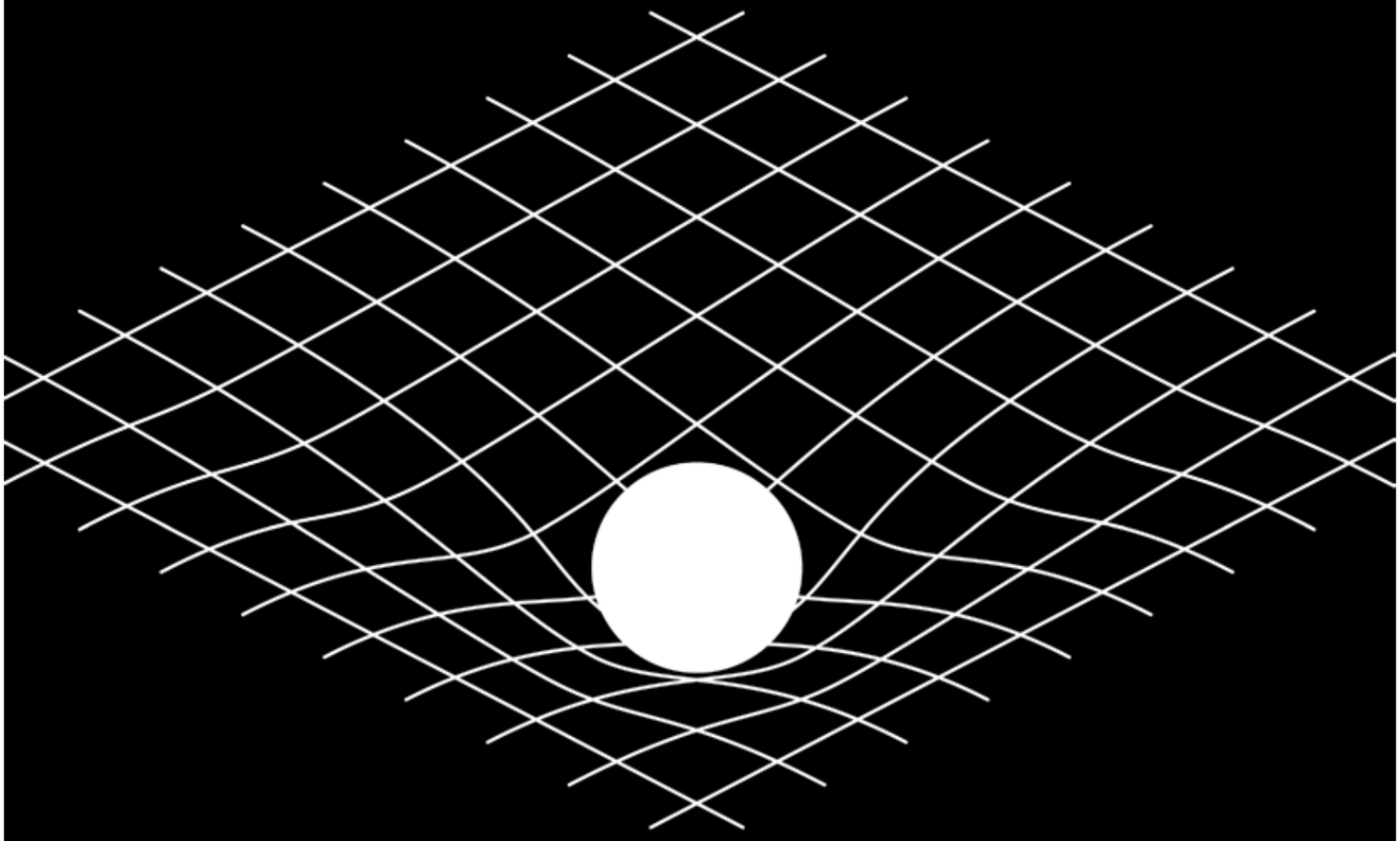
SPECIAL ISSUE 64 APR 19 JIM SCHOFIELD



SHAPEJOURNAL

THE LIMITS OF MATHEMATICS

THE INFINITE / WHY MATHEMATICS DISTORTS / A MIRROR OF REALITY AT THE QUANTUM LEVEL / TIME CRYSTALS
COMPUTER SIMULATION AND REALITY / TIME IN SPACE: OF GRAPHS AND PLURALITY / THE EFFECT OF MATH ON THOUGHT

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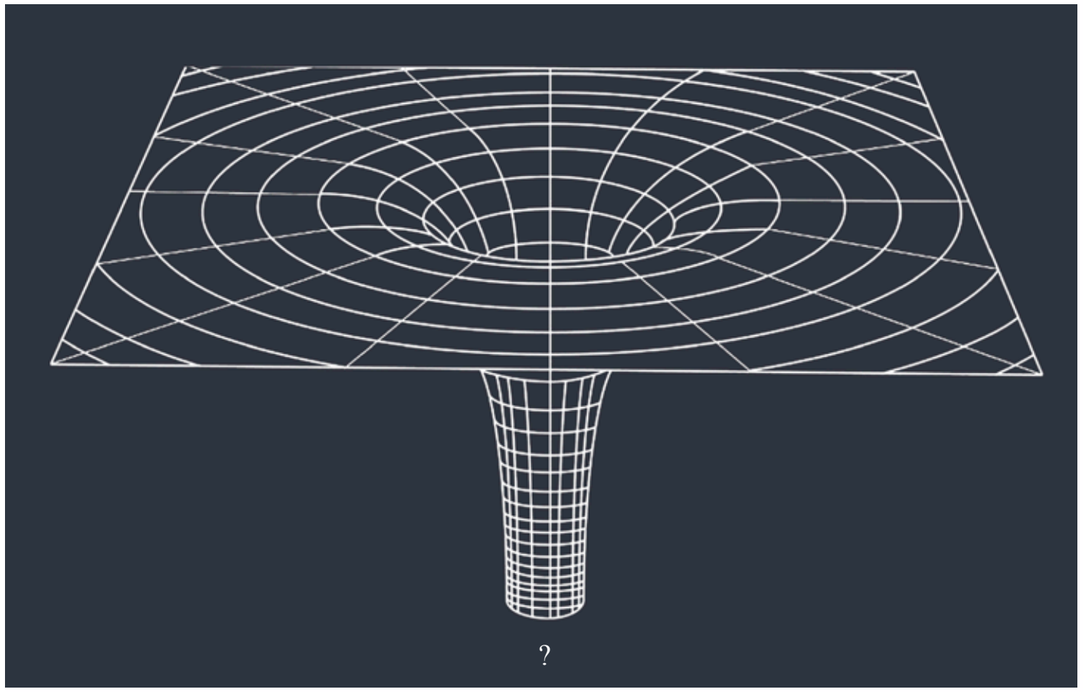

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The Limits of Mathematics

Special Issue 64 / April 2019

The Limits of Mathematics

Why

Pluralist

Mathematics

Misleads

by

Jim Schofield

Welcome to Special Issue 64. This edition deals with the various limitations of Mathematics from a variety of different scientific and philosophic angles, and features a fantastic guest paper by Abdul Malek, a Theoretical Physicist and Dialectician from Montreal, Canada.

It has taken me many decades to realise quite how limited Mathematics really is. I have the advantage of having been a gifted mathematician long before I switched to Physics. I made that significant change because Mathematics is a purely descriptive abstract discipline, of a very special type, and I wanted to really understand things rather than merely describe them in abstract form.

So, having Physics teachers with a similar view to my own, I switched-over, and concentrated all my efforts upon both the understanding and the explaining of physical reality, in more concrete ways.

But, it seemed that both I and my teachers were rapidly becoming a minority! For at University, both my fellow students, and my Physics lecturers considered that Mathematics was the more profound of the two disciplines. Physical Explanations were being abandoned at a remarkable rate, for a primarily, purely mathematical approach. My requests for Explanations of phenomena were invariably responded to with an Equation, delivered as an eternal Natural Law.

My response was to ask "Why?", and the inferrences it involved in answering that question. But it was invariably condescendingly dismissed by saying that it was the "Driving Essences" of Reality that were sought, and not mere explanatory speculations, so I never got my answers. However, I could "do" all the Maths, so my lecturers and fellow students criticisms of my "evident mathematical inadequacies", did not dissaude me from what I wanted from my studies (as I was always among the most adept in my Mathematics courses). And, I also knew that Physics, when given the priority it now always got, in the absence of Causal Explanation, the only route to a hopefilly coherent, consistent and comprehensive developmental methodology was believed to be confined to what was possible within Mathematics alone.

I got my degrees, but not in what I believed Physics to be! Though I did aquire a great deal more Mathematics, along the way, during those years. But, my alternative stance was not confined to the Description/Explanation supposed alternative purposes of the Science. For all experiments would also almost never address Reality-as-is. They had to be so severely filtered and constrained as to clearly deliver only a single involved relation or Law: for only then could a consistent relation between significant variables be revealed, and then also only over a given very-limited range. Yet, in almost all natural situations, multiple simultaneous factors were invariably involved.

So, the question just had to be asked:- "Was the relation obtained, from the extensively and rigidly farmed experiment, identical to how that same factor behaved in Reality-as-is?" The founding Greeks had "discovered" that such an assumption was indeed valid, within their new invention termed Euclidian Geometry, and thereafter also in the extention of that discipline into Mathematics.

What pertains is called The Principle of Plurality. But sadly, isn't true in both Reasoning or in Reality-as-is, where what pertains is The Principle of Holism! We can only really understand things by looking at their material contexts.

Now, this seems so blatantly wrong: how could it possibly be missed? Very easily indeed, if all investigations are always conducted in artificially-stablised-contexts, where Plurality does indeed hold.

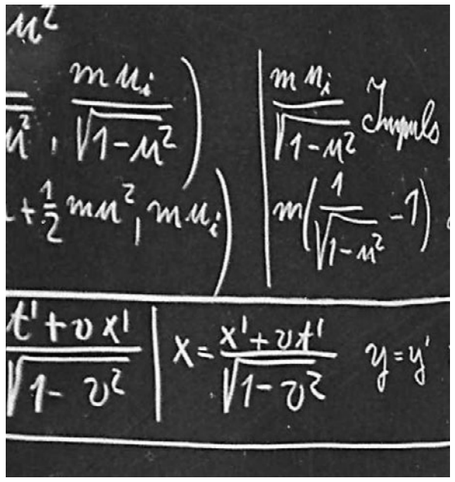
Now, even that wasn't the end of the distorting arrangements and consequent misconceptions involved! For, thereafter, Pure Forms from Pluralist Mathematics were fitted-up to match those found-relations, by using data from those experiments to convert a General Ideal Form, including constants, into a particular version with those constants evaluated via multiple inertions of the data into the General Form, so that by the method of Solving Simultaeous Equations, the necessary constants could be evalcated.

So, thereafter, the extracted Law was converted to being Pluralistic, Fixed & Idealised. Reality had been shoe-horned into an inccurate form, within which, if maintained as such, possible situations could both be predicted and even used to some required end.

Physics had ceased to be a Science, and had been converted into a Technology!

So, the once primary Holistic Causal Explanation was gradually turned, first, into a mere accompanying narrative, and then increasing dropped altogether!

And yet, today, the whole discipline assumes that Reality slavishly obeys such carefully arranged-for, and artificially achieved formulations - justified wholly by the inapplicable Principle of Plurality, which can only be used legitimately if Natural Laws are *eternal* - and that is certainly not true.



Now, conditions can be achieved, via rigorous eliminations and farming of conditions, to approximately approach those ideal contexts: we call such the establishment of an appropriate Stability.

In other words, Physics was converted into a Pluralist Science of Stabilities: and one driven idealistically by Purely Formal Laws.

No wonder it is in an untranscendable terminal impass as a Science!

Indeed, we can legitimately go a great deal further, and insist that it no longer investigates Reality-as-is, but instead can only deliver a distorted formal reflection of that World: it is an investigation of Ideality - the infinite World of Pure Forms alone: the Abstract Realm of Mathematics.

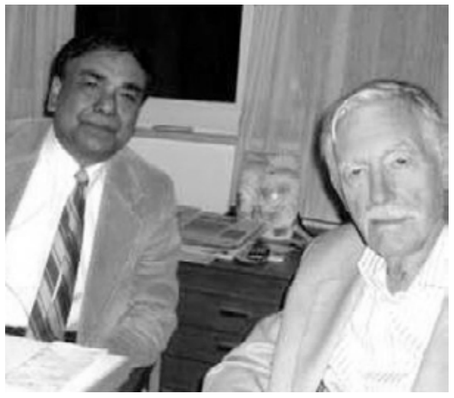
In short, Physics can only be saved via a wholesale rethinking of Mathematics and how we use it.

The Infinite

as a Hegelian Philosophical Category and Its Implication for Modern Theoretical Natural Science

by

Abdul Malek



Dr. Abdul Malek with Prof. Halton Arp
Malek is a retired Canadian scientist whose current research advocates a dialectical approach to understanding nature and life

1 The infinite as a mathematical category

The concept of the infinite as a mathematical category arose naturally enough with the invention of the numerical system by the Sumerians around 3000 B.C. and the subsequent developments of the concepts of geometry, the measure of time, mathematical operations (arithmetic, algebraic, exponentials etc.), One could always add or subtract a unit of number, length or time to get a new one ad infinitum without an end. This infinite is undetermined, has no characterization and was termed the "spurious" or the "false" infinite (bad infinity) by G. W. F. Hegel (1770–1831 A.D.), as opposed to the "True Infinite" (to be discussed later).

"The spurious infinite" according to Hegel [1],
". . . seems to superficial reflection something very grand, the greatest possible. . . . When time and space for example are spoken of as infinite, it is in the first place the infinite progression on which our thoughts fasten . . . the infinity of which has formed the theme of barren declamation to astronomers with a talent for edification. In an attempt to contemplate such an infinite our thought, we are commonly informed, must sink exhausted. It is true indeed that we must abandon the unending contemplation, not however because the occupation is too sublime, but because it is too tedious. . . the same thing is constantly recurring.

We lay down a limit: then pass it: next we have a limit once more, and so for ever."

The infinite as a mathematical category took a mystical form once Pythagoras of Samoa (580?–520 B.C.), and later Plato (429–347 B.C.) idealized the numbers, their relations and geometry into their philosophical system, where the infinite along with the numbers and the forms were universals that exists in a realm beyond space and time for all eternity, a realm that sense perception cannot reach; it is only given to thought and intuition.

As Frederick Engels [2, p. 46] wrote,
"Like all other sciences, mathematics arose out of the need of man; from measurement of land and of the content of vessels, from computation of time and mechanics. But, as in every department of thought, at a certain stage of development, the laws abstracted from the real world become divorced from the real world and are set over against it as something independent, as laws coming from outside to which the world has to conform. This took place in society and in the state, and in this way, and not otherwise, pure mathematics is subsequently applied to the world, although it is borrowed from this same world and only represents one section of its forms

of interconnection — and it is only just precisely because of this that it can be applied at all".

The mathematical pursuit of the infinite therefore, of ne- cessity became a spiritual endeavor. In his attempt to know the infinite and to prove his continuum hypothesis, Georg Cantor (1845–1914 A.D.) for example, was eventually compelled to make a distinction between consistent and inconsistent collections; for him only the former were sets. Cantor called the inconsistent collections the absolute infinite that God alone could know. His idea of an "actual infinite" attracted theological interest because of its implication for an all-encompassing God; but at the same time it inspired scorn of the contemporary mathematicians. What Cantor, other mathematicians and natural science pursued in reality is the "spurious infinite" of Hegel. An infinite series starting with a first term is also undefined, because there is no end to the other side, and one cannot come back to the first term starting from the other end. Cantor's pursuit of the infinite led him to the ridiculous idea of the infinity of infinities, and no other mathematicians followed his steps. If there is more than one infinite then by definition they become mere finites. Math- ematicians of all ages had no clue as to the nature of the infinite; some denied its existence all together; while others maintained (following Plato) that mathematical entities can not be reduced to logical propositions, originating instead in the intuitions of the mind.

2 The infinite as a scientific category

Historically, natural science took a rather pragmatic and an opportunistic approach towards infinity, i.e., reductio ad absurdum argument which avoids the use of the infinite. It truncates infinity by putting an arbitrary limit as Georg Cantor did, and calls the rest the "absolute infinite" that is known only to infinite God. It deals with infinity with some arbitrary mathematical tricks, for example, a circle is the limit of regular polygons as the number of sides goes to infinity; an infinite series starts with a first term; in renormalization, one set of infinite is cancelled by invoking another set of infinite to get a finite result that was desired in the first place and so on.

Isaac Newton (1642–1727 A.D.) and Albert Einstein (1879–1955 A.D.) faced the same conceptual problems of the infinite universe in formulating their theories of gravity. Einstein declared, "Only the closed ness of the universe can get rid of this dilemma" [3]. He then set himself to develop a theory of gravity based on geometry, because geometry deals with closed space!

But an attempt to truncate infinity this way can only lead us back to medieval geocentric cosmology. The unpleasant fact is that, by definition a truncated infinite is also infinity and any mathematical operation on infinity leaves it unchanged as Galileo asserted in his famous 1638 pronouncement on infinity that, "Equal", "greater", and "less" cannot apply to infinite quantities [4]. The arbitrary renormalization process and reductio ad absurdum practiced by natural science cannot resolve the contradiction of the infinite; it only leads to more and more contradictions and a dependence on ever more mysteries and theology, as we observe in modern theoretical natural science. The reason why Albert Einstein chose a finite and closed universe as opposed to the open ones was not only to make his equations meaningful and/or because of his love for simplicity and aesthetics, as reductionist ideologues and worshipers of symmetry would have us believe, but also because of his sober realization that his Machean-philosophy based cosmology collapses in an infinite universe. If Mach's principle is followed, then an infinite universe means that the inertia and the mass of atoms etc. also become infinite. To keep the world as we see it now (inertia, mass, etc.); all Mach based cosmologies must have the universe started at a finite past and also must have a finite extension. So this way the contradiction of infinity is not solved.

The notion of the infinite in natural science became ever more clouded after Albert Einstein established the primary role of mathematics in natural science. Natural science became seduced to the idea that where experimental evidence and empirical data is difficult and/or impossible to obtain "logical consistency of mathematics" will lead the way. The stunning success of the theories of relativity in early 20th century, led Einstein to revive Pythagoras's notion of mathematics. "How can it be" he wondered, "that mathematics being a product of human thought which is independent of experience, is so admirably appropriate to the objects of reality?" [5].

The theory of general relativity is a classic example where the power of mathematics, pure thought and aesthetics devoid of any empirical content is purported to have conceived the ultimate reality of the universe. "Our

experience hitherto justifies us in believing that nature is the realization of the simplest conceivable mathematical ideas. I am convinced that we can discover by means of purely mathematical constructions the concepts and the laws connecting them with each other, which furnish the key to the understanding of natural phenomena. ... In a certain sense, therefore, I hold it true that pure thought can grasp reality, as the ancients dreamed", declares Albert Einstein [6].

With his mathematical idealism Einstein erased the difference between the pure mathematics, whose program is the exact deduction of consequences from logically independent postulates, and the applied mathematics of approximation needed for science. Natural science uses approximate empirical data, which are fitted on in various ways to analytic functions of pure mathematics that helps in the systematization, generalization, and the formulation of tentative theories. But the results and the inferences are only valid in a narrow range of the data values for the argument for which approximate empirical information is available.

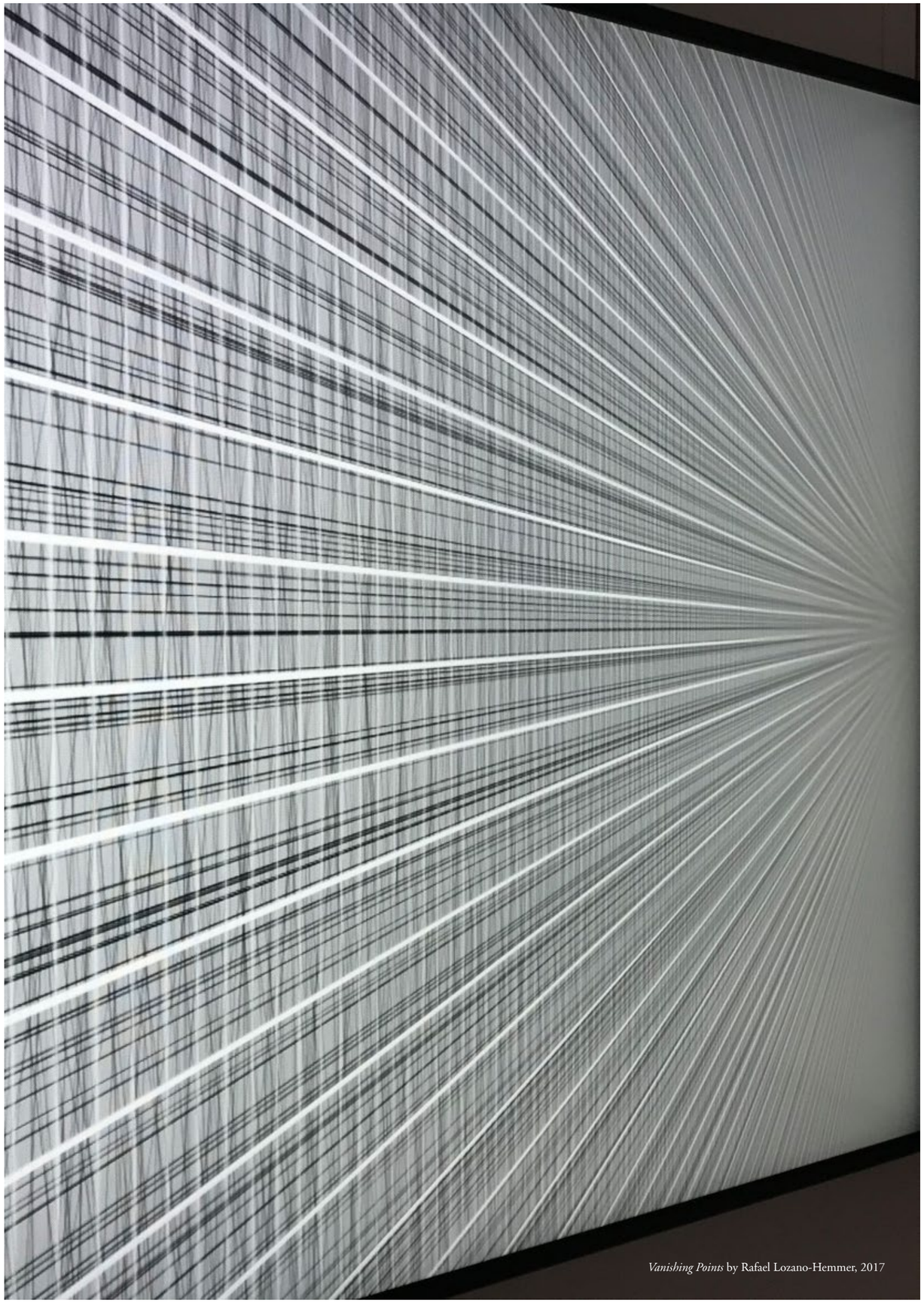
A convenient property of the analytic functions (such as the field equations) is that, such functions are known for all values of their argument when their values in any small range of the argument values are known and thereby allowing an unlimited extension of this procedure from the macrocosm to the microcosm. Thus, the a priori assumption that the laws of Nature involve analytic functions leads to a complete mechanistic determination of the world based on their experimentally determined value in a narrow range only. But the validity of such a procedure of unlimited extension of mathematical functions for the real world, were questioned both by mathematician/philosophers such as Bridgman [7] and scientists like Klein [8] at the advent of quantum mechanics; based as they argued (on different grounds) on the unavoidable inaccuracies of empirical knowledge. And as quantum mechanics clearly shows, there is uncertainty in the ontological nature of reality itself at micro level. So, our epistemological knowledge must always be defective, tentative and approximate, increasing in scope from one generation of humanity to the next; like an infinite mathematical series, without ever coming to a termination or without ever reaching one final and ultimate truth.

The quantum phenomena and the failure so far [9]; (in spite of over a century-long intense efforts by some of the most brilliant mathematicians including Einstein) to unify "ALL" the particles and "ALL" the forces of Nature into a simple and reductionistic "theory of everything" demonstrate the folly of this kind of naive and over-simplified extrapolation of idealized mathematics to the real world at the two opposite directions of infinity, i.e., macrocosm and microcosm.

3 The infinite as a philosophical category

The concept of the infinite was implicit in the early philosophical developments especially among the early Greek thinkers that centered around the basic questions of the primacy of spirit or nature, unity or multipliticity, stasis or motion. This debate divided the philosophers into two great camps. Those who asserted the primacy of spirit, unity and stasis formed the camp of idealism; the contrary camp formed the various schools of materialism. The earliest idealist Greek philosophers (the Eleatics) denied the reality of becoming, multiplicity or motion; these characteristics they maintained, are of the sense-world or physical Nature. These they argued are not real but only appearances and hence these are illusions. For Parmenides (515–450 B.C.) for example the sole reality is Being, Being is One, only the One is; the Many not. This Being cannot be perceived by senses, it is given only to thought or mind. This line of thinking permeates the range of idealist philosophers like Plato, Aristotle, Berkeley, Hume, Hegel and all monotheistic religions. The Unity of Being in this view means that the infinite must be contained in this one Being. The Being meaning God in theological terms, the infinite, then became associated with abstract God. The idealist view of infinity was later incorporated into mathematics and theoretical natural science.

But the dialectically opposite and the materialist view of reality — i.e. the validity of the sense perception of change, multiplicity and motion in material Nature also arose simultaneously in early Greek philosophy. The founder of the dialectical view, Heraclitus (544–483 B.C.) on the contrary saw the world as a process — as changing eternally. For him Unity is not a homogenous unity, but is a "unity of the opposites or of opposite tendencies". The Unity is a complex entity that contains at least two dominant opposite fragments that are in constant conflict with each other and renders this unity susceptible to diversity, change and movement. The concept of the infinite in this view is therefore, open ended. Epicurus (341-270 B.C.) following the tradition



Vanishing Points by Rafael Lozano-Hemmer, 2017

of Heraclitus was the first to assert that the universe is infinite in its extension in all directions and that multiplicity, time and motion are endless.

Benedict Spinoza (1632–1677 A.D.) made an important advance on the concept of infinity along the dialectical tradition which helped Hegel (himself an idealist) to formulate in a comprehensive way the dialectical view of the infinite in particular and his dialectical method in general. Spinoza formulated the profound idea that to define something is to set boundaries for it; i.e., to determine is to limit. The infinite then is something that is undetermined or that has no limit or boundary. In other words the Infinite is limited only by itself and like God is "self-determined".

In popular concept, God is supposed to be infinite. Spinoza's idea of the infinite led to an insurmountable difficulty for conventional philosophy and theology which regarded the infinite and the finite as mutually exclusive opposites; absolutely cut off from each other. How then the infinite can be conceived; how infinite God can have contact with finite man, since it will limit His infiniteness. Finiteness of the world became a primary requirement for medieval theology. The inquisition did not hesitate to spill blood and torture victims to defend its doctrine. Hegel, following Spinoza called the "Absolute Idea" of his philosophy the "True Infinite" which is self-determined. For him the material world or Nature is a crude replica — an alienated form of the "Absolute Idea".

The fundamental difference between these two world-views and hence their implication for the concept of infinity gets its concrete expression in the question of matter and motion. While Newton recognized matter as a real entity, for Einstein matter is a particular representation of an all pervading (space-time) reality ("Being" of Parmenides?). Einstein expressed this point of view in an unambiguous way, "Since the theory of general relativity (GR) implies the representation of physical reality by a continuous field, the concept of particles and material points cannot play a fundamental part and neither can the concept of motion. The particle can only appear as a limited region in space in which the field strength or energy density is particularly high" [10]. Motion in the view of both Newton and Einstein could only arise from an impulse from without — from God — the "unmoved mover". And why energy density at particular points must arbitrarily be high to form material points must also depend on intervention by Providence. For dialectics (and quantum mechanics) on the contrary, matter and motion are the fundamental ele- ments and the primary conditions of all physical reality; mo- tion is the mode of existence of matter. Matter without motion is as inconceivable as motion without matter.

The only way the conceptual problem of infinity can be resolved is through the dialectics of Hegel — the law of the unity of the opposites. The notion that the finite and the infinite reside together in a contradiction; that they are united as well as are in opposition to each other. That, the finite is the infinite and vice versa. That this contradiction resolves itself continuously in the never-ending development in time and extension in space of the universe, in the same way as for example intellectual advance find its resolution in the pro- gressive evolution of humanity from one particular generation to the next. Just as Nature or the universe (ontologically) is incapable of reaching a final, ever lasting, unchanging or an ideal state so is thought (which is only a reflection of Nature in the mind of man) epistemologically is incapable of com- prehending a completed, exhaustive or immutable knowledge — the so-called absolute truth of the world. For dialectics, "eternal change" (with temporary stages of infinite number of leaps) is the only thing that is permanent and the only absolute. Hegel's dialectics therefore, is a condemnation of all claims to absolute truth by all idealism including the mathe- matical idealism of modern official natural science, which is but a reincarnation or rather restoration of the old idealism. In human history, as well as in the history of natural science, hitherto all claims to the "final truth" are but the partial masquerading as the complete.

The continuous resolution of the contradiction of the finite and the infinite like the other evolutionary processes are not only dialectical but they also develop historically following the three general laws i.e. i) transformation of quantity into quality and vice versa, ii) interpenetration of the opposites and iii) the negation of the negation. Engels [11] summarized these three laws from Hegel's Logic, where the first law comprises the Doctrine of Being, the second, the Doctrine of Essence, while the third constitutes the fundamental law for the construction of the whole system. Hegel deduced his philosophy from the history of Nature, of society and of thought. The infinite universe is not a mere abstract, quality less, boring, endless extension of uniformity (spurious or bad infinity), it includes a variety of

qualitative contents with different forms of movements passing one into the other and develop- ing historically. The infinite space is adorned with the drama of things "coming into being" and "passing out of existence" in each of the innumerable island universes; each island universe with innumerable galaxies and each galaxy in turn with innumerable stars and planets. Under favorable conditions, galaxies propagate [12, 13]; the stars produce the higher ele- ments; the planets give rise to the evolution of molecules, to organic life and finally to the thinking brain through which infinite Nature (for a brief period of time) becomes conscious of itself ! Self-consciousness is therefore, the property of the highest developed form of matter, which like everything else comes into being and passes out of existence as temporary bubbles in the eternal and infinite universe.

The knowledge of the infinite is therefore proportional to the knowledge of the finite. This knowledge is necessarily a historical and an iterative process progressing through successive generations of mankind without ever terminating in one final or absolute truth a quest of which was the aim of all idealism — mathematical, scientific or philosophical. A progressively better understanding of the infinite universe can only come about by studying the finite around us guided by the general laws of dialectics. There are innumerable number of water and other mol-ecules and atoms on earth and yet we understand (in a limited sense) and live at ease with these! The properties of matter and its structure under the various conditions in terrestrial nature must be the same that exists under similar conditions billions of light years away. In fact, one sun with its planets and its life supporting earth and one Milky Way galaxy with its surrounding family group form the essential basis for an understanding of the universe. Beyond 15 billion light years there is no wonderland or lurking monsters to be seen. What we will see there is more or less the same we now see within a few million light years around us! The same applies to the micro-world. There is no limit of space, time or length in any direction; up-down, left-right; back-front, at least up to the level beyond which the terms mass, time or length lose their meaning (in the usual sense of the term) because of quantum uncertainty and due to other yet unknown effects. The limits from quasars (at the ultimate boundary of the universe?) to the quarks at the lowest end, set by Official Science must therefore be false; because this represents an arbitrary limitation of infinity, conditioned by the limitation of the empirical knowledge of our time.

4 The "Absolute Idea" of Hegel as the "True Infinite"

As Engels pointed out [14], the dialectical view of the in-finite as discussed above, are necessary logical conclusions from the dialectical method of Hegel; but conclusions he himself never expressed so explicitly. Hegel was an idealist and above all he was the official philosopher of the Royal Prussian court of Frederick William III. His task was to make a system of philosophy that must specify one absolute truth or a "first cause" of the world, as tradition demanded it. Therefore, even though Hegel, especially in his Logic emphasized that this absolute truth is nothing but the logical. i.e., historical process itself, he nevertheless found it necessary to bring his dialectical process to a termination in the "Absolute Idea". For his philosophical "system" his dialectical "method" had to be untrue. Hegel also turned his philosophy upside down, where the "Absolute Idea" (like all idealism) became primary and nature only a crude reflection of the "Idea", even though (through unprecedented detail and encyclopedic work) he extracted the laws of dialectics from the history of the material and the human world.

But nevertheless, the dialectical method of Hegel helped him to overcome the impossible contradiction of the infinite and the finite faced by Spinoza, theology and all previous idealist philosophies. For Hegel, the finite and the infinite are no independent entities separated from each other by an unbridgeable gap in between, as old philosophy asserted; but these are the integral components of a single unity within which the two opposites reside together in active unity and opposition, and hence in a logical contradiction. A resolution of this contradiction to an ever new "unity of the opposites" and so on — the negation of the negation is what gives rise to motion, change, development, and historical evolution of the universe as a never ending process.

Idealist Hegel can terminate the infinite process of change by making his "Absolute Idea" (the self-determined, the True Infinite") as the ultimate end result of all change, motion, development or history, and making it the beginning again, i.e. the end as the true beginning. For Hegel, the finite Nature or man IS the infinite "Absolute Idea" itself! The "Absolute Idea" alienates and disguises itself into Nature, evolves historically through all the usual twists and turns following the laws of dialectics and comes back to itself again through the consciousness of man and particularly through the philosophy of Hegel himself, who for the first time in the history of mankind

perceived in thought the ultimate truth of this dialectical movement, in absolute profoundness. For Hegel the "Absolute Idea" which is the end result of all change, development, motion, history etc. — the static reality of Parmenides, the abstract God of theology, the self-determined entity of Spinoza, is the "True Infinite" and the absolute truth of the world.

But this "Absolute Idea" or the "True Infinite" of Hegel like the mathematical "Absolute Infinite" of Cantor; are only absolutes in the sense that they have absolutely nothing to say about it! Thus in spite of his prodigious intellect and in spite of the logical implication of his profound dialectical "method" to the contrary, Hegel unfortunately pursued the illusion of an absolute truth, like all the other idealist philosophers and all theological prophets of all times. The mathematical idealism and reductionism of modern official theoretical natural science inherited this illusion — i.e., the empty shell of all idealism but not the kernel — the dialectical "method" of this great idealist thinker.

5 Conclusion

During the last few centuries especially since Copernicus (1473–1543), natural science accumulated impressive empir- ical evidence and gained variable degrees of understanding of the terrestrial nature; that collectively vindicate Hegel's assertion that change is the only absolute truth and that the dialectical laws are the only eternal laws that govern the development and the transformation of matter and life. But ironically, natural science claims its own invariable truth exactly in the areas where it possesses the least empirical evidence! As intoxicated modern official natural science celebrates its achievement of a definitive knowledge of one single event i.e., the "Big Bang" origin of the universe and the triumph of its mathematical idealism; with the award of Nobel Prizes, and as the world awaits in breathless anticipation the imminent discovery of a "theory of everything" that will bring an "End of Physics" and possibly the end of all knowledge (by "knowing the mind of God", according to one of the leading physi- cists Stephen Hawking [15]); it would be instructive for us to remember the sober dialectical assessment of Frederick Engels [2, pp. 43–44] — one of the greatest inheritors of Hegel's philosophy:

"The perception that all the phenomena of Nature are systematically interconnected drives science to prove this interconnection throughout, both in general and in detail. But an adequate, exhaustive scientific statement of this interconnection, the formulation in thought of an exact picture of the world system in which we live, is impossible for us, and will always remain impossible. If at any time in the evolution of mankind such a final, conclusive system of the interconnections within the world — physical as well as mental and historical — were brought to completion, this would mean that human knowledge had reached its limit, and, from the moment when society had been brought into accord with that system, further historical evolution would be cut short — which would be an absurd idea, pure nonsense. Mankind therefore finds itself faced with a contradiction; on the one hand, it has to gain an exhaustive knowledge of the world system in all in its interrelations; and on the other hand, because of the nature both of man and of the world system, this task can never be completely fulfilled. But this contradiction lies not only in the nature of the two factors — the world, and man — it is also the main lever of all intellectual advance, and finds its solution continuously, day by day, in the endless progressive evolution of humanity. . . ".

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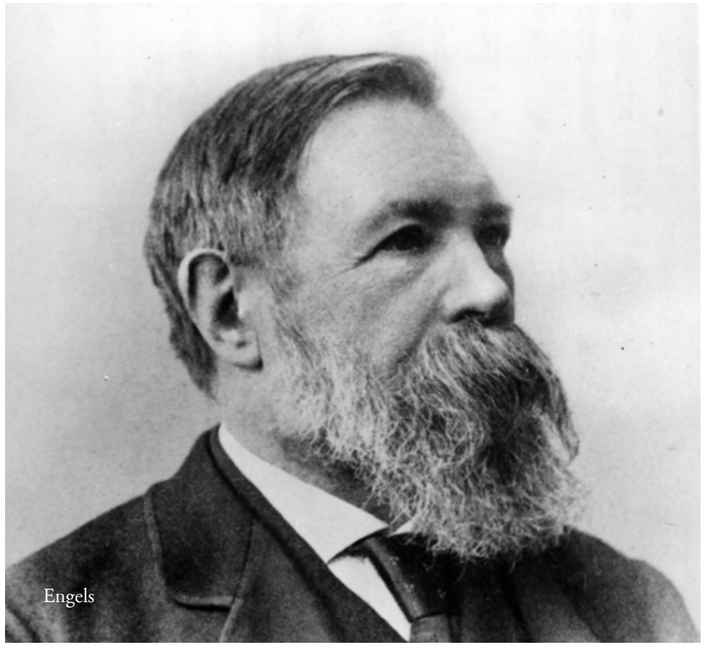

Engels

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Notes on The Infinite

A critique / muse by Jim Schofield

First and foremost, this set of brief notes is considered essential for this fellow Marxist not only to effectively appreciate, but also integrate into his own thinking, what Abdul Malek's remarkable paper on The Infinite, has to offer - and facilitate the production of a comradely critique and proposed additions to Abdul's excellent contribution.

Quite apart from this writer's own objectives, Abdul's paper has to be essential reading for any Modern Marxist attempting to equip the current Working Class movement *theoretically*.

But the paper is largely written from a Hegelian starting point, and thereafter, via Engels' works on Science. So, it cannot yet be of the same theoretical weight as Marx's own work upon Capitalist Economics - the only comprehensive exemplar of the use of his Materialist Dialectical Method, wherein he had to unearth, name, and explain the salient features of that discipline, in a dialectical way.

Nevertheless, it is still a marvellous contribution within a single paper.

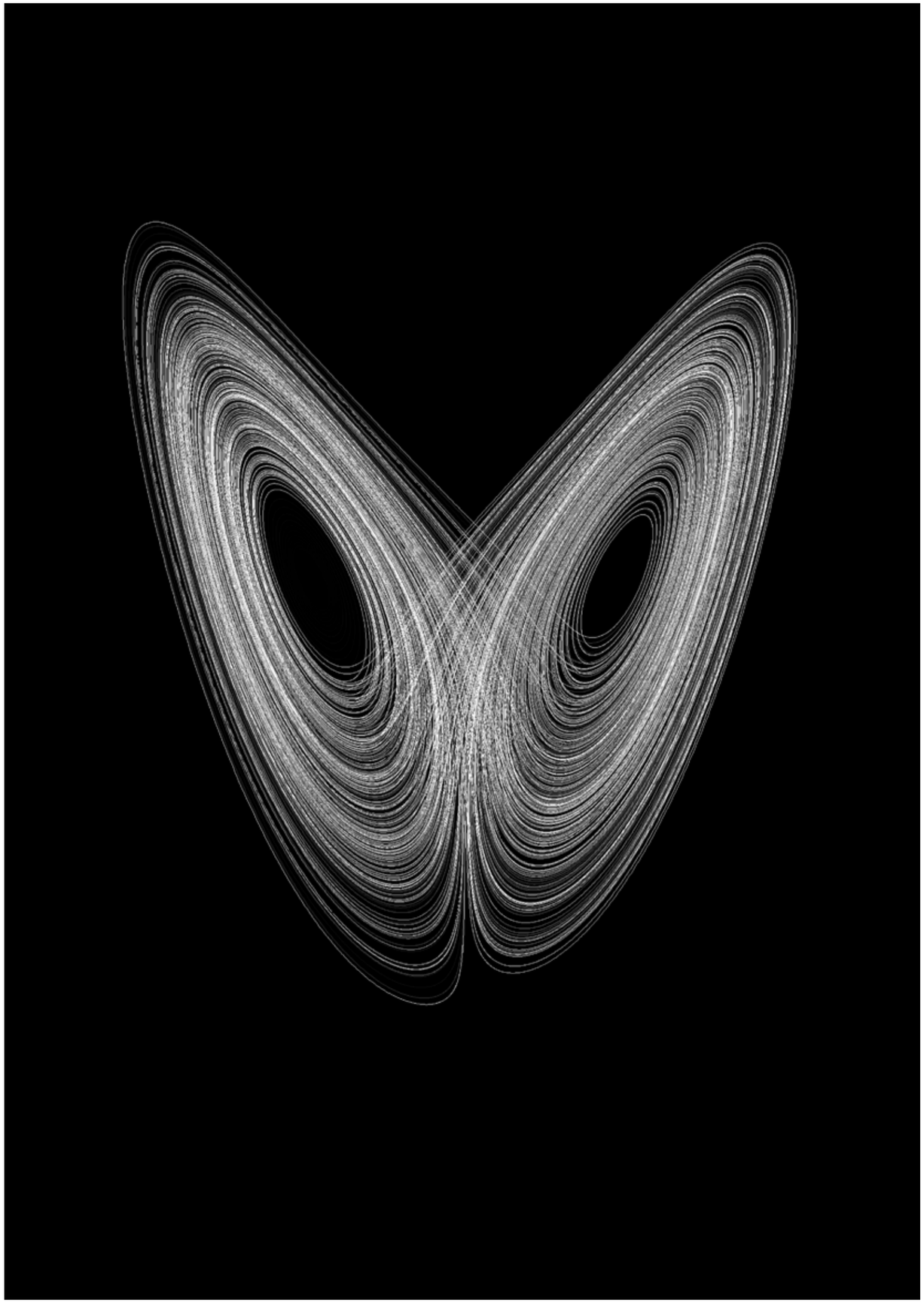
Clearly, the required undertaking for addressing Modern Physics will most certainly ultimately be of the same order of complexity as *Das Kapital* - constantly defining crucial explanatory dialectical abstractions, and positioning them within an overall, comprehensive system, along with their necessary opposites, and their consequent dynamic interactions and developments.

And, of course, such a task will be colossal, and even more so as it is long overdue.

But, the problem has always been that there has never been anyone, or even any coherent group of expert marxist physicists, competent enough to embark upon the vital endeavour of a Dialectical Materialist general assault upon Science. Neither Engels' various writings on Science, nor Lenin (with his *Materialism and Empirio Criticism*) could take the task beyond a basic philosophical refutation, and nobody since then has been able to take it on comprehensively. But, it certainly has to be done, and Abdul Malek is clearly just the kind of scientist to participate in such an endeavour!

This illuminating paper upon Infinity, though absolutely necessary, cannot alone be a sufficient first step! For, the concept of Infinity is too abstract to be validated within studies of *material* Reality. It does, however, throw a revealing light upon Mathematics and Idealism: and that is, of course, immensely valuable.

My contributions have so far been very different! In attempting to equip myself (a professional Physicist and inter-disciplinary expert) to appreciate Marx's Method, both as he used it in Das Kapital, and as it may be further developed too, I started with necessary research into *The Processes and Productions of Abstraction*, which fruitfully led to an intense period studying the Philosophy of Mathematics, and that discipline's unavoidable position within Ideality rather than Reality. But also, Mathematics' crucially predominant historical precedence, in providing the key philosophical premises, and consequent development of all the Intellectual Disciplines, arising out of the Greek Intellectual Revolution (circa 500 BC).



Taking everyday common sense conclusions as a starting point in *The Infinite*, Abdul retraces Mankind's initial ideas upon infinity, via what Hegel termed "bad infinity"! Here Infinity can be endlessly approached, but never reached, yet with the slant put upon this by Hegel, because he was an idealist, concentrated solely upon the ultimate extreme and purely abstract approach, in spite of the fact that all the time, in everyday life, similar ever-closer-processes, which most of the time look exactly the same, nevertheless, always end in a real termination:

For, as Zeno showed, just reaching for an object has this apparent repeated process, modified throughout its passage, but always terminating in a concrete "touch" of the reached for thing!

Now, insisting upon the ideal extreme and abstract case, is exactly what idealists will always do, for they would be seeking some beyond-this-world-ultimate in literally everything: in this case Infinity as a concept. BUT, and this is crucial: in Reality, absolutely all such seemingly infinite processes do eventually terminate, because absolutely nothing is eternal.

The belief in Eternals is actually part of Plurality, while, everything being finite is something we paradoxically see in Holism!

Now, interestingly, Mathematics is validly pluralistic: which naturally makes it only a Reflection of Reality in an idealistic mirror!

And, crucially, the invention of the Greeks that made it developable into a whole coherent discipline, were termed simplified, relatable abstractions, which, for the first time ever, delivered a kind of reasoning, but only when based purely upon Forms, made extractable by using those crucial bases. The understandable mistake of the Greeks was to transfer the same wonderful kind of bases over to Reasoning too - to deliver Formal Logic, and to Science also: neither of which are pluralistic: they are Holistic.

And even Hegel, who radically altered Formal Logic with his Dialectics, arrived at his modifications via the unavoidable anomalies in Dichotomous Pairs of contradictory concepts, so delivering an alternative way of *thinking* only.

Now, Abdul's use of Engel's apt quote (included again below) resonates very well with my own independently arrived at findings on the Philosophy of Mathematics, but had not at that time been located in specific premise errors.

"But, as in every department of thought, at a certain stage of development, the laws abstracted from the real world become divorced from the real world and are set over against it, as something independent, as laws coming from outside to which the world has to conform. This took place in society and in the state, and in this way, and not otherwise, pure mathematics is subsequently applied to the world, although it is borrowed from this same world and only represents one section of its forms of interconnection – and it is only just precisely because of this, that it can be applied at all"

In my research I have shown how both the Forms are extracted and effectively used in rigorous, intensively farmed contexts, and as long as such required contexts were always used, the intended objectives could be achieved -but only at a rate of one-isolated-law-at-a-time. But, the belief that each of these was a General Law, only depended wholly upon a total subscription to The Principle of Plurality.

Interestingly, after a long unsuccessful search for a solution to these sorts of problem, I finally found it in a collection of solutions to the problems of various researchers, who had come to me (a System Software expert), for computer help. Let me briefly describe what they required!

1. DANCE
A colleague who was occupied with teaching both Performance and Choreography for future Teachers and Dance Company artistic directors, who needed to use Film and Video footage of the highest quality exemplars. But, not only were both adequate Access and Control totally unavailable, most of the dynamics involved (continuous) were simply absent in the recorded footage available (a series of discrete frames). And, all the industry-wide preferred solutions were unacceptable, because they were too expensive: the solution had to be found using technology that could be easily afforded throughout all levels of Education. The problem I had to solve was how to do this.

2. EMULATION
A mathematical colleague was attempting to model the beating of the Human Heart using a modified version of the Van der Pol equation (originally devised to model an oscillating electronic circuit), but it delivered nothing new until he added a "driver" and converted it to delivering iterative versions of the equation. I was brought in to deliver possibility space graphs of their performance.

Now, I was able to find solutions to both the above problems, but only by addressing them holistically, and abandoning eternal pluralistic forms for unifying seemingly contradictory alternatives.

The important consequences were not in those particular solutions, as such, but in the light they have thrown upon the false infinities in ordinary pluralistic Mathematics, and for the always finite results arising out of such seemingly infinite situations in the Real World.

I re-assessed Emergences in this light, and ended-up with a comprehensive Theory of Emergences: thereby, integrating all of these and other discoveries into a full detailed Trajectory of Emergent Changes.

Now also, in considering The Infinite in Science, the switch to a holistic and dialectical approach, from the endemic pluralistic (and often all-too-frequent idealist) approach, once again transcends the problem. The Infinite becomes totally absent, and is replaced by a transition from what seems-to-be a permanent cyclic iteration, to one which absolutely-always terminates!

The reasons for such terminations being the occurrence of new Emergences - always totally dissociating the prior apparently permanent cyclic and stable process completely, via changes first undermining the prior state, in a series of increasing crises, followed by a creative construction of an alternative and new persisting Stability So, instead of a series of somehow-terminated, seemingly potentially infinite cycles, we actually get an Emergent Interlude, ultimately arriving at a wholly new Stability upon a wholly new basis.

All the intellectual arguments, rejecting this alternative, arise from mistaken conceptions of "Infinity": indeed, two important points must be emphasized:-

First, the absolutely crucial Constructive Phase terminating every completed Emergent Interlude, - a process which is always even more invisible than the Interlude itself, when studying what remains available of such trajectories.

And Second, the consequent constant alternation between long periods of stability, separated by very short interludes of Emergence.

For not only do they replace the idealist concept of Infinity, but exist always as a regularly extended finite sequence in themselves.

Indeed, more generally, the means by which the scientists get away with their various fixes and tricks, is due to the contradictory amalgam of grounds, always-permitted by the still-persisting underlying tenet of Pragmatism - "If it works, it is right!"

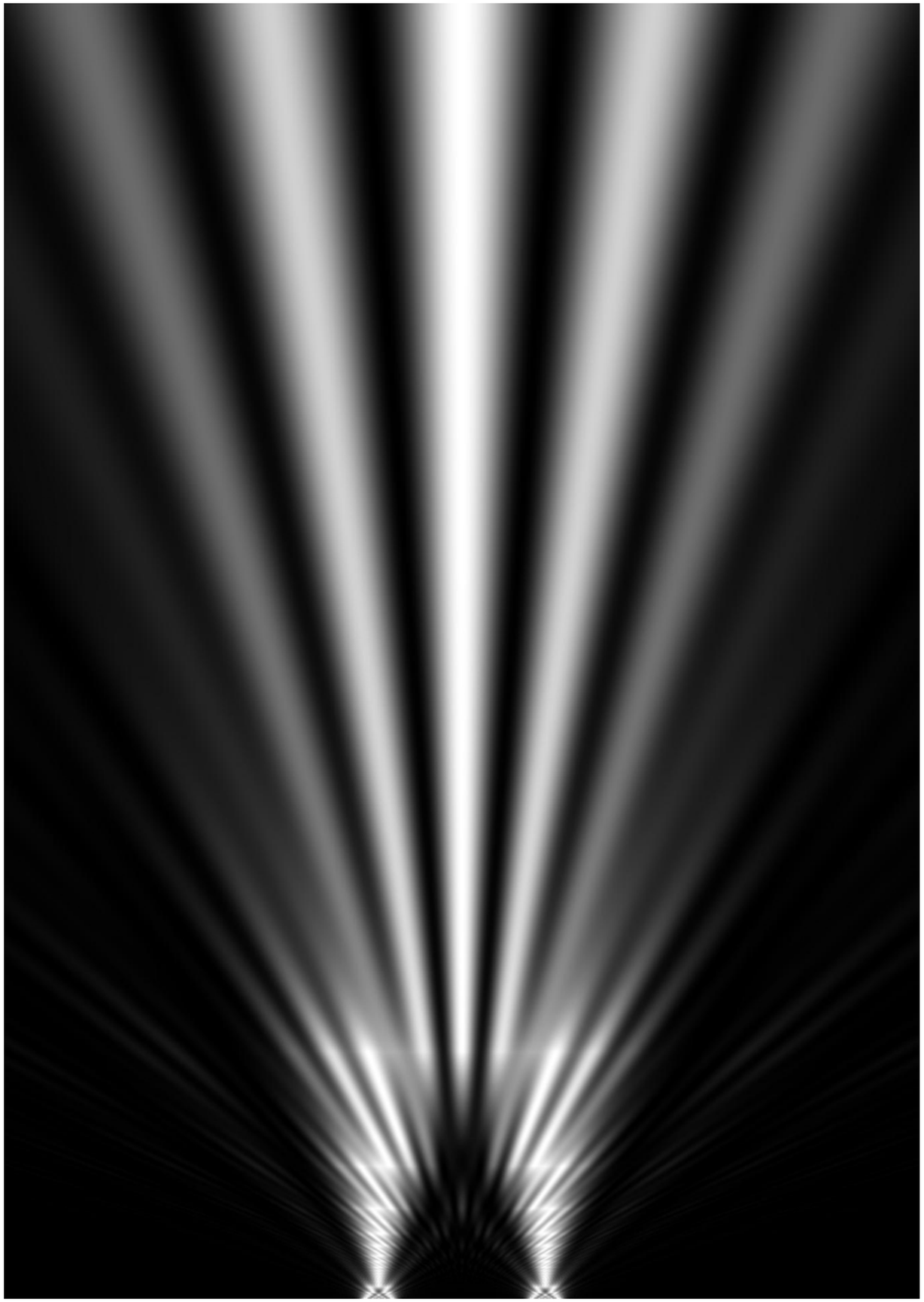
Now, Abdul makes a series of excellent points about Einstein and his Theory of General Relativity, but I would also stress that his battle with the Copenhagenists could never have been won, because he actually shares too much of that same illegitimate amalgam of contradictory grounds.

While, at the same time, it should also be stressed that his Spacetime Continuum requires something having very similar properties to those of a material Substrate, yet without any coherent justification in terms of his other idea - that of the alternative of totally Empty Space.

Now, Abdul's quote from Einstein, extolling the all-embracing virtues of Pure Mathematics, displays clearly, on the one hand, his conceptions of what Mathematics could enable, but also on the other, his own ignorance of both its philosophical inadequacies, as well as his own, which are clearly idealist. For, he believes that an accurate description, via Mathematics, actually delivers the driving-truth of a situation. And in making these mistakes he confuses Ideality (with its possibilities), with Reality, and its possibilities. They are NOT the same!

It is therefore ironic that in his Theories, he embraces Infinities that are impossible within Reality!

A Cautionary Aside:
Early on in my assault upon Copenhagen, I embarked upon a purely theoretical alternative approach addressing



the ill-famed Double Slit Experiments! In this research I merely assumed the presence of a Universal, though currently-undetectable, Substrate: and every single anomaly in that whole series of experiments simply fell away! Everything was physically explicable without any recourse whatsoever to Wave/Particle Duality.

And, further research, in the same vein, also revealed a physical explanation of Quantized Orbits for electrons in Atoms.

Clearly, as with James Clerk Maxwell's analogistic model of the Aether (from which he derived his Electromagnetic Relations), such purely theoretical researches can reveal things, even if the model is only an apt analogy rather than a really existing concrete situation.

I could not improve upon Abdul's tight and correct criticisms of Mathematics in Science, generally - but differ with both him and the Copenhagenists, when it comes to the reasons for inaccuracy at the Sub Atomic Level.

For, as has become clear in my own purely theoretical researches, ambiguities are often caused by sequences of multiple processes, entirely due to the presence of a Substrate, acting first as an affected, and later, as an effecting intermediary, in which a moving Particle can cause a disturbance within it, which then propagates as a wave therein, and which can thereafter undergo divergence and then recombinant interference effects, that can later be re-communicated back to the behaviour of the always-present, and now affected originally-causing Particle. For then, the consequent behaviour, of that recursively affected Particle, will have been subject to the processes it itself had set in motion within that Substrate.

The applicability of Wave Equations in delivering the probabilities of the Particle being in all the possible positions, actually reflects the full range of what possibly happens to that always-present Particle due to the disturbed, separated, and then recombined Substrate!

Though Abdul's statement that:- "So, our epistemological knowledge must always be defective, tentative and approximate, increasing in scope from one generation of humanity to the next; like an infinite mathematical series, without ever coming to a termination or without ever reaching one final and ultimate truth",

But our "knowledge" must reside in Ideality - where else?

This is one I entirely agree with, but which I see as a perpetual seeking for ever-more Objective Content, as the only valid path to take!

CODA:

At this point I can no longer continue dealing with this whole area independently of the cultural environment that underlies that whole intellectual superstructure!

Listening to a recent lecture by David Harvey upon the current worldwide Economic Crisis, wherein he clearly exposed the very same assumptions within current thinking about Capitalist Economic Development as we are discussing here about Philosophy.

Both consensuses take the idealist conception of the Infinite as real!

And the proposed economic solutions see no alternative to chasing the Infinite to solve the contradictions both of Capitalism, and in Philosophy.

But, of course, that will only precipitate the next crisis, in an ever bigger collapse than 2008. Believing in the Infinite infers that such means will always work. NO, it will precipitate solutions outside of the currently assumed possibilities: which, as in all Emergences, are never predictable from the prior state.

Now, though not immediately evident, the profound misunderstandings that have led to the current positions in Science, particularly in Sub Atomic Physics and Cosmology, also assume the idealist Infinite, and have no idea of the cataclysms that are building for a new Emergence. Indeed, they long ago embraced "The Infinite" for their past, purely-speculative solutions. Indeed, they abandoned concrete Reality for the truly-infinite-expanses of Ideality - the world of Pure Form alone: they study Pure Mathematics, not Physics!

Indeed, the assumption of the infinite is consistent with, and also a consequence of, the whole set of basic premises created-by and coming-out of the Greek Intellectual Revolution, which were all based entirely upon the simplifying relatable abstractions of Mathematics, but also exported via the Principle of Plurality to both Reasoning and Science.

And, consequently thereby, ensuring the relating of only fixed entities and concepts, and the seeing of development as both purely quantitative and hence merely involving infinite complication, rather than involving significant and transforming Qualitative Changes, always occurring in cataclysmic Emergent Interludes that, in turn, are only understandable via the very different Holistic Stance.

Abdul relates the long and contorted trajectory of conceptions of Infinity, and, as would be expected, absolutely NO totally indisputable conclusions were unearthed, though often valuable adjustments were sometimes achieved. But, once again he includes Quantum Mechanics favourably in the following quote:- "For dialectics (and quantum mechanics) on the contrary, matter and motion are the fundamental elements and the primary conditions of all physical reality; motion is the mode of existence of matter. Matter without motion is as inconceivable as motion without matter." And in his next quote on Dialectics:- "(the) dialectics of Hegel - the law of the unity of the opposites. The notion that the finite and the infinite reside together in a contradiction; that they are united as well as are in opposition to each other. That, the finite is the infinite and vice versa. That this contradiction resolves itself continuously in the never-ending development in time and extension in space of the universe, in the same way as for example intellectual advance finds its resolution in the progressive evolution of humanity from one particular generation to the next."

At this point, Abdul, necessarily-and-unavoidably embarks upon a re-statement of the necessary bases for where Mankind (and of course Reality itself as the necessary context) has currently got to in attempting to understand that containing World. It is essential because he is consciously departing from the usual consensus, because of its effectively terminating misconceptions. And, in attempting to re-orient the whole enterprise, he must re-iterate the nature of that spasmodically emerging alternative, finally intellectually established upon a developable footing by the idealist philosopher, Hegel, with his Dialectics.

But, that Mankind was itself, a part of what it was attempting to explain, and equipped with a relatively inadequate means - Human Thinking, to span absolutely everything, was bound, unavoidably, to have to simplify the richness of self-developing Reality, in order to "get even some sort of partial handle" upon its dynamic.

Clearly, every significant gain in that endeavour would have to be evident within Mankind's experiences, thus far, but also limited by the level of Thinking currently reached in their now-reached intellectual possibilities.

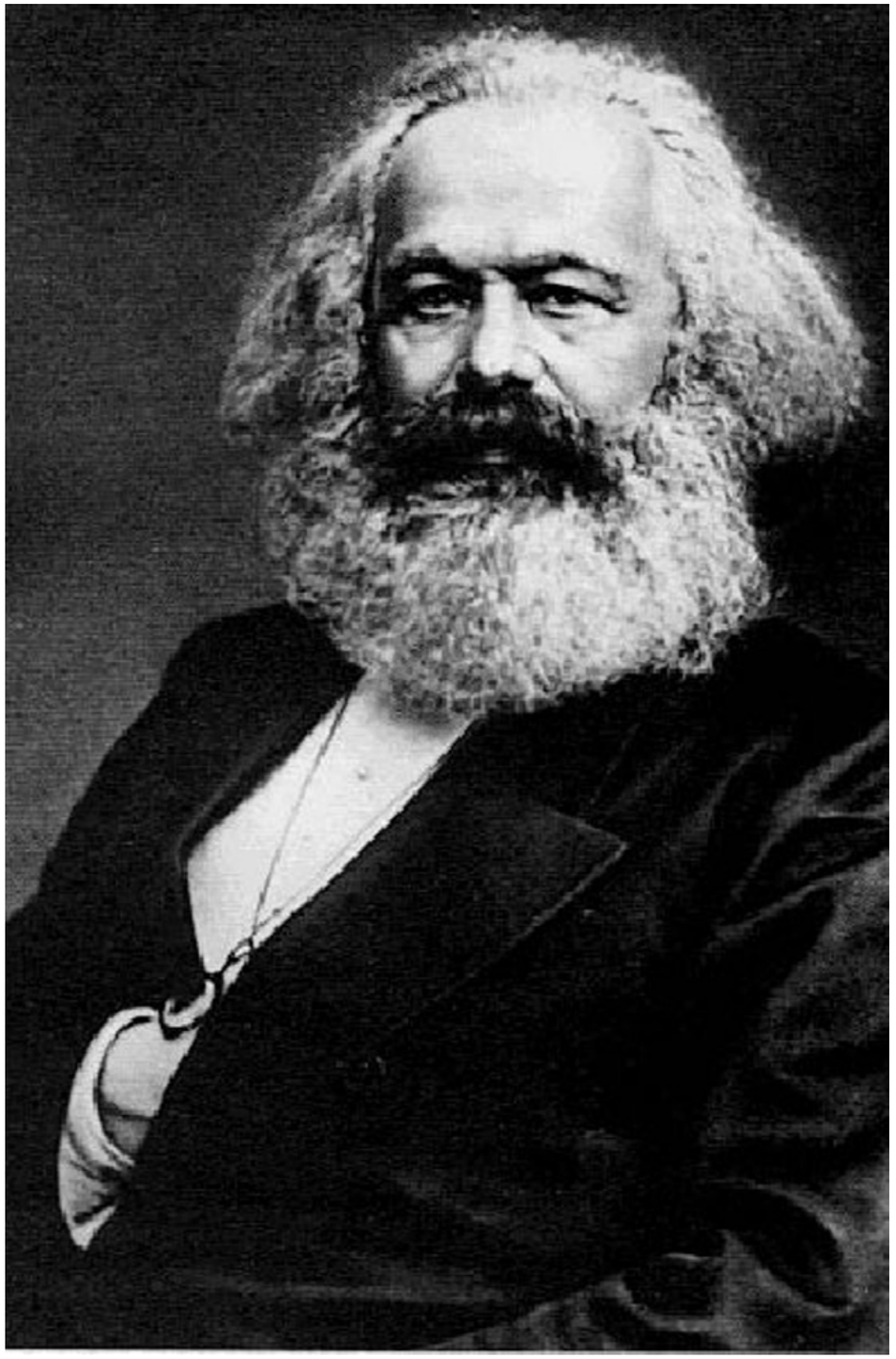
And, as with everything else, it could only go so far: Absolute Truth, as always, must be unobtainable! Nevertheless, progress is always possible, but NOT incrementally! Mankind does not build understanding out of merely a collection of ever more "Knowledge". There also will be encountered seemingly untranscendable impasses, which appear to terminate any further progress.

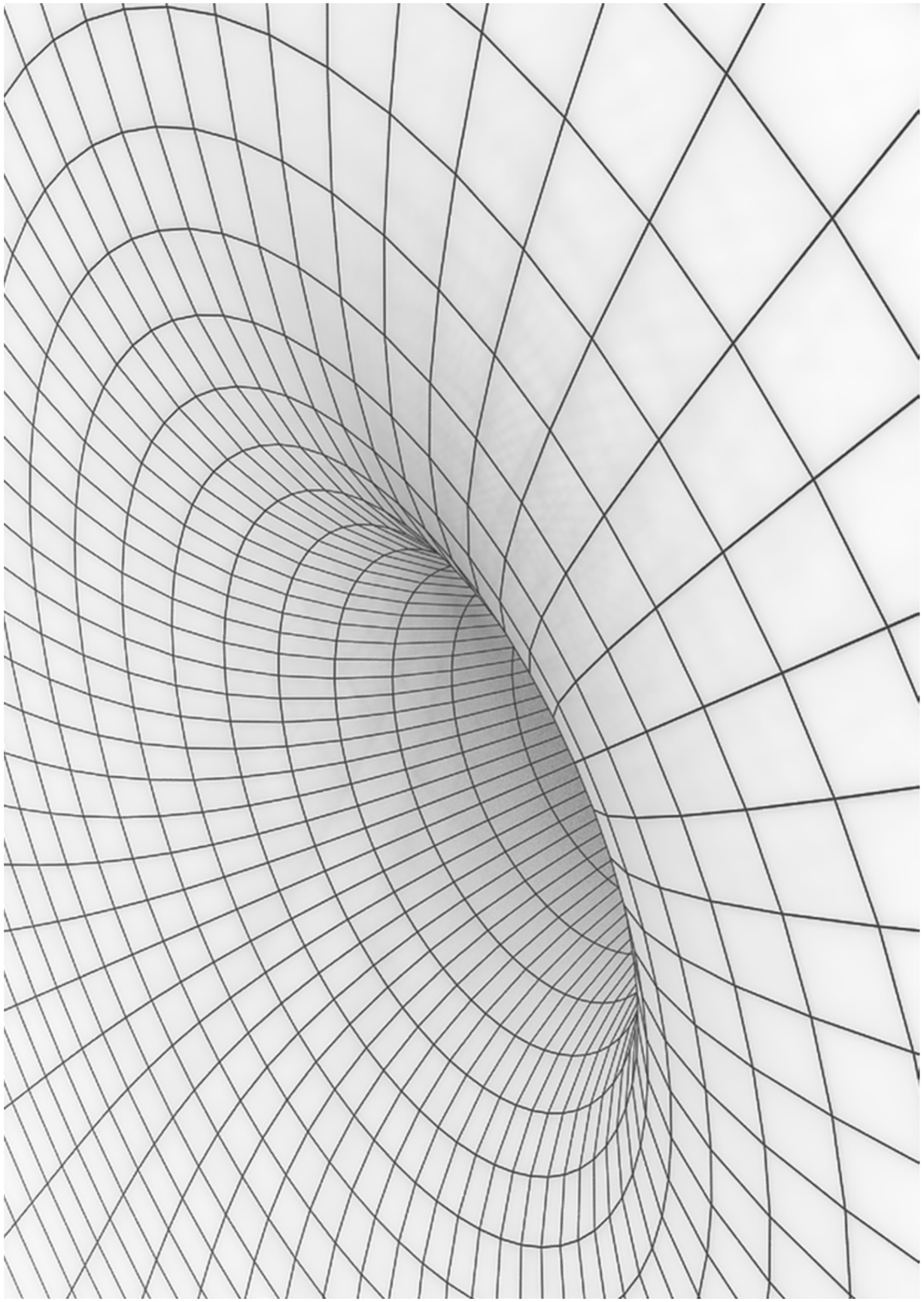
The current means turn out to be inadequate, and a qualitative leap must be made possible by a wholesale critique of those means, and a realisation of what was causing the blockage. But, Hegel was an idealist philosopher: his area was fundamentally restricted to Human Thinking, and, as such, he would have to base his modifications upon newly defined or newly updated concepts.

His clues emerged from Dichotomous Pairs of contradictory concepts (as in Zeno of Elea's Paradoxes), and the pluralistic prohibition of Contradiction in the then consensus version of Formal Logic. His solution was to allow Qualitative Change within Logic, and to source it in "real contradictions". He found many situations in which previously denounced flips into their opposites seemed to be behind such Changes.

Idealist Philosophy, even in the hands of a genius like Hegel, was congenitally incapable of revealing the concrete causes of Qualitative Changes in Reality: for that you not only had to be holist, but also, and crucially, a materialist too!

Clearly, that is where Karl Marx entered the fray: for he rightly proposed the transfer of the whole of Hegel's Dialectics into a Materialist basis - crucial for Science. We cannot address these matters without him.





Time in Space

...of Graphs and Plurality

Is it legitimate, to do as Einstein did, and merely add *Time* as another dimension to the three dimensions of real Space?

There are a very good set of diverse reasons why this was not a good idea!

For Space, of itself, can deliver nothing but Position.

So, when we construct an equation, like y=mx+c, "delivering a connecting-path" in Space, it is, NOT THAT, but, in fact, only a Description of a collection of such Positions: containing absolutely nothing about *why* such a connecting Path exists, or at what rate it could be traversed, or even what might be causing it to do so - for, as such, with no other information, it just defines a particular infinite set of points! It merely links these positions together, as a set, without saying anything else. "Obeys this equation" doesn't even signify as any kind of law.

It does, however, deliver a totally-neutral, spatial context, created by the three dimensions in Real Physical Space, with some arbitrarily selected Origin, from which these dimensions emanate, and defining Distances to place the set of positions with respect to that Origin in three mutually-perpendicular directions!

And, given this Nature and an equation, like the one mentioned above, it still does not restrict how you interpret that sequence as a "Travelled Path".

You can imagine-a-movement, in either direction along that sequence, but in doing so you are introducing Time - so far, without any possible constraints whatsoever.

But NOTE: Those committed to Mathematics, put it rather differently, and say that such things show a certain determining *Symmetry*.

Beware abstractions about abstractions!

They can begin to sound like Rules!

So, what is it, that you are doing, if attempting to think further about something? You are invariably Abstracting-from-Reality certain features, so that by various such legitimate simplifications, you might make further suppositions possible, and be able, then, to do a great deal more with such a set of observations.

You *select* certain simplifications from the complexity of Reality, with the intention of revealing some sort of relation between them. And, expect to ultimately get sufficient to explain what you are studying.

You may be using the Abstraction of *Graphing*, to extract an actual "Movement from its confusing Real World context". But, all such abstractions also leave out many features of that original situation. You may have Positions, but still no actual Movements, nor their Causes as yet! So, this approach will also have to involve other abstractions, and bring them together, in an attempt to get a handle upon what was really being observed.

Abstractions are very old, but the sort we are discussing here were the initial, significant contribution of the Ancient Greeks. And Graphing was the start of constructing a remarkable New Discipline, which was first termed Euclidian Geometry, but which was, thereafter, extended by further Abstractions to deliver

the discipline of Mathematics. This process was crucial, both in what useful Systems it enabled for the first time, but also, in what disabling errors it also inavoidably included from its very birth!

I have not forgotten that we must tackle *Time*, but, first, there was another abstraction which both enabled the further development of the Discipline, while simultaneously severely limiting it for literally millennia.

To actually include some kind of movement onto such a Graph, you would have to link a series of points to their "times", when they were at those positions, only such times would turn that equation into a possibly traversed Path.But, even simply joining them up with a line, also includes an infinite number of intermediate points as legitimate positions in that path too. It may have been inferred, and then initiated, by a finite set of points, but drawing the connecting line does make it a Continuous Path, even though no times or speeds are yet available.

The co-ordinate system alone could give positions, and they might be sufficient to convert them into the suggested equation, which related those co-ordinates to one another, but still not yet as to how the points could be traversed: that would need the times too, and they can never be measurables upon such a graph as this.

Indeed, with the graph in this state, absolutely nothing can be firmly said about any traversing: it might be in any direction, and at any speed, we just dont have the necessary information. The equation, as such, is entirely reversible. And this is even considered a form of Symmetry by mathematicians. Clearly, when only a part of a situation is turned into an equation, that will impose a certain Symmetry onto it, but it is likely not to be there in the real world situation being considered.

But, the hidden, and yet implied, abstraction which can allow the inclusion of illegitimate extras to a given situation is that which we term Plurality! For, Plurality is an implied simplification that was reasonable, considering its historical origin, in which the elements involved appeared to never qualitatively change into something else. All concerned elements remained the exact same things, qualitatively, forever!

And, within Mathematics, as originally conceived, that would always be the case: all Forms and spatial relations (Laws) are considered to be necessarily eternal! Any changes, other than quantitative ones, would take the situation wholly beyond the scope of Mathematics.

Now, this was important, because as soon as Time was similarly included, it just had-to-be in a particular version in order to be *allowed* in: it could change things quantitatively, but never qualitatively! Translational, quantitative movements over steady incrementally-changing Time could be appended to such individual points in space, but all qualitative development was permanently excluded.

It still gave them a significantly empowering Mathematics, which could also be validly extended. BUT, therafter, its Premises, Principles and Methods were then also applied to Reasoning and even to Science, and there Plurality was frequently, and importantly, wrong.

But, we must not run before we can walk, so, let us return to Time.

The reversibility already described for a sequence of positions in Space is lost when that sequence is seen as a possibly travelled Path, for then, like it or not, you are associating different times with each position, and Time can never flow backwards!

Indeed, used in the old way, only a-single-position-from-one-time could ever appear on the graph, for to show the whole path is then bringing in Time! NOTE: But mathematicians are rarely philosophers, and when they are they are Idealists; so they frequently ignore these limitations, legitimising their trangressions with pragmatism.

Dimension

Now, mathematicians fall deeply in love with abstractions, and very soon extended Graphical Representations well beyond the Dimensions representing those of Space: the visual layout was brilliant, as an alternative way of delivering and investigating all formal relations, limited initially, of course, to the three dimensions of real space for the purposes of displaying them.

But, nevertheless, despite the limitations outlined above, they still found the form involving a whole path connected by a line to be a brilliant abstraction. For the same Graph could be used with different added, or even omitted, assumptions, so that it was seen as the Common

Element in a whole series of useful processes. It wasn't that, of course, for if reasoning was pursued, as you must, but without any adjustments to that "common basis", it would, and has, many times led people astray! But, at the same time, always using that same form, didn't blinker us to a particular correct version, for the "includes all" (though incorrect version in many application) DID always remind us of the other interpretations, so we could switch between them, in the classic, pragmatic way, to use whatever version of it actually delivered - "If it works, it is right!" You can see how pragmatism frequently solved problems, without advancing understanding.

So, the mathematicians soon extended such methods to other relations of diverse variables, by having one physical dimension in a graph, for each variable. And, of course, Time was often a prime candidate to include as a dimension too. Now, plotting graphs, where the "dimensions" involved were no longer representing the three actual Dimensions of Physical Space, but were, instead, using the three Dimensions of that Space, as formal placeholders, physically, in a graph, for actual variables, then the word "dimension" has been wholly redefined.

And, this does matter, for instead of using "Drawn Graphs" to investigate problems, the data collected was assigned to alphabetic, algebraic variables, and turned into general equations relating those variables algebraically. For then, many geometrical techniques were converted to instead apply to algebraic forms and processes (worked out from those techniques) but applied directly to the alternative algebraic Equations of the found relations.

Hopefully you can see what I mean about a total commitment to Abstractions. And the built-in assumption of plurality would not always be legitimate for the data involved.

As algebraic versions were developed for equations with more than three variables, you couldn't physically plot them anymore, but by generalising the Geometrical techniques, algebraically (as formal relations), the whole thing became yet another level of Abstraction! The mathematicians now no longer dwelled within Reality, though they believed that they still did.

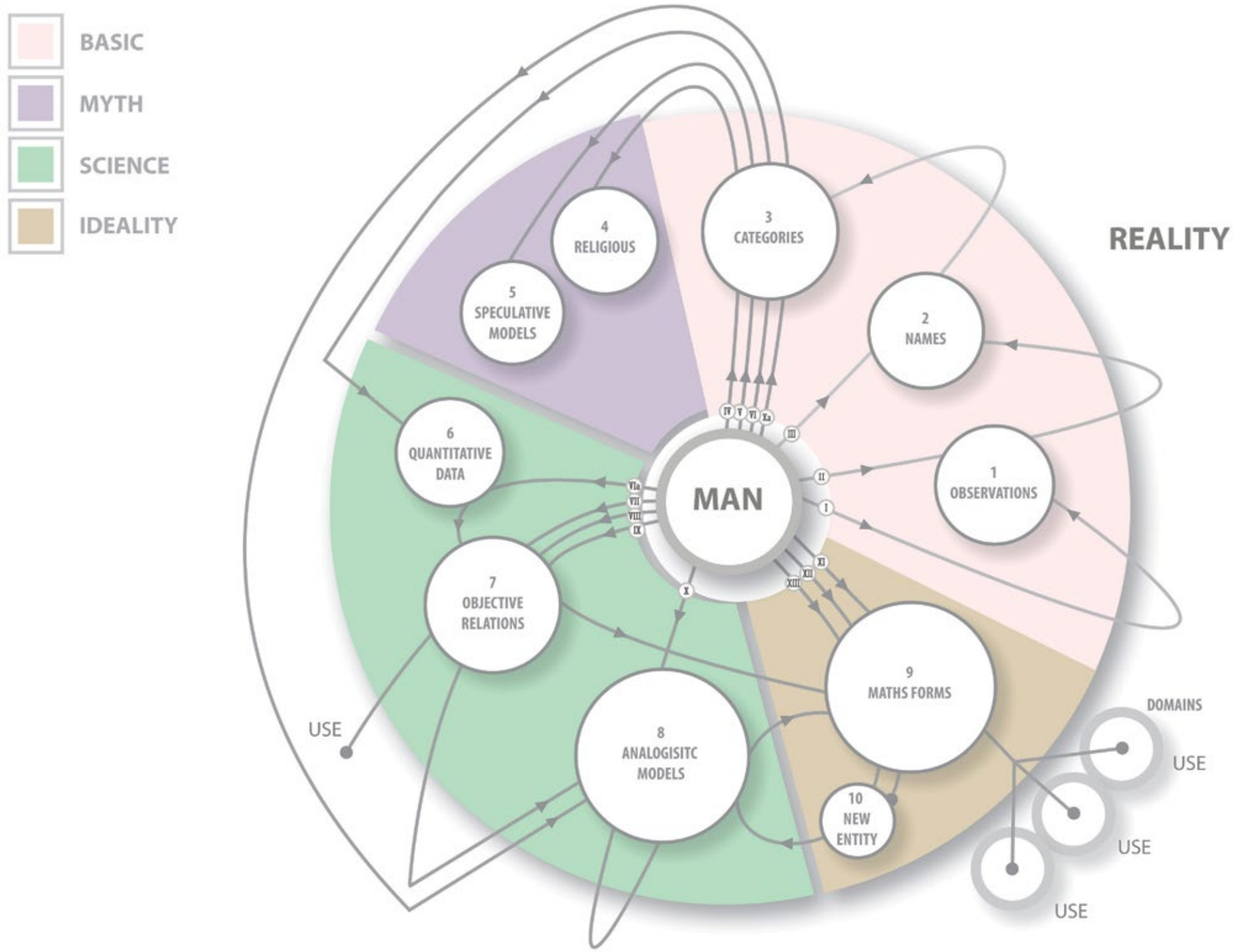
The Pluralistic nature of Mathematics was inevitably also linked to Graphs; because of the necessary mutal perpendicularity of the axes, which isolated the effects of what was allocated to those directions alone, so their contributions were only in their own directions. And this imposed Plurality onto what could be taken from such graphs - the different directions could never affect one another. This would even be extended to numbers of dimensions above three, for all the assumptions employed were still derived from the necessary isolating involved in the original three dimensions. But, of course when all the techniques had been "algebraicised", it wasn't easy to see that built-in quality of indpendance, and Reality is certainly NOT Pluralistic.

And the proof was not only in the farmed way that both Experiments and Production were organised to reflect this. But also in how the mathematical tail began to wag the physical dog - in Cosmology, for example, they began to talk of actual physical Dimensions higher than three. And, in String Theory, this has reached the heady heights of 11 dimensions, and cosmologists unashamedly talk of "Branes" occurring in un-seeable Dimensions, and causing "Big Bangs" by their Collisions!

Indeed, this theorist, many years ago, in his Figure entitled *The Processes and Productions of Abstraction*, had included "The realm where Mathematics dwells", as outside of Reality entirely, termed Ideality for obvious reasons, and drew it as such too.

But, by far the most damning indictment of the way Time is included in the universally applied forms within Science, is in ignoring that it is only in Real Time that any qualitative changes resulting in the most important changes of all occur - in fact those creative, transforming changes which deliver Development, in those revolutionary interludes we call Emergences.

As the mathematical theorists of the Copenhagen Interpretation of Quantum Theory delve ever-deeper into Ideality, they will never extend our understanding of Reality, but only the increasingly abstract nether regions of their own creation - the landscape of Ideality itself..


BASIC
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Seven Twists by Dóra Maurer, 1979

Why Mathematics Significantly Distorts

both Physics & Formal Logic

Studying the contents of Modern Physics, both via their usual historically-defined conceptions on the one hand, and the conceptions of the Copenhagen Interpretation on the other, we effectively and unavoidably limit the scope of the addressable, and hence discussable area involved, in such a way as to ultimately and necessarily prohibit any real progress in Understanding. Let me initially spend some time revealing why this is the case, before proffering any alternatives. We have to reveal the totally depended-upon tools in those endeavours - for it is they that define those limits.

The key discipline for dealing with all-of-this is agreed to be Reasoning, or more particularly, Formal Logic, but the universally used means betrays another discipline actually more fundamental than Logic, which, in the hands of the initiating Ancient Greeks originally, seemingly, permanently-defined them both. And, this "Bottom Line" is certainly Mathematics, and its intrinsically-defining Principle of Plurality.

For, before these absolutely crucial "inventions", the only means at the disposal of Mankind, could never produce a self-consistent and developable discipline of any kind at all! Mankind had only intelligence and dexterity, along with a single integrator of Knowledge, which was never about any revealed intrinsic rationalities, for it was the purely pragmatic tenet of "If it works, it is right!"

The proof of this claim is that in the prior 190,000 years of Mankind's history as a species, the above was all that they had, severely limiting development. But, in the 8,000 years after the Neolithic Revolution, in which Mankind converted from wandering Hunter/Gatherers into Sedentary Farmers with an increasingly social way of life, both the consequent great proliferation and sharing of Knowledge, became insupportable as a mere unintegrated collection of separate abstractions. Something simply had to be done to relate those Abstractions to one another due to the actual natures of what was involved.

But, it wasn't easy! And, the Greeks decided to simplify their Abstractions into much more *essential* elements that could be related to one another, and they found they could do it in Geometry - the Study of Spatial Forms.

It was, indeed, a veritable Revolution: because the elements extracted were NOT physically-existing as such!

The "essence" of a given Position was taken to be a Point of zero extension. While a Line was defined as connecting two such Points, but of zero width. Two dimensional shapes were seen in terms of Perfect Forms like Squares and Triangles - themselves composed, in turn, of those Ideal Points and Lines.

They all began to form into an intrinsically related family, and rules of relation between them could finally be found.

Indeed Theorems could be produced and established by rational Proofs!

Abstraction had been taken to a new level by extracting ideal essences, and relating *them* instead. These were NOT real relations of real entities, but they certainly approximated to those, and crucially, if real world things were purposely adjusted to be much closer to such Ideal Shapes, they could be dealt with effectively by these

Abstractions. A powerful new Discipline had emerged! But it was a wholly pluralist discipline: its elements were fixed. You couldn't use it if your elements changed into qualitatively different ones! But, it inculcated a necessary control over situations to enable its consequent effective use. So, it ultimately directed a following Science only into highly transformed, filtered and controlled experimental situations to enable such extractions to be achieved, and the restrictions imposed were vital for consequent uses too.

But, long before that occurred, the virtues of the mathematical approach were immediately imported into Reasoning too, to produce what became known as Formal Logic. But, of course, the elements of Reasoning were very different from those of Geometry! They were man-devised categories and even concepts, and unlike the abstractions in Mathematics these had a very different, and even an evolving, character: so to straight-jacket concepts as fixed, greatly limited what could be achieved, into something more like a mere complex Game of Logic, rather than the attempted revealing of elements of the Truth. The consequent discipline grew merely by new additions, and intrinsic relations between them were clearly severely limited.

Almost immediately, Zeno of Elea, in his Paradoxes, was able to demonstrate many contradictions in applying such reasoning to Movement, addressed by the concepts of Continuity and Descreteness, but his revelations were mostly ignored for a further 2,300 years, until German Idealist Philosopher Hegel in the 19th century.

The problem, imported from Mathematics, was the permanently-fixed nature of concepts - in these cases involving that special group where the given concepts could legitimately turn into their apparent direct opposites.

Now, such a mistake was NOT stupid at all! With the timespan of a human's thinking life, fundamental features of the world did indeed stay exactly the same, appearing eternal. Stabilities did seem to dominate the World, so for humankind to base their Thinking upon the assumption of fundamental stabilities (or laws), was indeed reasonable, and mostly dependable too. But, it wasn't actually correct!

Now, here's the question - "Have those thinkers changed?"

And, today, the answer in Science is "No!" And the answer in most other reasoning is also, "No!" The cornerstone of almost all Science is still Pluralist Mathematics in the Formulae used, and involves Pluralist Logic in their Theoretical Explanations. And, of course, it causes innumerable problems!

They are forced to import all sorts of tricks, to get away with it. And, the most impenetrable are by virtual extensions deep into the Ground of Mathematics, which is no longer Reality, but Ideality - the truly Infinite World of Pure Forms.

And, in addition, a wholly new definition of the Sub Atomic World, as ruled by Uncertainty and Randomness, was established. Even the pluralist drastic farming of experimental situations didn't help, and hence they were totally unaddressable by the usual approaches.

The problem was that Hegel had not gone far enough in his corrections to Formal Logic, and the reason was that he was an *Idealist* philosopher! His content was composed of the categories and conceptions of Man, and though he managed to make progress with Dichotomous Pairs of contradictory concepts like Continuity and Descreteness, he couldn't generalise to all conceptions, or beyond the trappings of Idealist thought.

He needed something more objective than the thoughts of Man. And that required the extension of Hegel's Dialectics to concrete Reality too. This was realised by one or two of Hegel's followers, within The Young Hegelians, and initially significantly addressed by the historian Karl Marx, in first applying it to History, and thereafter, and at great length, to Capitalist Economics. But, the comprehensive application to the Sciences was never exhaustively carried out!

So, when scientists like Henri Poincaré and Ernst Mach began to experience major difficulties in Physics, they devised an idealist/mathematical add-on which they termed Empirio Criticism, which later was greatly extended by Niels Bohr and Werner Heisenberg into the Copenhagen Interpretation of Quantum Theory.

Now, you cannot study the work of believers in this position, without very soon encountering their insistence that there is absolutely no alternative to their approach, yet, as a physicist myself, I have abundant experience of particles, waves and even randomness and probabilities,

yet all of these were occuring without major problems, within the pre sub-atomic-era: where none required a wholly new realm, as is claimed for Quantum Physics. So, what enabled these things within the old Physics, which are now prohibited in the new?

The most obvious example was the presence of a Substrate or Medium, wherein all sorts of phenomena could both be caused by interlopers, or could equally well affect the subsequent behaviours of such interlopers, by that disturbed Substrate. And, in addition, Recursions could be involved with time-delays caused by intermediate detours or delays.

The question was posed, "What difference would the presence of an everywhere-present-yet-undetectable Substrate be able to achieve, with the right properties, and in the appropriate circumstances?" And the place to try this out, initially, as a Thought Exercise, was obvious! It just had to be in the Double Slit Experiments.

But, the always built-in difficulties of the usual pluralist approach, would have to be consciously avoided. The usual experimental set ups had to be omitted. And, an entirely holist approach would have to replace it.

Now, this had significant consequences, even as an initial Thought Experiment! The usual thorough-going simplifications would be wrong in a holist approach: any simplified placeholders for the Universal Substrate would defeat its object.

Indeed, a fairly thorough-going preparatory investigation into the range of different units necessary to deliver all that we already know occurred in those prior experiments, would be essential before attempting the Thought Experiment itself!

ASIDE: We must never forget what the subscription to Plurality actually did to our prior scientific approach! Its drastic farming of Reality so reduced the contents of experimental situations that the crucial mutual effects between components, which actually delivered their natural behaviours, had been largely removed. And even those that remained were butchered to leave only those delivering in that context effects that were related to Form alone - the ones that could deliver relations between such abstractions as had been allowed to remain.

So, with a Holist Approach, we had to address all possibilities as they would naturally occur. Initially, as alternative dominances, and thereafter, increasingly, as combined and varying effects too!

We already do it, in verbal Explanations and Real Theory, and usually do it reasonably well: indeed, the ascent of the Copenhagen Stance significantly reduced our ability to Understand by totally rejecting all such attempts at holistic explanations.

There have been several serious revolutionary, and hence important, attempts at strictly holist theories, but absolutely no systematic attempts at defining a General Holistic Scientific Approach.

The most important was, of course, Darwin and Wallace's Origin of Species via Natural Selection. While another was Stanley Miller's Experiment into the chemical developments prior to the Origin of Life. Experimentally, Yves Couder's Walker Experiments, involving only a Substrate and Energy, have taken us closer to a Holistic Experimental Method, most particularly as he was able to produce Quantized Orbits at the Macro Level without any recourse to Copenhagen whatsoever. And, finally, this theorist's definition of a new and holistic form of Iteration experiments in tackling Movement, as well as his proposed re-design of Miller's Experiment, also suggest ways forward.

But, of course, the monolith of Pluralistic Science, especially due to its clear successes in Technology and Production, as well as the enormous investment of scientific endeavour, by dedicated scientists, worldwide, under that delivering Pluralist Aegis, will not be easily defeated!

Computer Simulation and Reality

How Plurality Falsifies Simulation

As both a professional scientist and a philosopher, also highly qualified in both Mathematics and Computing, I have to challenge the myths that are perpetrated by those who clearly have no substantial grasp in any of these disciplines. And, the most crucial inadequacies, are most clearly evident in their assumptions about Mankind's Pursuit of Truth.

For, they don't seem, at all, to appreciate the flaw-strewn trajectory of that Intellectual History, which has occupied only a mere 1% of the existence of our species upon this planet, and within that period suffered as many crises as triumphs, with still literally zero access to their sought-for Absolute Truth. And instead, has traversed a tortured path, defined only by the amassing of pragmatic Knowledge, rather than ny Understanding, via the seeking of an ever increasing measure of Objective Content - aspects or fragments of that sought-for Truth, which even together are incapable of delivering something consistent, coherent nor comprehensive enough to deliver what is actually being sought.

Yet, nevertheless, that journey has still been a magnificent achievement! For, it was achieved only by a single species of Great Ape, in a trajectory that physically took over 6 million years of adaptations to finally achieve the potential to reach for the stars!

But, that final outcome could never have been predicted from prior developments: it was indeed a Revolutionary Emergence essentially wholly New to Life on Earth - which, itself, had been the most significant prior Emergence upon this planet. Now, such statements as these themselves reveal a very different approach to the whole trajectory of Mankind's intellectual development, since that first flowering of those ideas, with the Greeks, only some 2,500 years ago. For, as with all such qualitative developments, the intellectual breakthrough not only opened up new vistas of explorable intellectual space, but also simultaneously-constrained those potential developments via certain mistaken aspects of that very same enablement.

The very means which revealed the potentials, also limited the possible development beyond a certain point.

For, the Greeks had extended Abstraction in a remarkable way: instead of mere naming and categorisation - linked by myths and religion, they exposed certain essential features, by a particular kind of abstracting-simplification of the Shapes of Things, to expose formally hidden relations, which they extracted and related to one another to create Euclidian Geometry - the very first developable intellectual discipline! Now, this discipline had a crucial flaw, which they did not notice, as their prior abstractions had also had it too: they considered that the crucial elements being dealt with were permanently fixed. Just as a Cat never changed into a Mouse, so the elements of Geometry were also unchanging!

Both conformed to the Principle of Plurality, in which things were totally-unchanging-forever! Now, though true for Geometry, and ultimately for Mathematics too, it certainly wasn't true for concrete Reality in general, or our conceptions about it! Yet, the vast extensions revealed within Mathematics just had to be exported to other possible disciplines too: so Plurality was imported into Reasoning to deliver Formal Logic, and even soon after to an emerging Science.

To this day, some 2,500 years later, scientists still insist upon eternal Natural Laws!

And most logicians still reject all contradictions as evidence of falsity!

Zeno and Hegel's work in these areas have been largely ignored by Mathematicians and Scientists, and while Karl Marx attempted to bring these philosophical approaches to materialism, he never was able to apply Dialectics comprehensively to Science.

Now, the consequences of this failure to apply real Qualitative Change to Science, were an inevitable and unavoidable series of ever larger Crises culminating in the abandonment of Physical Explanation in Sub Atomic Physics, and its replacement entirely by Mathematics!

Now, that was inevitable, as absolutely all of Physics had been moving in that direction for centuries, and had itself been locked into a View of Reality constrained irrevocably by Plurality!

And, so finally, we can arrive at our principal focus for this particular paper - Computer Simulation!

So, what are my credentials, for tackling this question?

I wrote a machine independent Fortran Compiler in the 1970s, and spent the rest of my professional career in Universities in three countries, ending up as Director of Information Technology in a College of London University. I also won a British Interactive Video Award for my contributions to Multimedia in Dance, and have since concentrated upon writing for the last 12 years, principally in Physics, Mathematics, Computing, Philosophy and Politics, in which I have published over 1,000 papers.

Now, having spent a significant part of my career helping researcher-colleagues and students with tailor-made software to aid their objectives, as well as always being something of a polymath, I have benefited greatly from that width, which those limited strictly to a single narrow specialism never enjoy.

And, perhaps the most significant areas for a physicist such as myself to be involved in were actually Evolutionary Biology and Dance! For, neither of these could rest easy with Mathematical Plurality, because of expressive Movement in Dance, and real Qualitative Change in Biology, but, perhaps surprisingly, the focus occurred primarily in Computing when used for Simulation!

For, though in the tighter and narrower subjects, inexplicable switches and qualitative Changes, could be put down to being "explicable-elsewhere". Computing was a generally applicable method, so these things stood out like sore-thumbs!

They were clearly fixes and tricks and validated by "prior experience", or "current try-outs", and then justified by the pragmatic tenet- "If it works, it is right!" Now, you can get away with such a "frig" if your primary purpose was only to produce a certain outcome, BUT absolutely never, if the purpose was to reveal-the-causes - to Understand something in Nature.

Mathematics, when I first got to Grammar School, constituted an exciting revelation! Coming from a non-academic, Working Class background, I was stimulated, just as the Ancient Greeks had been, by the rational power of Mathematical Abstraction. I, like the Greeks, considered that applying what was possible in Mathematics to absolutely Everything, was the way to understand it!

I shot to the top of the class in Mathematics, and remained so for the rest of my School career. I was persuaded to enter for 7 "A" and "S" level exams in the Sixth form (which I got without any trouble). But, by then I had already abandoned Mathematics as a "cure-all", and had turned, instead, to Physics, for there, at least, the purpose was to understand Reality, rather than matching it up to the prettiest Formal Garb!

So, though I was still an able mathematician, and have remained so throughout my life, I knew what it was, and what it could do, and crucially also what it couldn't do! Nevertheless, I continued to do serious work in Mathematics from the Symmetry Properties and Tessellations of Re-entrant Polytopes, to he Laban Pure Form - a polyhedron important in Dance Notation, along with an extended period of research into The Properties and Processes of Abstraction.

Rather than study Mathematics itself, I went to University to study Physics (though Mathematics was a significant component of that course). Sadly, I arrived just as Physics was abandoning Physical Explanation, for purely mathematical description - embodied in the Copenhagen Interpretation of Quantum Theory "in order to solve" the increasing anomalies appearing everywhere in Sub Atomic Physics.

I was amazed, and disappointed! But, aged only 19, and with a future to ensure, I buckled down and got my degree, but found the necessary sustenance elsewhere: I ran the University Art Society until I graduated, and turned to reading, painting and active student politics. But, from that very first term, I knew that the Mathematics employed in my course *explained* nothing!

Becoming a teacher in Schools and Colleges, I switched my specialism first to Biology, and then also back to Mathematics, but crucially finally to Computing, so that I quickly became the first port of call for researchers requiring Computer Aids in their work.

I worked in Computing for several decades. With a series of ascending posts in three different countries, I finally became a Director of Information Technology in London University.

Now, this seeming diversion was absolutely necessary, because I was constantly called upon to employ the latest Mathematics in the tailor-made Computer Software products, which I developed for a wide range of researchers, in very diverse disciplines. And, throughout this work I was always using the very same forms that the Copenhagenists were contorting into what they said was Physical Theory. And, both Probabilities and Wave Theory, and even Simulations were being employed to pragmatically, and in highly constrained circumstances, achieve the "required results". I was in a remarkable position!

Indeed, I worked for a world-class mathematician by providing graphical revelations of Possibility Spaces in iteratively-delivered models of a beating Human Heart. So, I know precisely what Computer Simulations are and when, how and why they are used in Science. They employ pluralistically achieved eternal Natural Laws, until they reach a situation where prior experience had shown that the passing of a given threshold in a certain parameter always indicated that a new Law must be switched-to.

No reason was required - so no explanation is involved! And, such a means is both retrospective and selective - for not only must that situation have occurred before, but also, in the very same way.

Anything qualitatively new or even significantly modified simply won't work! You can build-in ranges of adjustment, but any Emergent Transformation can never be delivered through Simulation - a fact that is increasingly overlooked in its many scientific applications.

NOTE: Now, as Pluralist Science was achieved by using only "farmed contexts", efforts, within our control, to replicate past contexts are implemented to remedy this obvious, short-coming, but then the myth of applying supposedly "General Laws" is clearly blown!

Another mathematical ruse is to use what is called Iteration, which is one of the many geometrically-derived tricks associated with Graphs, along with the idealised Formulae associated with such Graphs, achieved

by “fitting-up” perfect Forms from Mathematics to measured data.

NOTE: Interestingly, occasionally equations can be formulated directly from Theory, with NO experimental data, and NO fitting up to ready-made Perfect Forms from Mathematics.

For then, similar methods, to those described above, can indeed deliver a great deal more via Iteration! My mathematical colleague’s use of the Van der Pol Equation did in fact reveal both Fibrillations and Heart Attacks.

While James Clerk Maxwell’s Theory of the Aether did produce his still used Electromagnetic Equations.

We must not confuse pluralistically and holistically achieved equations: they are certainly NOT the same!

The Effects of Wrong Premises

and of Mathematics upon the Way We Think

Several already well-established and profound criticisms of Mathematics, as the universal Lingua Franca of Science, along with the “negative-or-repulsive nature” of so-called Dark Energy, both clearly indicate the fundamentally undermining presence of key premise-errors, in the assumed bases of the way we currently do Mathematics, and consequently Science too!

I have personally spent many years attempting to apply the revolutionary approach of Dialectical Materialism (Real Marxism), to both Mathematics and Science, for, in spite of it being a primary objective of the originator of that stance, Karl Marx, it has never even been comprehensively attempted (never mind successfully achieved).

The primary achievement of that endeavour, turned out, somewhat surprisingly, to be the necessary re-instatement of a material-yet-undetectable Universal Substrate, present literally everywhere, along with a resounding critique of that unavoidable cornerstone of Mathematics - Plurality.

Indeed, the inclusion of the former alone, entirely removed every single one of the anomalies in the Copenhagen Interpretation of the full-set of Double Slit Experiments, explaining absolutely everything physically - without any recourse whatsoever to Wave/Particle Duality.

While, the added rejection of that latter premise, has allowed, for the first time, the inclusion of Qualitative changes in both Formal Reasoning and in Science.

Indeed, the usually-supposed alternative of completely Empty Space, to that of some kind of Substrate, is now generally considered to be insupportable, with talk of “The Interstellar Medium” and similar alternatives literally everywhere else.

While the opposing stance to Plurality, namely some version of Holism, such as that used by Hegel, and ultimately by Marx, as his basis for Dialectical Materialism, allows Science to finally creatively embrace Real Change in general, and Evolution in particular, and extend Science from its current limited areas of Stability, and eternal Natural Laws, into a stance capable of addressing the evident trajectories of Development occurring everywhere, and in everything.

And, that essential research had also both required, and then demanded, a necessarily, historical account of the entire development of the underlying Philosophy, employed by Mankind, throughout its History, but particularly since the original establishment of the basic intellectual disciplines by the Ancient Greeks. For, that is also where today’s problems originated!

In spite of the many contradictory alternatives, conceived-of during that important revolution in ideas - they could only be effectively used, by keeping-them-all, and justifying the switching-between contradictory stances, via the oldest tenet of all - the pragmatic, “If it works, it is right!”, along with the underlying and greatly simplifying assumption of Plurality, first in Mathematics, then most damagingly, first in Formal Logic, and finally even in Science too.

In spite of those gains made possible in Thinking about a complex World, simplified by assuming Plurality, it also gradually dawned upon Hegel that the very same Principle was also severely limiting.

For, it also totally excluded all real-qualitative-changes, from all these disciplines, and, therefore, made them all about dealing only with fixed-elements-only, and limiting the possible areas of investigation to just Stabilities, with their purely quantitative variabilities, and absolutely nothing else.

So, here reside the problems of the Sciences: they are ill-equipped philosophically, methodologically, and even more crucially, theoretically, to ever cope with 20th and 21st century problems in their fast developing fields.

The Crises in both Physics and Cosmology were totally unavoidable given the overall mess that constitutes their still current, philosophical stances.

The necessary pluralist restricting of both experimental and productive situations, as entirely rigidly-maintained Stabilities, made the transitions involving qualitative change wholly impossible to deal with as such, which was also masked by the retreat into ultra extreme situations, such as High Energy Colliders, and very low energy situations, all of which were both maintained, and then addressed in the old ways.

But, whenever they did so, absolutely NO particular solutions were achievable, and probabilities increasingly replaced old-fashioned causal solutions. And these were excused by Indeterminacy Principles making anything else impossible.

Let us muse for a while about Fields, and the way their effects are communicated in so-called “Empty Space”.

Clearly, such a basis as Empty Space couldn’t actually explain anything, so James Clerk Maxwell had suggested a particular physical model of a Universal Substrate - The Aether, that he considered was necessary to deliver what we knew actually occurred there. But, later investigations found NO such Substrate! And, the Michelson-Morley Experiments seemed to establish, once and for all, that no such Substrate existed.

But a recent alternative has resurrected The Universal Substrate as a material, but undetectable collection of joint, mutually-orbiting sib-units with intrinsic, or population-wide cancelling effects, to make then undetectable.

And, such a Substrate could hold quanta of field-energy, within the internal orbits, of the composing Units, along with appropriate orientations in the required direction via their produced Dipole Moments.

While, the alternative of NO-substrate-at-all would make the propagation of such fields impossible - so the only possible imposition, of an impelled direction, would be by collisions, starting where such particles were numerous and encouraging a net expansion outwards.

Notice that where both Substrate and free-moving particles occurred together, the propagation of the field orientation, and its required energy amount, could be communicated unit-to-unit, within the Substrate, and at the speed of Light, while the collisions of free particles would be much slower: so the field effect would undoubtedly dominate.

So, moving outwards, the field would dominate whilever there was still a Substrate, but beyond that boundary, outwards, only the pressure from collisions would dominate instead. The processes requiring a Substrate would never transcend such a boudary, while the free particles “in the void” would in the end remain in the vicinity of the Universe and its Substrate.

NOTE: These new models and theories contain no Mathematics whatsoever - and would never have been realised if they did.

Compare Subtrate Theory with Einstein’s math-derived Spacetime.

A Mirror of Reality at the Quantum Level?

Throughout the history of science, the attempts at explaining things correctly have been unavoidably stymied by who, and indeed what, we, the human interpreters, actually have access to, and how we interpret that knowledge.

For example, there isn't, nor could there be, any intrinsic human capability for addressing such questions - for Mankind was, initially at least, merely a clever ape, which for over 97% of its existence, as Homo sapiens, never got beyond the purely pragmatic tenet of "If it works, it is right!", as their only "intellectual" tool. Indeed, all of Mankind's congenital capabilities were selected-for only by Evolution, and, therefore, determined solely by Darwinian Natural Selection, involving just those capabilities enabling the species' overall survival and effective reproduction. Everything else has been only very recently attained - entirely socially - which only began within that last 3% of Mankind's total existence, and which could never be based upon the Full and Real determining Truth of the situation, as it wasn't then, and still isn't now available!

How on earth could this species of ape actually access such things? They only, and very-slowly, invented just a subset of the necessary words, and even that only over the last 1% of their existence, and as the History of Human Thinking, since then, has shown, every single gain has been, at its very best, approximate, and certainly never wholly sufficient. Nevertheless, though the bulk of their socially-created-language has always been exclusively descriptive, attempts at Explanation have been gradually improving, especially since the advent of Science.

But, the engine of Explanation has, unavoidably, always been Description. They could only start with Analogy!

For, though it does NOT deliver why things behave the way that they do: it does deliver how things behave, and in very different contexts that can at least begin to move the task towards common or similar causes.

Even thereafter, they could only proceed with natural and evidently-connected sequences of events. But, the actual reasons, or causes, for those connections were not usually evident.

So, in the early stages, such conceived-of causes were initially invented! And, it was only with the advent of a scientific search for actual, physical causes, that the process could be improved beyond the supernatural and the purely speculative.

Now, this contribution is evidently NOT an adequate treatise upon such questions, though they have been, and will continue to be, addressed fully elsewhere.

But, the above few points were clearly going to be indispensable here, if only to demolish the myth, that we already have all we need to Understand Reality: we are still a long, long way from that!

After all, it took almost 2,300 years for the more significant of the errors initiated by the Ancient Greeks, to at last be addressed by the German Philosopher Hegel. And, we still have, a further 200 years later, to comprehensively extend those crucial contributions to materialist Science - for they were in Hegel's hands entirely idealist!

So, in this paper, I will limit my objectives to a celebration, as well as a critique, of a certain PBS Space Time release on YouTube, which, I believe, shows where we are at in Modern Sub Atomic Physics at the present time!

Its topic is Virtual Particles.

And, it is remarkable how both that idea, and the alternative one that I have been pursuing (an undetectable Universal Substrate), perhaps surprisingly, actually appear to resonate-analogistically with each other, as attempted explanations of Reality at The Quantum Level!

First, the presenter tells of phantom particles appearing and disappearing in Space "literally in-and-out of nowhere"- the famous cases of Pair Productions and Pair Annihilations, involving one Electron and one Positron, present, perhaps, the best examples.

Now, elsewhere, similar virtual matter and antimatter pairs are also said to be created out of nothing, by "cheating the Universe", achieved by borrowing sufficient energy to do this, and paying it back by their almost immediate annihilation! And the Source for the energy required?

"It is the invisible Quantum Field!"

And also, near Black Holes, virtual matter and antimatter pairs of units are said to be split by the surrounding Event Horizon, to leave one IN, and the other OUT, consequently, overtime, delivering appreciable Hawking Radiation.

But, my own alternative explanation, for the former case, assuming an undetectable Universal Substrate, is achieved by involving, as crucial part of that Substrate, an undetectable joint-Unit, produced by the mutual-orbiting of the very same two sub-particles as are considered above. And, though these can absorb energy by the promotion of their inner orbit, too much energy will dissociate the union to deliver the two particles - free once again. Yet also, as part of that same stance, an appropriate encounter between two such free-moving, potential partners - of those same kinds - could cause their joint-capturing into a mutually-orbiting pair, and, therefore, become undetectable, apart, of course, from their effect as an energy-supplying Photon.

Indeed, all the Units of the undetectable Universal Substrate are conceived-of in that same, mutually-orbiting-pairs form, so energy can be internally held, and so will be generally available throughout the Substrate, from the promoted orbits of all such Units.

With such ideas, many problems consequently vanish!

And, with regard to the latter case, the suggested undetectable Universal Substrate will be absolutely Everywhere, and will both be affected by, and itself-affect the situations it encounters, including majorly transforming ones, where Substrate perturbations will cause all sorts of very different structural Phases, along with their differing consequent Effects.

Now, the main purpose of this paper is to compare Virtual Particles (particularly as described in the video above) with the Units of a suggested undetectable Universal Substrate.

For, the video's presenter describes Virtual Particles as - not being physical, but, instead, being our simplified and idealised mathematical representation of the quantum mechanical behaviour of Fields.

This is clearly the crux!

For, as physicists, we always have to explain things physically. The clue is in the name!

And, the Universal Substrate as defined by this theoretical physicist is entirely physical. The natures of its Units are such as to actually physically supply Fields as useable energy, both held-within and delivered-from, various structural re-organisations of the Substrate's mutually-orbiting-pair type units. Though, these Units, all of which being such mutually orbiting pairs of exactly opposite matter and antimatter Lepton sub-units, deliver either individually or over-local-populations, no obvious means of passive detection, they, nevertheless, are both effecting-of and being affected-by, conducive interlopers within their various different physical Phases or "Fields"

Problems

Now, the problem for consensus physicists has always been the clear existence of Wave-like effects when no Substrate capable of producing them is considered to be present.

The infamous Double Slit phenomena caused by, say, moving particles seems to be totally inexplicable.

So, particles were given Wave/Particle Duality to explain such phenomena.

But clearly, another alternative could be to re-instate a Substrate, like the Aether, but for it to be wholly undetectable due to its unique, though still entirely material, composition.

And, such a Thought Experiment was conducted, and surprisingly solved all the various anomalies of the full set of Double Slit Experiments. Undetectable or not, it would still both affect situations, and itself be affected by occurring phenomena within it.

But, physicists rather liked Totally Empty Space! It greatly simplified, and also made possible, all kinds of experiments - for attaining a vacuum, which was eminently possible, also "delivered" Totally Empty Space too. The presence of such a Substrate, especially as it wasn't detectable, would greatly complicate ALL experiments! For, all the usual perturbations as of other detectable substrates would occur here too.

And, in addition, the initial assumption of Plurality, at the very beginning of Mankind's intellectual concepts, had forced the absolutely essential, pragmatic farming of experimental situations, to greatly simplify, as well as select-for a particular targeted context with a single dominant factor, that would both clearly display, and then allow-the-extraction of that sought-for relation. And this was best achieved by pragmatists, who had learned how to do it effectively over a couple of millenna.

The theoretical physicists thus left it to their experimental colleagues to achieve the appropriate conditions, and, sometimes, to even extract the necessary data! Only then, did the theoreticians move in, armed increasingly with their "solve-all" discipline - Mathematics, to then find-a-form which they could fit-up to the acquired data.

So, with generations of such processes of simplification and idealisation, no-one wanted to reverse direction, and have to holistically juggle with multiple simultaneous varying factors, which had prevented development so completely in the distant past.

And finally, this technique had been justified by the assumption of the Principle of Plurality. which made the so-extracted relation into an eternal Natural Law-which isn't ever true!

Plurality may hold in Ideality, but never in unfettered Reality.

There are also many fundamental areas of Reality, which are still totally unexplained, particularly to do with Charge, Direction and Energy in Fields!

Now, the ever-present, yet never-explained properties of Attraction and Repulsion (usually linked to Charge) are clearly the major problem, for both my alternative explanations, and those based upon Virtual Particles.

They must attempt to provide the bases for a substitute to those non-physical, entirely-formal descriptions, at the very heart of the whole Copenhagen Interpretation of Quantum Theory.

For, that is a very old trick, indeed, and uses not a single causal explanation, but, instead, a whole range of probabilities, including counter-intuitive cases, to smuggle-in outcomes as selections from that range.

NOTE:A related argument is often proffered to counter supposed direction in the Evolution of Living Things, by purely random damage to Genes, certain cases of which, counter-intuitively and by-chance lead to development.

NOTE 2: To counter such "fixes" requires a philosophical discourse upon the opposing Principles of Plurality and Holism, which has been exhaustively pursued elsewhere, but would deflect us here from a more reachable and understandable, yet important objective for this paper.

Now, I will not pretend to be able to fully explain Attraction and Repulsion, but, once given an evident Force and its clear Direction, obviously evident by its

affecting of a given entity, but I will deliver a full detailed Field, composed of of physical particles, with every single one containing, both the exactly correct amount of energy along-with-its-direction, sufficient to power the Field Effect at that point onto the affected interloper. and absolutely nothing will be taken from either the usually-supposed cause, or from the affected recipient: for they will both be totally unaffected in their prior-properties, by the actions of the Field! So, the active agent in establishing the Field, and supplying all the requisite energy, and its necessary direction, will be entirely due to the Units of the Universal Substrate alone.

Now, we must compare this with the Quantum Mechanical "explanation" supplied here as the consensus alternative, by this video.

Let us also attempt to deliver that alternative.

It is very different!

It involves an infinite number of possible amounts and directions, which are involved literally everywhere in the assumed Field, and are even simultaneously-present in every single, individual position, but this set includes every single possible option, including both Directions, but unlike this alternative Substrate version, the Copenhagen versions all have no physical container, nor are they specific: they instead are an immaterial infinite set - present everywhere!

And this appears to be an underlying vibrational(?) set of possibilities throughout the Quantum Field.

BUT, a real Physical Explanation can never really be even attempted: the best that can be delivered is a description of a kind of parallel universe, in purely mathematical forms!

In abandoning Explanation, these theoreticians are also abandoning Reality, for a parallel, merely-reflected world of Ideality- the realm of Pure Forms and absolutely nothing else.

They can use their Mathematics, along with pragmatism - based upon experience - to deliver usable predictions, without any idea of what is actually going on, and why!

This is termed Technology! Science must attempt to actaully explain phenomena.

In working with Mathematics, they are exploring the truly infinite world of Forms available in Ideality, hoping to find appropriate patterns for everything that occurs in Concrete Reality. But, of course, that is impossible, as Reality is holist and consists of many sets of simultaneous factors all acting together, and influencing one another, in many different situations.

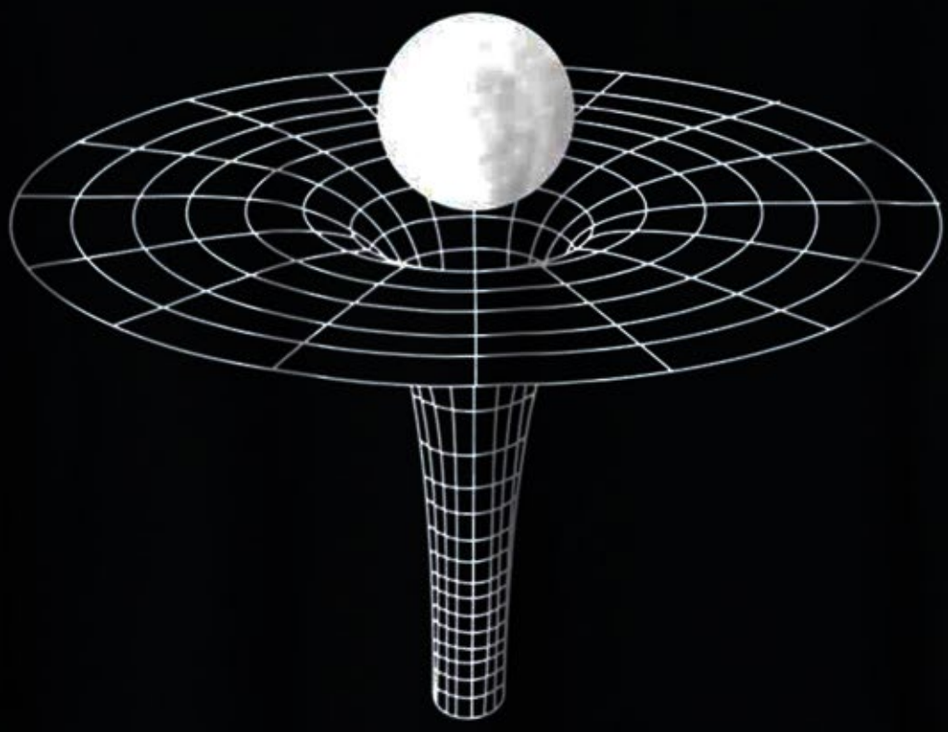
But, Physical investigations of these can be, at least partially, uncovered - that is what real investigative experiments are for!

In Ideality, you can't possibly know which of them: so you substitute, mathematically, all possibilities and hope, by a very different kind of experiment, to get enough multi-possible sets to pragmatically confirm, in each case, a particular probabilistic formal model.

But it will deliver useable Predictions ONLY.

It is, of course, an admission of Defeat for their chosen version of "Physics", and will only be ousted by the Creation of a Holist Physics to replace the dead-theoretical-end of current Pluralist Physics.

SPECIAL ISSUE 64 APR 19 JIM SCHOFIELD



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