavoured to write "Prolegomena to any future ethics that can possibly pretend to be scientific". In other words, I have endeavoured to discover what are the fundamental principles of ethical reasoning; and the establishment of these principles, rather than of any conclusions which may be attained by their use, may be regarded as my main object.

A skilled analyst may detect a shade of doubt in the last part of the above confession of a credo. If one were so sure about the veracity of the fundamental principles in one's field of work, one could not relegate the conclusions from the application of those principles, so to say, to a secondary line of importance. Especially in this particular case where Moore in the paragraph before castigated all previous thinkers (all known great classical philosophers) in the study of ethics for not answering the questions they professed to answer, since, according to him, "ethical discussion, hitherto, has perhaps consisted chiefly in reasoning of this *totally irrelevant kind*" (italics are ours).

In this passage Moore unjustly criticized the classics. It is true that in his book he raised new questions and forged new tools of analysis which, of course,

led him to attain new results different from those achieved by his predecessors. On the other hand, we suspect that he was aware of a stumbling-block in his way to finish his dream of Prolegomena, namely, the performance of the classics. In order to feel free in his own mind with his own intellectual framework, in a crude way methodologically speaking, he used the same technique as did Einstein (even though surely not knowing of each other's work!), i.e. so to say, pushing aside the performance of the classics.

What Moore was not aware of, or failed to see in time, was the fact that – using current terminology – he changed the frame of reference, that is, the model and kind of reasoning used by predecessors, and therefore it was no surprise that his results were different. When we began studying Moore's *Principia*, we noticed soon and became somehow apprehensive that he was critical to the point of negation, in regard to the work in the same area not only by contemporaries like Sidgwick but also by John S. Mill, Bentham, Spinoza, St Augustine, all classical thinkers going back to Aristotle – as if the contributions of these distinguished thinkers of the past had little or no value.

Finally, after going through the book with great patience, we fully realized that Moore was an original thinker, like many predecessors, but he used a different approach, model and mode of reasoning from those before him. He did not, however, reach the point of being able to envision and prove analytically all possible ethical systems, as related to an individual (micro-ethics), a community or a nation (macro-ethics).

Briefly, Moore was short in providing the necessary ingredients for his promise: "Prolegomena to any future ethics that can possibly pretend to be scientific". Such a prolegomena is still a great challenge worthy of investigation. We think that a skilled social scientist with our new research program can provide material for a true and complete prolegomena to any future study in ethics.

Here we shall confine ourselves to the construction of the orientation table for ethics at the micro- and macro-level.

The basis of the table, in the form of an axiom, lies in the distinction between two distinct categories of values:

(1) Positive (equilibrium) values, i.e. moral facts associated with human conduct, behavior, institutions or legal provisions which satisfy conditions of general, stable equilibrium. These are the virtues, the good qualities, or the right and beautiful ethical elements in a human being and human societies.

(2) Negative (disequilibrium) values, i.e. moral facts which do not satisfy the conditions of general stable equilibrium (totally) and therefore are conducive to perpetual moral instability or decay, that is, social disequilibrium and disintegration.

These are the building blocks to construct models, both in micro and in macro-ethics.

Micro-ethics is concerned with the analysis of moral values of an individual living in a civilized society, a study which leads to the identification of the ethical profile of a person in all its possible facets or alternatives.

The orientation table (see Table V) in micro-ethics follows on the next page: building blocks for Table V:

V = pure virtues or positive values, the good qualities in man at their limit of perfection.

E = pure evils or negative values, i.e. the bad vices in man at their limit of intensity.

Of course, these are models, but in real life one and the same person by his or her daily actions and reactions in contact with other individuals, i.e. in dynamic analysis, may move ethically from one model into another, depending on the degree of strength or weakness in his or her character. In any case, his or her behavior at any given moment, no matter how good or bad, is included in this table. The remaining problem is to search in each particular case the degree of positive and/or negative values in order to be able to identify the respective ethical model that has application in that case, for further investigation.

Macro-ethics is concerned with the study of moral values and value judgments in the aggregate, with reference to ethical systems pertaining to a whole community or nation or the whole world, identified in the form of written or unwritten code of ethics versus the behavior of people.

Models	V	E	Description
M_1 =	100% V		The good man at the Divine limit of ethical perfection, as Aristotle conceived it. Pure and perfect ethical equilibrium within an individual
M_2 =	95% V	+ 5% E	A most virtuous good man in real life with some minor ethical weaknesses. A man of very strong character
M_3 =	65% V	+ 35% E	From M_2 to M_3: the area of minor ethical conflicts From M_3 to M_4: the ethical conflicts are more intense and more extended
M_4 =	50% V	+ 50% E	An ethically ambiguous person A relatively unreliable man; unstable equilibrium in a person
M_5 =	35% V	+ 65% E	A rather weak character From M_4 to M_5: the area of major ethical conflicts in man
M_6 =	5% V	+ 95% E	A very weak character A really evil man with little sense for ethical concern From M_5 to M_6: the area of an ethical character predisposed to crime and breaking the law
M_7 =		100% E	The bad man at the absolute limit of criminality Total ethical instability or disequilibrium Totally committed to evil

Table V.
An orientation table for micro-ethics

The building blocks are the same as in micro-ethics: pure virtues (positive, good, true, right or equilibrium values) and pure evils (negative, bad, false or disequilibrium values).

According to the general possibility theorem and based on the universal hypothesis of duality, we can conceive in the aggregate an unlimited number of possible ethical systems, which for study purposes can be reduced to seven basic models as shown in Table VI.

15. Impossibility theorem in ethical analysis

Following the orientation table, we can formulate an impossibility theorem in ethical analysis, which says:

(1) It is impossible by definition to construct one single, general theory in ethics, explaining all possible combinations or systems as Moore wanted.

Reason: any theory that would include all models on the upper part of the table would be simultaneously negated by a similar theory constructed with reference to the models on the lower part of the table. And there is no way to avoid this antinomy or pure paradox (Smarandache).

(2) It is impossible practically to expect or enforce a most perfect code of ethics in business, government and civil life in general, if we do not first

Models	V	E	Description
M_1 =	100% V		The ethics of pure virtues A 100 percent consistent ethical system The classical ethics of certainty or perfection
M_2 =	95% V +	5% E	A most consistent ethical system conceived in realistic terms A community or nation with a most advanced system of ethical values The ethics of special relativity
M_3 =	65% V +	35% E	The ethics of general relativity I The area between M_2 and M_3 of increasing minor ethical conflicts within a community
M_4 =	50% V +	50% E	An ethical system of ambiguities or confusion Unstable equilibrium ethics in a community
M_5 =	35% V +	65% E	The ethics of relativity II From M_4 down, ethical conflicts begin to dominate a community
M_6 =	5% V +	95% E	The ethics of disintegration of moral values The case of an imminent revolution or counter-revolution because the existing conditions are humanly unbearable
M_7 =		100% E	The ethics of pure evil

Table VI.
An orientation table for macro-ethics

Notes: The ethical profile of a community (small or large): Eth. = ethical systems related to all institutions, laws and social customs, including the behavior of all members of the community; V = all virtues in the aggregate; E = all evils in the aggregate

construct an institutional and legal framework consistent with what we called pyramid of human wisdom, as shown in Figure 1.

Reason: when a stable equilibrium form of institutional and legal framework is missing, the human behavior is confused, somehow pushed or induced toward unethical conduct, not necessarily by human nature *per se* but rather by a perverted social and economic system in a strong disequilibrium. Numeraire, fully covered commodity (gold or silver) money fulfills also an ethical function of limiting abusive political power.

16. An orientation table for political science

There is hardly any other field of knowledge (probably with the exception of economics) where there is more conflict or controversy between ideas and solutions produced by theoreticians or recommended by statesmen in power or in opposition than in the domain of politics and political science. Fundamental views and issues are tarnished by being constantly pulled in different directions with no way of determining, at least in science, the right direction.

The new research program and the construction of an orientation table for political science in particular can help to make order both in theory and practice. Political writers and politicians, in this century called "liberals", tirelessly insist that for almost every issue (public or semiprivate) there is no other workable or better solution than more government programs and in regulations (with or without central planning), even though now by the end of 1990s we are confronted with mountains of evidence that current governments, in the West as well as in the East, are not capable of delivering what they promise. Modern thinking in terms of disequilibrium conditions or man-made unstable equilibrium dominate this line of reasoning.

At the same time, conservative political writers and politicians (some reactionaries but also many true Liberals of the nineteenth century), with the same tenacity, defend the opposite view that there is no better solution than less government intervention and planning, even though it is also evident that a plethora of social and economic issues literally are crying for an effective and efficient solution that only wise governments can provide.

There is no need to belabor this sad state of affairs at length. The political, economic and social thinking of our time is torn apart and incapable of arriving at reasonable and workable solutions acceptable to a majority in the profession, and not less by an enlightened, well-informed citizenry. Especially on informing the public correctly and fully, we are deficient to a large extent.

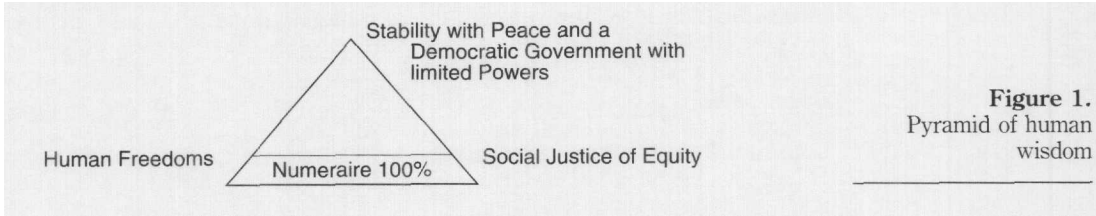


Figure 1.
Pyramid of human wisdom

A reminiscent yet soberly unclear heritage of the classical mode of reasoning lies with the conservative line of argument. The innocent, large part of the population, now poorly informed, forms the majority, but every four or five years when elections are held, they have no other alternative but to replace an incompetent conservative government with an incompetent liberal one, or vice-versa. "Incompetent" is valid for both cases, because a whole generation of economists after World War II were taught only one solution in schools (macromonetary and fiscal policies) due to the Keynesian doctrine in the West and to Marxian doctrine in the East. Both doctrines are refuted by the impossibility theorem in practice, as is evident in the orientation table for economics.

Admittedly, there is some solid truth in both the liberal and the conservative theses, but not in a super generalized and exclusivist form with no definite limits. It is these kinds of unconditional, unqualified generalizations which, among other things, characterize the intellectual and political malaise of our time.

The twentieth century was much more dogmatic in thinking and action when compared, for instance, with the nineteenth century, even though, on the surface and viewing it nominally, it may not seem to be so. To be more specific, we have not yet developed adequate methodological tools to see objectively and systematically how far the liberal or conservative side of the argument is true and valid and, in addition, to perceive what other possible points of view may be considered in finding out better solutions to the problems of our time. To repeat once more, both in theory and practice, no problem has been solved effectively and efficiently in practice without being first solved analytically, that is, theoretically beyond any reasonable doubt. We hope that our prolegomena (Rugina, 1998) can provide a reasonable solution to the impasse left by the twentieth century.

How did we arrive at this historical impasse, the incredible stage of (using Smarandache's[2] terminology) "paradox of too much knowledge" and no workable solutions? Assuredly, the impasse did not develop overnight. It is a long, complicated story worthy of a separate study. For the moment, we think that the clue for the understanding of today's conditions lies in a misinterpretation of two essential but incomplete revolutions in political thinking.

The new research program of a simultaneous equilibrium versus disequilibrium approach can help to identify the two revolutions in question. The first is the classical approach, which in a rudimentary but meaningful form goes back to the beginning of the history of social life. It is the search for a better life, conceived both spiritually and materially.

More specifically, it is the human imagination tracing the vision of a most perfect state and form of government, as we can find, for instance, in Aristotle's *Politica* (334 BC) and St Augustine's *The City of God* (AD 426). Aristotle wrote:

> The conclusion is evident: That governments which have a regard to the common interest are constituted in accordance with strict principles of justice, and are therefore true forms; but

> those which regard only the interest of the rulers are all defective and perverted forms, for they are despotic ... Now it is evident that the form of government is best in which every man, whoever he is, can act best and live happily.

St Augustine was also a classic thinker, when he wrote;

> And so we define the end of good to be as follows: It is not something by which the good is consumed so that it ceases to exist but something by which the good is perfected so as to reach fullness and the end of evil is not something by which it ceases to be, but something by which evil is carried to the extreme point in doing harm. These ends are the "supreme good" and the "supreme evil".

Beyond any doubt, we may consider Aristotle and St Augustine as the first fathers of the universal hypothesis of duality in the ancient time. The roots of the simultaneous equilibrium vs. disequilibrium are clearly implanted in the thinkers of the ancient world too, even though we do not know whether our vision of a perfect state and form of government based on conditions of general stable equilibrium, as established in our Prolegomena Ch. 3 (Rugina, 1998) was ever explicitly stated. We leave this matter to be answered by historians of development of thought. That the classical concept of a most perfect type of society, economy and government in general terms, existed, even when quoting only Aristotle and St Augustine, is sufficient evidence.

Regarding the modern times, the roots of classical thinking about a free society, economy and form of government can be found in the works of John Locke, Montesquieu, David Hume, J.J. Rousseau, Edmund Burke, Thomas Jefferson, Jacques Maritain, to mention only a few giants included in the *Glossary of Prolegomena*.

However, regarding the modern era, we should not forget the other approach in terms of more concrete, existing disequilibrium, empirical, actual mixed conditions. In this respect, we should remember the works of Niccolö di Bernardo Machiavelli who wrote *The Prince* (1516), Thomas Hobbes with his *De Cive* or *The Citizen*, Karl Marx, Harold Laski and others who opposed liberal philosophy.

Thomas Hobbes, in *De Cive*, wrote:

> There are no authentic doctrines concerning right and wrong, good and evil, besides the constituted laws in each realm and government; and that the question whether future action will prove just or unjust, good or ill, is to be demanded of none, but those to whom the supreme has committed the interpretation of his laws ... the civil laws ... are nothing else but the command of him who has the chief authority (pp. 70-75).

Harold Laski in his book *The State in Theory and Practice* (1935) wrote:

> The purpose of this book is to discover the nature of the State ... to explain that nature by an examination of the characteristics as they have been revealed by its history; and in their light, it seeks to outline a theory of the state more in consonance with that history than the classic outlook.

We can see here how Laski, even though in principle he is on the same line as that of Hobbes, nevertheless in point of language he is distancing himself from Hobbes, showing that the spirit of the time changed.

Summing up, we can distinguish between two bipolar basic principles in the organization of a state and form of government defined:

Demo	=	The principle of pure democracy, or the ideal type of an equilibrium form of government and state, based on voluntary cooperation or social consent according to the voice of majority with the respect of minority rights.
Olig	=	The principle of pure oligarchy, despotism or the dis-equilibrium form of government and state, based on forced cooperation or social coercion and according to the interests of those in power.
Nu	=	Numeraire, equilibrium, or 100 percent commodity-type of money.
anti-Nu	=	Anti-numeraire, disequilibrium, paper and credit-type of money.
$R_1, R_2 \ldots R_7$	=	Factor R or a suitable institutional and legal framework consistent with each model on the orientation table (see Table VII).

For what purpose can the orientation table in political science be used? In political history, with the help of the table, we can determine easily the real nature of a given government and state and thus facilitate the work of a research man.

In political theory, the same table warns the analyst that there are various possible political systems, i.e. models of a different structure which require a different solution for any given problem, depending on the model where we want to search it.

In political ethics, the table gives the scientist, again, a warning that absolute ends and values exist only in Model M_1 and this is a truth in the abstract only.

In political practice, the table helps a wise statesman to identify where his political boat (government) is docked: a relative equilibrium as in M_2 and M_3 or a major disequilibrium as in M_5 or M_6, and in what direction it may move.

In political doctrine or history of political thought, the table can be useful to determine the model where a given concept or theorem, coming from an original thinker or school, is valid beyond any doubt.

Finally, for some professionals the most important message brought to light (Table VII) is the fact that the mixed modern capitalist regime was never close to M_1 (Walras) or M_2 (Marshall) but rather moved up and down around M_4 (Keynes), i.e. the territory of unstable equilibrium with unemployment.

During the 1990s, the situation of modern capitalism was even worse, being strangled around M_5. A good example is Japan in 1997-99.

Models:

M_1: *Demo* 100% + *Nu* 100% + R_1
The political system of *Pure* and *Perfect Democracy* at the limit in a State, Society and Economy under conditions of general stable equilibrium in every respect.

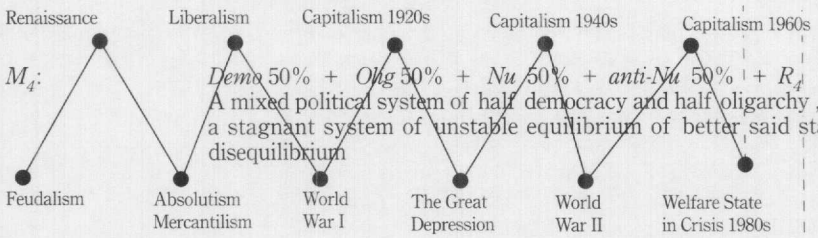
This is the ideal system of perfect Human Solidarity as envisioned by Cesar Partheniu (1938, 1939) and also by all classical thinkers going back to St Augustine and Aristotle.

M_2: *Demo* 95% + *Olig* 5% + *Nu* 95% + *anti-Nu* 5% + R_2
A most perfect political system of Democracy, judged in human terms and which can be realised anywhere in the world; it is a system of general equilibrium in practice.

Around Model M_2 there are only minor social conflicts and insignificant disequilibria.

M_3: *Demo* 65% + *Olig* 35% + *Nu* 65% + *anti-Nu* 35% + R_3
A Mixed political system where democratic features still prevail but oligarchic characteristics are increasing.

Around Model M_3 we are faced with more serious social conflicts and significant disequilibria, which, however, with good will and understanding can be solved, specifically by applying wise policies in the direction toward Model M_2.

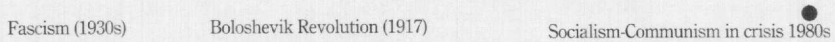


M_4: *Demo* 50% + *Olig* 50% + *Nu* 50% + *anti-Nu* 50% + R_4
A mixed political system of half democracy and half oligarchy, i.e., a stagnant system of unstable equilibrium of better said stable disequilibrium

M_5: *Demo* 35% + *Olig* 65% + *Nu* 35% + *anti-Nu* 65% + R_5
A mixed political system where oligarchy (open of hidden) prevails.

Around Model M_5 we are in the area of major disequilibria where very serious social conflicts endanger the existence of any democratic regime. The problems are beginning to become insoluble by democratic routine policies.

M_6: *Demo* 5% + *Olig* 95% + *Nu* 5% + *anti-Nu* 95% + R_6
A fascist of Marxist revolution has succeeded to overthrow the old regime and establish a dictatorship of the right or the left.



M_7: *Olig* 100% + *anti-Nu* 100% + R_7
The political system of *Pure* and *Perfect Oligarchy* at the limit in a totally collectivistic form of State, Society and Economy.

Table VII.
An orientation table for political science

17. Nobel Laureate Arrow's impossibility theorem vs. Rugina's version

As it is well-known in the profession, Nobel Laureate Kenneth J. Arrow developed a version of an impossibility theorem in political science where the model of reasoning is composed of three voters, three alternatives, the "paradox of voting" and the use of modern, formal symbolic or mathematical logic. The final result: it is impossible to apply the democratic method of majority decision without ending with a contradiction, i.e. the paradox of voting.

We do not want to open an argument with Nobel Laureate Arrow but rather to apply the Einstein heritage that, if we change the framework reference, i.e. the model of reasoning, and also we introduce the new integrated logic developed in the prolegomena, then the paradox of voting is decomposed, resolved, and the democratic method of majority decision is confirmed, both analytically and practically. In other words, the Arrow impossibility theorem can be converted into a possibility theorem. This corresponds also with Professor Smarandache's[2] theory of paradoxes.

Because the argument – in the good sense of the term – is so important for the benefit of the reader, we give a rather long quotation so that the voice of Laureate Arrow and not our interpretation will speak:

> In ideal dictatorship there is but one will involved in choice; in an ideal society ruled by convention there is but the divine will or perhaps, by assumption, a common will of all individuals concerning social decisions, so in either case no conflict of individual wills is involved.
>
> The methods of voting and the market, on the other hand, are methods of amalgamating the tastes of many individuals in the making of social choices.
>
> The methods of dictatorship and convention are, or can be, rational in the sense that any individual can be rational in his choices. Can such consistency be attributed to collective modes of choice, where the wills of many people are involved?
>
> It should be emphasized here that the present study is concerned only with the *formal aspects of the above question* (italics are ours).
>
> That is, we ask if it is formally possible to construct a procedure for passing from a set of known individual tastes to a pattern of social decision making, the procedure in question being required to satisfy certain natural conditions. An illustration of the problem is the following well-known "paradox of voting".
>
> Suppose there is a community consisting of three voters, and this community must choose among three alternative modes of social action (e.g. disarmament, cold war, or hot war) (Arrow, 1951 and 1963, p. 2).

First of all, Laureate Arrow's model is very restricted and hypothetical. If his theorem is translated into practice, then that would mean simply that a really democratic form of government is impossible by definition. Our orientation table shows clearly and beyond any doubt (in the Newtonian sense) that both in analysis (Model M_1) and in practice (Model M_2) "an ideal society ruled by convention" – using Arrow's language – or by the rule of the democratic process of the majority voice – in our language – is possible. It is possible in terms of both "pure reason" and also "practical reason", in

the Kantian sense. Thus it satisfies the rule of integrated logic, whereas Arrow's model satisfies, according to his own description, only the formal logic.

Our position is supported by the possibility theorem in analysis as well as in practice which says:

> When all the conditions for a general stable equilibrium in regard to the economy, money, finance (private and public), organized official and private markets of securities, commodities and foreign exchange, a law for social and economic justice (Law of Omenia), are fulfilled, then a really democratic and functionable system of government of limited powers, and following the majority voice with respect for minority rights, is possible beyond any doubt.

Our orientation table and the whole new research program with respect to political science can help to formulate also an impossibility theorem in analysis which lies outside of Nobel Laureate Arrow's theorem of impossibility. The new theorem says:

> It is impossible by definition to construct one single, general political theory capable of including and explaining all possible combinations or systems indicated on the table from M_1 to M_7 included.

Reason: since all models on the lower part of the table are reciprocal or diametrically opposed to all models on the upper part, there is no single general theory that could satisfy the logical requirement, that is, the condition of being true and valid for every possible model on both sides. In other words, any general theory which would include the upper part, by necessity would be negated by its counterpart on the lower part, and there is no way to avoid the antinomy or Smarandache's paradox.

The dream of a single general theory, shared by many thinkers of the past, of the present and we dare to say, of the future appears thus shattered. Both Laureate Arrow and Laureate Samuelson, as mentioned earlier, are oriented in the same direction. However, a final evaluation by the use of the orientation table and the integrated logic shows that the attainment of such an ideal is impossible by definition. More dramatic, to repeat, was the case of Einstein, who also attempted to construct such a universal theory called "The unified theory" but, when he was older, in *Out of My Later Years* (1950) he was forced to admit, like any great thinker: "We do not know whether or not this ambition will ever result in a definite system. If one is asked for one's opinion, one is inclined to answer no". Our impossibility theorem in analysis confirms that the great Einstein was right in his judgement, five years before he died. And this author owes him and his sincerity as a scientist, very much in this and other matters.

The impossibility theorem in practice, again with no relationship to Laureate Arrow's principle, says:

(1) It is impossible to realize in practice and maintain over time (in dynamics) a most perfect possible democratic form of State and government, unless among other requirements included in factor "R"

(the institutional and legal framework), a 100 percent numeraire currency and banking system are fulfilled with priority, in the sense that no substitute can replace them.

(2) It is impossible to sustain over time (in dynamics) any sort of political dictatorship or oligarchy, so long as a 100 percent numeraire currency and financial system is retained and respected.

Hobbes, in political science, entertained the same ambition to construct a single general theory. He started his reasoning from the opposite direction, respectively from Model M_7 (his version of the "state of nature" being complete anarchy) but he could not go further than Model M_6, which does not confirm the possibility of a general theory.

The full truth, according to the orientation table, is that universal statements (concepts and theorems) are not possible in the realm of science. The primary reason lies in Axiom 1, namely, the universal hypothesis of duality, which gives a more realistic and more complete vision of the world – the physical and social universe – in which we live.

There is an organic, stable equilibrium relationship among society, state, economy, money, banking, finance and form of government which is revealed by the orientation table in integrated logic, economics, money and banking, finance, ethics, sociology and political science, concentrated in Model M_1 (pure theory or abstract truth in the good, constructive sense of the term), and Model M_2 (practice or truth in the concrete) as presented in the prolegomena together with the equation of unified knowledge: $S = f(A, P)$.

Final remarks: where do we go from here?

18. The future belongs to a social economy of human solidarity

> The difficulty lies, not in the new ideas, but in escaping from the old ones, which ramify ... into every corner of our minds (John Maynard Keynes, 1936, Preface).

> To be overcome in science is not only our destiny but also our own purpose. We cannot work without hoping that others will come further than us (Max Weber, 1919).

It is a sad story that powerful vested interests in the material world of business and finance, combined with vested interests in the world of ideas, specifically in some powerful dogmatic intellectual and scientific circles, are impeding the realization of the old and great ideal of humanity: to live in a social and economic order based on individual freedoms, social justice of equity in principle and of equality whenever required by special circumstances in the distribution of national income and wealth and monetary and financial stability, without economic and financial crises of the business cycle, and peace within and outside a country.

Beneath the surface of daily news there is nowadays a continuous struggle at the global level between the two rivers of vested interests mentioned above, a struggle for unrestricted power, first by managers of large national and international corporations now in a furious trend of global concentration, in

both the financial and the commercial sector, as if led by an "invisible hand" to fulfill Karl Marx's dream of easy socialization, when the time comes. On the other hand, there are powerful dogmatic intellectual and scientific circles which want to share first and then dominate the economic and financial power in the decision-making process at the national and international level, via serving as advisors (experts) on both sides of the game – private business and government, including international organizations.

This is the real and complicated problem with which humanity is now faced when we are on the eve of entering the third millennium, a problem which is not discussed at all as a public issue for information. Adverse forces are trying on all occasions and by any means to impede this particular issue in becoming an open, pro and con, dialogue among scientists and the public in general.

Under these conditions, the moral responsibility of any social scientist is to ask: "Where do we go from here?" The global disequilibrium in which we are now, with two rather weak exceptions (USA and the European Economic and Monetary Union), cannot go on indefinitely. Whether we like it or not "A great transformation" will come not too long into the twenty-first century. It could be for better, if we prepare it properly and fully, but it could be also for worse, if we allow blind historical forces of disequilibrium to act, manipulated without any public discussion by the two vested interest groups mentioned above. Indeed, if the first group wins, then the capitalist regime with all its economic, financial and social problems of today and yesterday may be prolonged for one or two generations. If the second group wins, then for sure we will be living under a new regime, in all probability called "communitarian system" (an expression already in circulation in certain American circles), i.e. a centrally-planned and controlled economy, at the global level, led and controlled by international organizations like the IMF. the World Bank and other United Nations departments. The previous nationalist rivalries of old politics will play no role. The game will be guided by a new version of economic and financial disguised dictatorship. We say disguised because it will be presented as a "historical necessity" of a better communal life all over the world. This sad state of affairs will not survive too long, because the new communitarian regime could not deliver what it promises but humanity meanwhile will be bleeding.

This scenario was presented as a hypothetical case to warn other social scientists and economists that we are not "*sur la bonne voie*" – "on the right track!" International experts in collaboration with national colleagues on both sides of the game, by their wrong advice, macro monetary and fiscal policies, together with austerity measures, are fighting a losing battle with the real impossibility theorem in practice and *nolens volens* they are pushing history to disaster.

In this way, by intention or not, they are prolonging the contradiction between the prevailing theory and the given realities, exactly as it happened in the early 1930s when the Harvard Barometer just a few weeks prior to the "Black Thursday" in October 1929, wrote that the American economy was never so flourishing before and truly was never before so sick!

The international experts in unison with Japanese economists are responsible for the fact that Japan, the greatest creditor country in the world with the largest international reserves, has been fighting for two years and cannot extricate itself from the present economic, monetary and financial crisis.

The Southeast Asian countries, including Russia and recently Brazil, all debtor countries, are tortured by the same dilemma and are begging for billions and more billions of credit (loans) from outside financial institutions. And the International Monetary Fund, the World Bank and other international organizations, including US banks, are granting these loans because in the first place they make a profit by charging compound interest rates and, in the second, they think they are helping to restore and preserve economic and financial stabilization in the world. In reality they are increasing international indebtedness, which in turn is not only retarding a possible future recovery under stable equilibrium conditions, but on the contrary is creating new financial problems when this extra indebtedness comes to maturity.

One word more about the global disequilibrium. In January 1999, the EURO was launched with a big media-communication splash, but it "has fallen steadily from its inception and reached a new low against the US dollar of $1.10 versus its starting position of $1.17 just six weeks ago" (see *The New York Times*, February 21, 1999). The European experts, no doubt in consultation with their colleagues at the IMF and World Bank, i.e. the architects of the Maastricht Treaty of 1992 who constructed the monetary plan for the EURO, carry the full responsibility for whatever may happen in the future to the European Monetary Union, especially if the European Central Bank in Frankfurt a.M. loses the gold reserves of the 11 member countries by engaging in pure speculations to defend an indefensible paper EURO, i.e. in fighting a losing battle with the impossibility theorem in practice.

We think that the coming "great transformation" can be guided for a better world of tomorrow only through a new orientation and full information of the public opinion everywhere in the world that the best alternative to so many unsolved problems exists but it is not discussed freely and openly, because of some vested interests in the world of ideas to perpetuate a certain dogma which proved to be unsuccessful in practice and socially harmful for so many. The solution is, and cannot be other than, the realization of a free, just and financially stable society and economy based on conditions of general stable equilibrium, as indicated on the orientation table by Model M_1 and M_2.

Philosophically speaking, we are living in the twilight of a much deeper crisis due to a gap between modern civilization and modern culture. There is a prolonged transition of a haphazard technical development which has reversed to a significant degree the relationship between man and society, including science as an instrument, i.e. technology to change environment. Originally it was supposed to improve the life of man in a civilized society.

With the passing of time and because of a disequilibrium method in financing it (paper money and monetized credit or "forced saving" by the people, but no due compensation), creating illegitimate profits to business, banks and even the state, the tempo of mechanization has increased and created social problems. To a large extent modern technology has become the master of our daily life. It will not be easy to turn the clock of history back in the right direction, but it is not impossible.

Mechanization in the material world may have in continuation serious repercussions on human destiny by implanting mechanization also in the world of ideas. By trusting completely that machines can ultimately perform human reasoning – as it is now being experimented – we may create in human beings a state of spiritual stagnation, a laziness of the mind, no longer being alert to what is happening around or why? We are not at all safe from what Orwell described in his novel *1984* as a nightmare fantasy. What Dr John C. O'Brien calls the "eternal values in man", during such a process of dehumanization may be turned upside down by evil governments or false prophets (see O'Brien, 1982).

The real problem is not to stop or reverse modern technology, which would be nonsense, but rather to slow down with new technology and give a chance to more prosperity for all, more employment opportunities and fewer social problems. This is what a social economy of human solidarity, based on conditions of general stable equilibrium can do. Should we ever decide to introduce such a system, then a new era for humanity will start.

Notes

1. de Malebranche, Nicolas (1638-1715), theologian and philosopher, under the influence of Newtonian Mechanics tried to create a similar "social physics" to explain by one single principle the social universe. See: *The Harper Dictionary of Modern Thought*, edited by Alan Bullock and Oliver Stallybrass, Harper & Row, New York, 1977, p. 587.
2. The contribution of Professor Smarandache was postponed for another occasion.

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