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REAL EMERGENCE

WHAT IS EMERGENCE / HOW ORDER ARISES / DOMAINS AND EMERGENCES / WHY DIALECTICS EMERGE
MATHEMETICAL CHAOS OR REAL EMERGENCE / REAL TRANSFORMING DEVELOPMENT

Words **Jim Schofield**
Design **Mick Schofield**

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Real Emergence

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Emergence & Collective Organisational Principles

by Jim Schofield

We now seem to have three very different definitions of Emergence.

We have John Henry Holland's version, which is probably the consensus at the Sante Fe Institute (which I have dealt with some time ago), and the two more recent interpretations. We have Robert Laughlin's, and we have my own.

I think the time has come to clarify the differences (and similarities) in these last two definitions. (I leave out of the reckoning Holland's version, as it doesn't by any stretch of the imagination deal with *real* emergence – as in the origin of Life on Earth. It is a computer scientists's idea of emergence, where programs, written by such as himself, can, of themselves, generate novelty. I consider that this is pure rubbish, and will hopefully die its own death without any help from me!

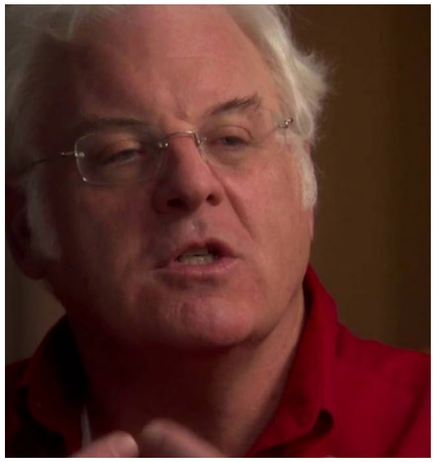
Laughlin, on the other hand, is certainly related to my own approach, but brings to what you would expect from a Nobel Laureate. He brings great experience, knowledge, understanding and of course original discoveries.

Let us see what we can do to integrate these alternatives. Laughlin sees emergence as the appearance of collective law, that can only exist when many participating elements are involved. The same elements taken one at a time, or even as a small group, act very differently and variously, to seem to indicate that NO law is present. But, once a threshold of numbers is passed a stable "law" emerges. It is dependant on the collective effect of the aggregation of elements. It is difficult to see how, with the incoherent activities below the threshold, such a collective law can be "explained" in a straight-forward , reductionist way in terms of lower order properties, as they seem invisible and non effective in the lower orders themselves (i.e. below the threshold) Laughlin is well aware of this and contrasts so-called "fundamental laws" with these "collective laws". Indeed, he says quite bluntly that he doesn't believe that ANY fundamental laws actually exist. His slant is that ALL laws are collective, and he can reel off innumerable and clearly correct cases of these. He notes that multiple participating individual elements seem to always impart stable relationships to such laws, and he puts this down to "collective organising principles".

Now, he may well be right, but WHAT are the organisers? Just what makes the behaviours of aggregates predictable and stable, while the individual elements seem a law unto themselves. What is *really* going on?

Now, as it happens, I originally came up with a related form some years ago, but put in different terms. I was attacking the problem of law from a very different angle – really a critique of maths-led theory, and my crucial areas were where mathematical equations blew up, and gave meaningless answers. The most significant cases were where there was a change of state in a substance – say from solid to liquid.

Note: with reference to Laughlin these cases showed a similar feature to the one's he describes. Single elements, taken alone (i.e. extracted from) a solid, a liquid or a gas are indistinguishable and display no solid, liquid or gaseous features). What amazed me was the easy dumping of the solid law, and substitution of a liquid law, without a mathematical bridge between. There was always some sort of "explanatory bridge", many of them quite profound, but with the increasing dominance of maths in theory, this eclectic, pragmatic switching seemed reprehensible. So, I tried to compare explanatory theory along with its analogies and previously established understanding, with what mathematics was doing. There was no doubt it was useful, but could be dumped at the drop of a hat. When a solid melts the laws that governed



its behaviour melt too! They actually give zero or infinite values, and are no longer relevant. So, in a sense I am saying something similar to Laughlin when I talk about the emergence of Levels typified by a change of state.

But, in addition to these, there are a series of Level changes that involve considerably more than such changes of state. State changes are REVERSIBLE, and don't change the world. They are local, and stay local. They are temporary and can just as easily revert back as conditions change. There are, on the other hand, Levels which do precisely that. Moreover they involve innovation. Such levels bring into being things that have NEVER existed before. The crucial one is, of course, the emergence of Life (please don't take me to task for the possibility that Life could well have originated previously, and even subsequently, somewhere else in the Universe. To that I say, "Irrelevant!" We are trying to explain these phenonena, and reference to maybe elsewhere with no possible interaction is a waste of time).

The origin of Life on Earth is precisely where I get my alternative meaning of Emergence from. All other Levels of Reality are trivial compared to one like this.

When the complexity of Reality is studied taking into account all phases from the beginning of the Universe (if such can be conceived of), then many new, innovatory Levels will be shown to have emerged at many different times, which also changed the whole environment. New forms of matter successively emerged from the basic resource of Hydrogen, and doubtless before that the same could be said of pre-Hydrogen forms. From this it is clear that Matter itself has developed, and emergent Levels (in my definition) have proliferated throughout this history, each one significantly changing the environment and changing its potentials.

So, the emergence of Life is only one of many emergent Levels before and since. How can we characterise this sort of Emergence?

It seems to me that this Emergence occurs when a certain threshold has been passed for the first time in the universe, which opens the door to a brand NEW Level. This is not just a threshold-of-numbers as with most ordinary collective laws. It is, on the contrary a Threshold-of-Content, of Qualities, and when it occurs it changes the world.

Such a Level has certain special characteristics.

First, it is entirely new – unlike changes of state, this level has never existed before, and again unlike the normal "collective" levels it is NOT reversible.

Second, it constrains the lower levels that produced it tend,in important ways, to strongly maintain the Level. So, while maintaining below, it also changes the possibilities above. Its protecting of lower processes, brings into the realm of possibility, new configurations that before were "impossible". And, it makes possible new, emergent Levels in the Future.

The organisation of Matter by the new (self maintaining) forms avoids the gaggle of myriads of undirected changes, and substitutes from them new emergences which would be impossible by pure random change. In a sense some sort of Direction is defined by emeregent Levels.

At this point, it might be seen to be the case that TWO kinds of emergence are involved here.

1. Reversible Collective Organisation Levels
2. Almost irreversibel, self protecting and potentially innovative watershed Levels.

If this is true, then Laughlin's are type 1, and mine are type 2.

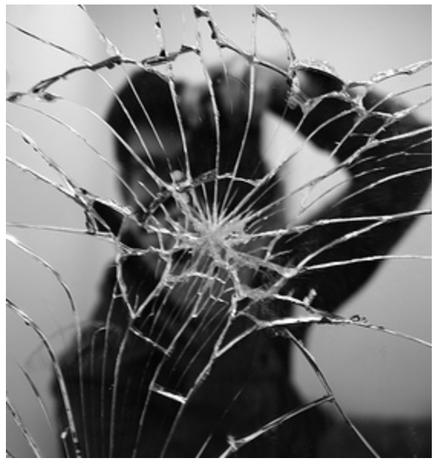
Though I am keen to claim type 1 also for its meaning when we consider the role of Mathematics in Physical Law. Laughlin (and myself) makes clear that Mathematics has limitations in this regard. In particular, he sees it as proven that direct reductionism as evidenced by a strict hierarchy of laws has been totally undermined as the sole means of explanation. Reductionism as a universal system to deal with the whole of Reality is finished.

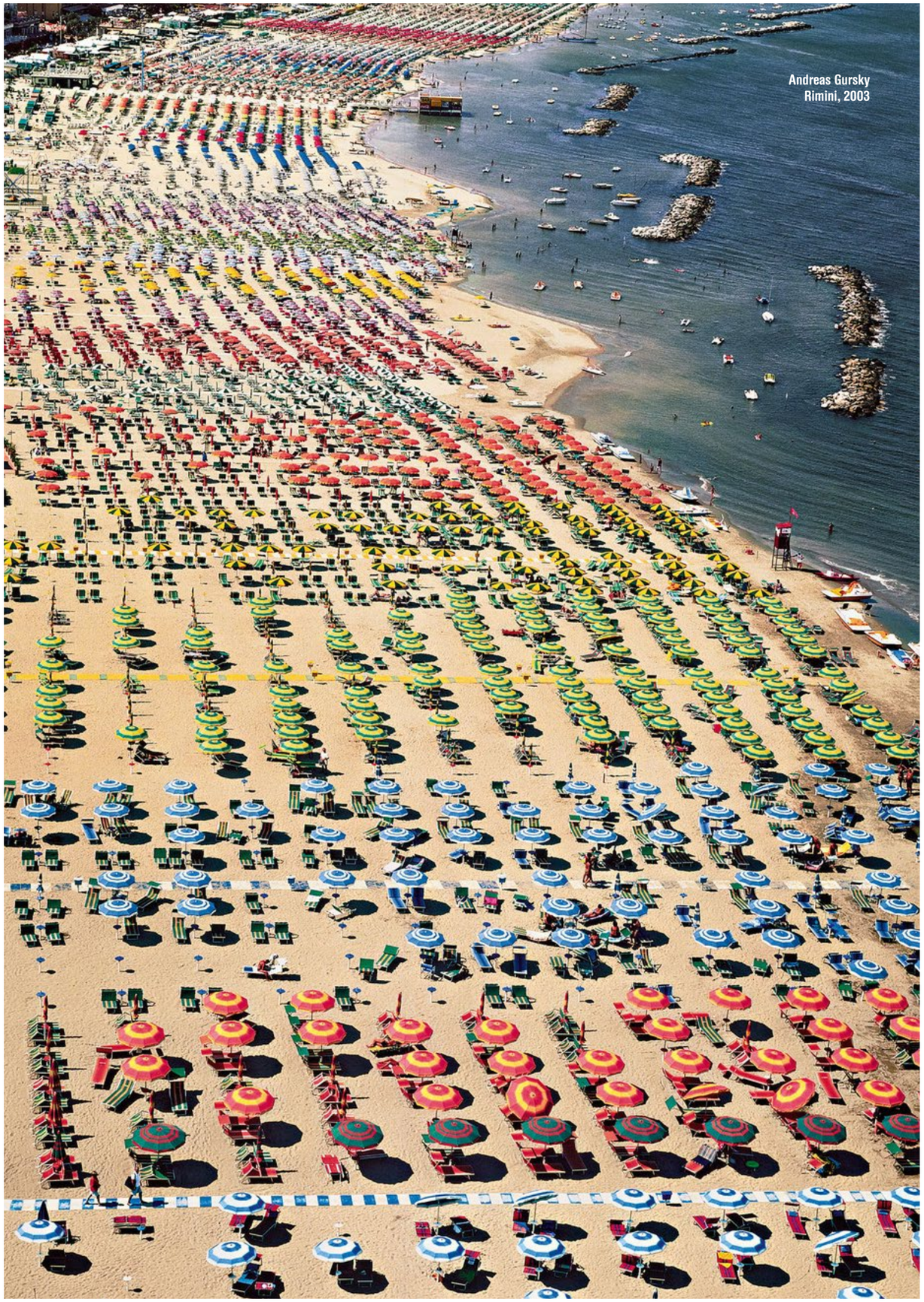
Now, my take on Mathematics is somewhat different. I am an able mathematician, and have spent many years in mathematical research, BUT I see mathematics as part of, and related to, the important Processes of Abstraction. Abstraction is the set of processes and productions, via which mankind gets a handle on Reality. Abstraction can be the extraction of purely formal elements OUT of the complexity of Reality. Such an abstraction is always LESS than the Reality from which it was taken, but without it reality is beyond full control. We isolate sub-sets of reality, and within these carefully extract given variable elements, so that we can study their relationships as their values change. These relations (remember extracted out of only a part of Reality) can be furthet abstracted into pure mathematical relations – Formulae. Now these forms are very useful in DOING things in the given small area that has been selected (the domain) and becomes vital in Technology, but they are NOT of this world. They are purely abstract!

Now, this turns into yet another advantage. Similar relationships in many widely different contexts in Reality can be "fitted-up" with the very same mathematical form. So, such Maths forms are universal - but they are also limited in applicability.

A solid-law will give meaningless quantities for certain parameters after the solid melts. The values become zeros and infinities and have to be DUMPED. Quite new empirically established liquid-laws have to replace them, and there is NO continuity of those seemingly-adjacent laws. One cannot be made to turn into the other.

This is the major weakness of mathematics. It does not reflect the trajectory of reality. It is a myriad of fractured mirrors, each only useable in quite limited domains





How Order Arises

Dominance, Stability & Life!
Dynamic Holism versus Static Plurality

Now perhaps, we must go much further in considering Dominance, for it occurs throughout a whole hierarchy of levels in Reality, and thus complicates and enriches classical Holism to a considerable degree.

For our explanations, so far, have taken the classical holistic standpoint, which has ensured that it still does not deliver what actually happens, either in detail, or throughout that hierarchy to give it its undoubtedly creative nature. In fact, in a classical, idealised holist mix, dominances will come and go incessantly, without leaving behind any significant or developmental changes, for, in actuality, such a purposely-idealised version does not generally occur.

Indeed, we must go beyond individual contributions as separable, yet sum-able processes, and consider just how these components affect and change one another, not only towards a possible process dominance, but also to produce overall Systems, where all processes would be changed by one another, whether dominant or undetectable.

Hence, taking all contributing factors together, we must consider not only the temporary coming to prominence of individual dominances within any holist mix, but the association of processes into mutually conducive proto-systems, where particular individual contributions benefit from others, and also vice versa, so that collections of such operating processes grow at the expense of others not so collectively well-endowed.

NOTE: It is precisely in such objectives that we part company, in a totally principled manner, with the consensus scientific standpoint. For that stance is always pluralistic, and therefore sees analysis as totally legitimate. It is their firm belief that all contributions to any complexity are always separable – that is independent of their individual contexts. For then, the usual scientific Domain-Farming prior to a subsequent confined extraction of an assumed-to-be eternal relation is considered valid. But that is certainly NOT the case. It may well be a necessary pragmatic technique to enable certain objectives to be fulfilled, but philosophically, that is concretely, it isn't true!

Now, even such a higher-level system could also clearly zoom off to dominance, not as a single process, but here as a System of Processes. Yet no such system can ever be entirely independent of its environment. It will depend on its context for its initial resources, and will still use that same context as a dump for its useless-to-it waste products.

It can, therefore, both exhaust its supporting environment of required resources, and even poison it with a surfeit of its wastes.

So, it is conceivable that such a system could more or less out-perform its less well-endowed rivals, to finally totally dominate, only then to surprisingly collapse by ruining the essential environment on which it rests. We are, clearly, deeply embedded in a holistic World, and NOT the pluralistic World that we constantly labour to make it.

So, the only salvation for such self-defeating systems is that its component processes, probably in conducive linear sequences, also form Cycles!

In such situations, the end process in a sequence would produce the required resource for the first process in that same sequence, and thus, to an extent, be relatively self-supporting! Indeed, separate sequences may also form lateral associations (particularly of unconsumed, but vital, catalysts or inhibitors) where products become

essential controls to other systems too. Whole parallel families of sequences could grow up, feeding each other, and perhaps just depending upon the environment for only the most abundant and inexhaustible basic requirements.

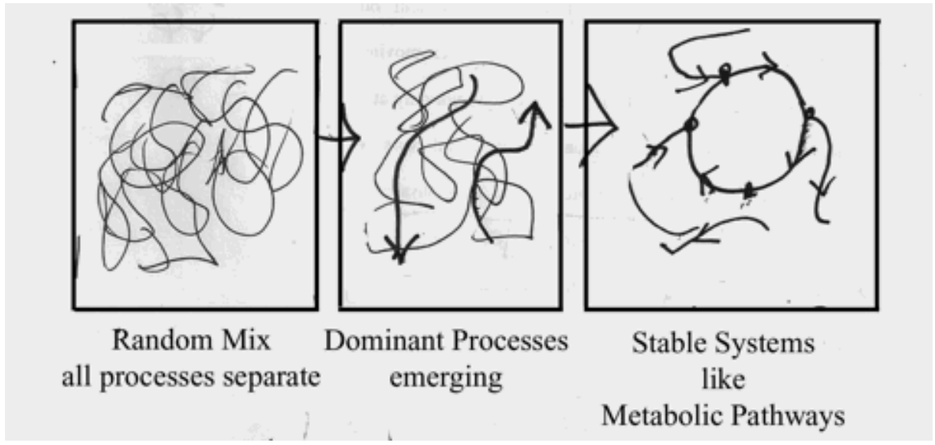
After all, is that not what Life is, and the above description is almost a definition of the famous Metabolic Pathways System?

NOTE: Consider the environmental necessities for plant life – the Sun, the air and water!

Clearly, therefore, while chasing the definite appearance of Dominances in Reality, we find ourselves having to raise-our-game, significantly, by having to consider, not only close advantageous relationships between processes to ensure a given process's increasing success, but also, and unavoidably, its role in systems of processes, the crucial contribution of cycles, and the inevitability of Stability, to plumb the question of Dominance completely.

Yet, Tempo certainly intervenes for nothing is eternal. In the end all things pass and the totality inevitably changes. Nothing remains permanent! Constant changes, though usually countered by appropriate sub processes within a coherent system, will ultimately breech the security of the system and weaken it, allowing other previously inhibited alternatives to grow and compete.

Even Dominance is temporary, and though at a vastly different timescale, Stability itself is too.



Indeed, there exist both of the seemingly opposed kinds of change always present within Reality – the incremental, relatively smooth changes, and cataclysmic, revolutionary changes. For one actually causes the other: but Level is crucial!

In an ideally conceived-of holistic World, the bottom-up-only conception becomes inadequate for interactions become processes, and processes become systems, and systems become Levels, and at every stage, in this hierarchy, new relations are possible and these can then have top-down effects.

Now, this means that in an ideal, totally random situation some changes at the bottommost level have no major constraints; they can happen all over the place, and all the time. But, as such, they have no overall effect, and indeed do, "team-up", and begin to form higher proto-systems, and (still in an idealised World), these will compete with other proto-systems. But, even there, surprisingly, such associations can ultimately demolish the assumed random, going-nowhere mix.

A particular proto-system can integrate purely destructive processes within its aegis, because they make its success more likely by attacking other competing proto systems.

Something new has occurred!
And it changes the game entirely.
The supposed ideal random mix is finally destroyed and Dominance of a proto system results in what we call a Stable Level – a Stability!

Perhaps the most perplexing feature of Levels is that though they form a hierarchy, and each new and higher Level arises out of the demise of its producing lower Level, that is never a global crisis: it is always initially a purely local Event. The producing crisis occurs where the prior stability is no longer sustainable, while elsewhere that prior Level continues as before.

Indeed, the new Level does not absorb the older Level everywhere. That never happens. Indeed, the new Level only appears in a locality where the old Level collapses. It is the result of the demise of the old Level in its own terms, but it occurs locally due to its own contradictions in that particular place.

Thereafter, the new Level and the old Level co-exist, and remarkably, the presence of the new Level prohibits any repetition of the crisis, cataclysm and creation that occurred in its own birth.

Its presence is not only a self-propelling system, but also a defensive system that will merely absorb any new alternative long before it becomes another identical crisis for the old Level.

The new Level actually ensures the continuance of the old Level that produced it, but actually subtly modifies it: it adds to that lower Level constraints of its own.

Indeed, the most apt analogy is that the "Sea", within a local crisis, produces a new Level, which continues to float upon it, but has also "changed the Sea" beneath it. It could no longer produce crises, as it would henceforth be policed by its own creation: a top-down constraint would eliminate any such potential crisis happening again.

The "Sea" had been subdued by its own creation, at least in its potential further crises and creations. But notice, if some totally externally caused calamity destroyed totally the "floating" Level, then its constraints upon the underlying "Sea" would be removed, and it once again would, via some irresolvable crisis, produce a higher Level as a result of its inevitable demise.

Mathematical Chaos

or

Real Emergence?

Introduction:
Who says Philosophy isn't important?

The total chaos that currently infects Mathematics and Sub Atomic Physics (plus a tidy overflow into Cosmology) is a symptom of disciplines without a sound philosophical base, which have been taken into explanatory dead-ends! The following paper attempts to tackle these problems via a range of Philosophical bases.

The trouble with mathematicians, and for that matter, also with mathematical physicists, is that they model really-happened Emergences in a dead-end way.

It is because they put their trust entirely in purely formal, and pluralist equations, as the "true drivers" of Reality. They, therefore, unavoidably throw away the physical entities involved, and their causal effects as mere invented self-kid, and instead trust only the purely formal aspects - those both simplified and idealised reflections of Reality – existing only as such in Ideality – the realm of Mathematics.

And, though this, immediately, signals an incipient major crisis, it is just ignored, so that the process generally ends there, with a Singularity, or even an Infinity at its extremities.

But, even at their best, such reflections are mere adjusted snapshots, standing-in for real ongoing processes in Reality.

So, such an approach can never, in the slightest way, ever deal with a dramatically transforming Emergence! At the very best, it is only the new, produced situation, as a consequence of the Emergence, that is dealt with, but in the very-same-way as the one existing before the transforming cataclysm. Clearly, such a switch tells us absolutely Nothing at all about the turbulent and violent Event that produced the new situation!

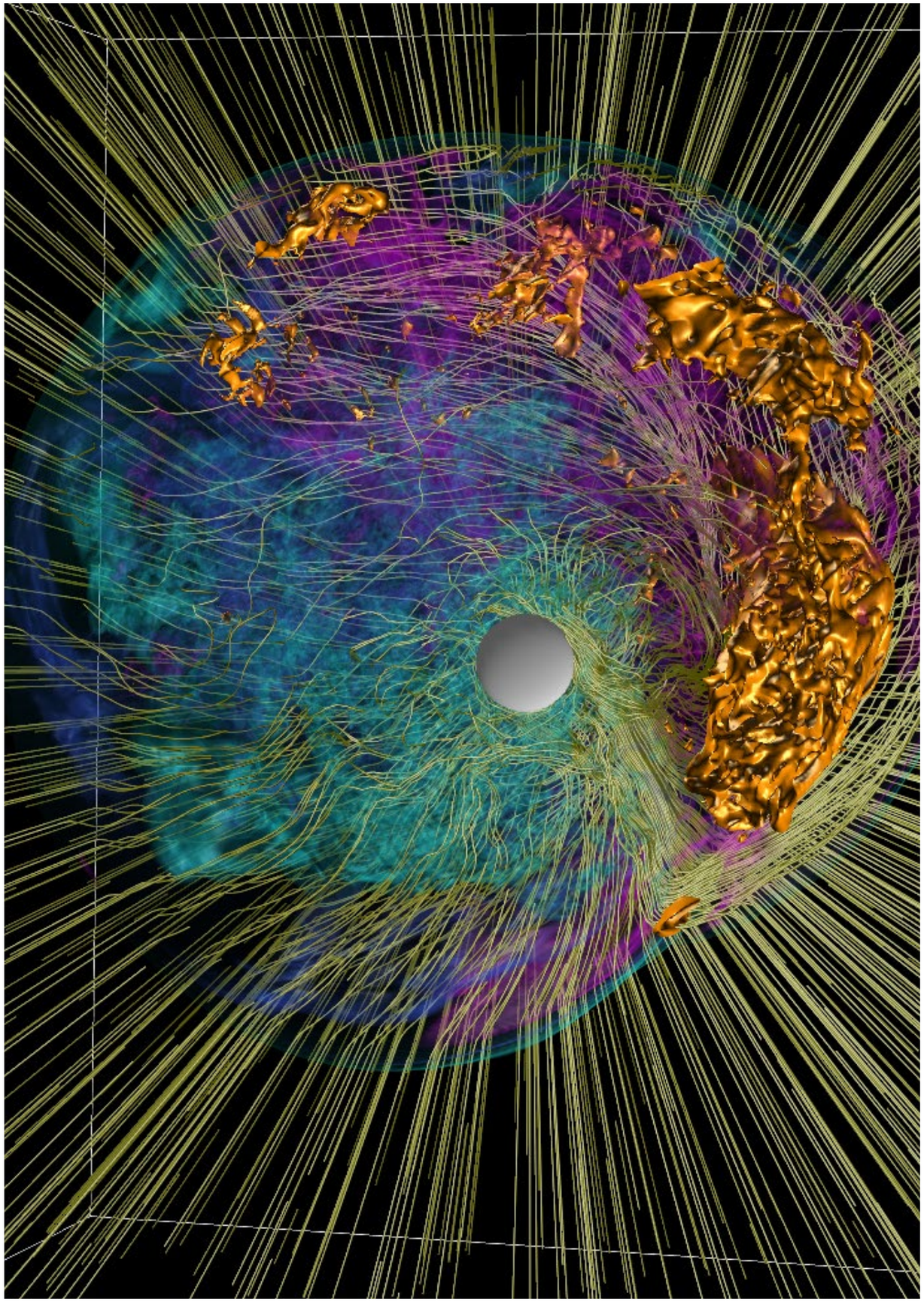
It is, therefore, a crude and retrospective way of positing past experience into such a major crisis and collapse – without any understanding whatsoever of that creative phase at all.

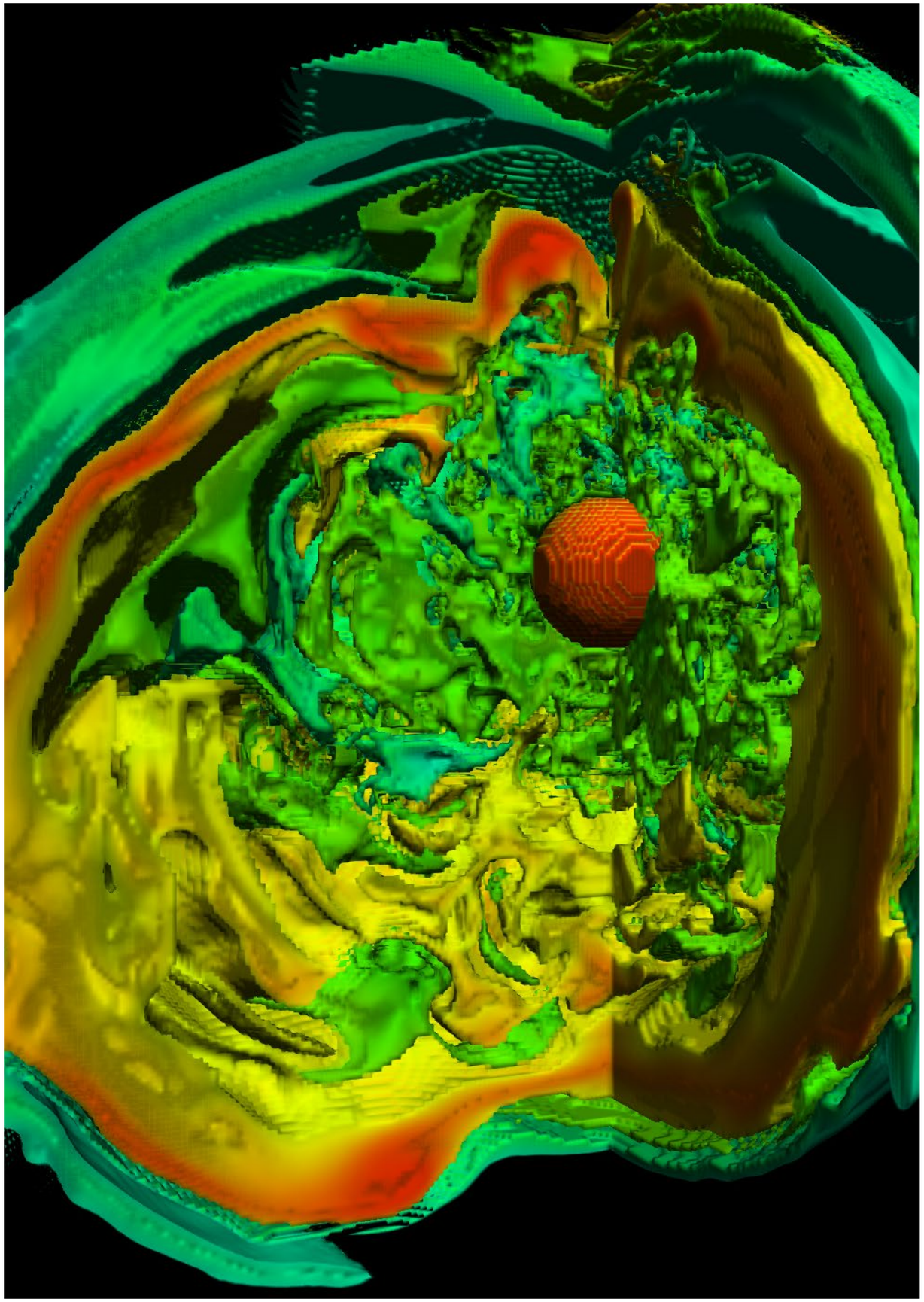
Yet, in limited situations, something can be done, even when strapped into that old inadequate harness. The English physicist Fred Hoyle showed what could be achieved with his remarkable Evolutionary Development of Stars. And, what a remarkable story it was!

In his contention, the Universe was "originally" limited to literally a single element – Hydrogen, which under the right circumstances, would aggregate into an ever mightier, local concentration. This would continue until the heat and pressure caused by an enormous number of high speed collisions, led to the onset of Nuclear Fusion.

Hydrogen nuclei (protons) were fused together to produce Helium nuclei with a certain loss of matter, which had been turned into Energy. And, in the confines of the heart of that body, accelerating chain reactions occurred, vastly multiplying the production of energy from matter by that multiply-repeating process.

But, such events don't continue to infinity, for with the pressure outwards due to this production of energy, while that of gravity acting in the opposite direction, an ultimate Stable State would be reached, and the expansion would cease, at a balance between these forces. A star had been born!





But, this Event was more than a mere containing reaction to an explosion: overall it had been a classic Emergence.

Something entirely new had been created out of literally Nothing – mere Hydrogen Gas and absolutely nothing else: Yet, it was a cataclysm of immense proportions and resulted in a veritable beacon pouring out vast quantities of energy into Space!

And, that wasn't the end of the process. More stars all over the universe similarly burst into life, and though they would survive as such for billions of years, Hoyle was able to explain their subsequent History too.

After a long period of ongoing stability, and a constant outflow Energy, the available Hydrogen nuclei became insufficient to maintain that situation, and Gravity wins, and so causes the star to collapse! The star falls inwards, at an ever increasing rate, until the resultant heat and pressure at its heart is sufficient to cause the product of the first phase, Helium nuclei, to themselves fuse into higher nuclei, again with lost matter as another consequent production of energy. The predictable chain reaction, then produced another vast outward flow of energy and another balanced stable state with the opposing inwards pull of Gravity.

Clearly, the original Emergence, though it seemed to produce an eternal stability, did nothing of the sort, and again the insufficiency of the necessary nuclei would in time generate yet another Emergence, transforming the star into yet another Beacon of energy.

Now, this would continue until the usual pattern became repeated long interludes of Stability, interleaved with short and violent Emergences. This same pattern has been recognised as the usual one in all occurring Emergences, and happening at every possible level. It established a new kind of scientific explanation, differing markedly from the prior paradigm, and with Qualitative Change at its turbulent heart.

The simple pragmatic switches, ignoring all inner processes of the crucial transforming Events, just wouldn't do any longer! The old ignoring of Emergences had to end.

They were clearly, the real-drivers of significant, creative change, and to ignore them committed so-called Science to being limited to being the Science of Stabilities only"

Now, Hoyle took his Dynamic History of Stars even further, until, indeed, the usual pattern ceased with the production of Iron (Fe) nuclei by fusion. Thereafter, there was another period of stability, but it was terminated by an almighty collapse of a very different form. This time there was no recurring following sequence. Without any doubt, the biggest type of explosion within a Universe occurred, which we call a Supernova.

With such a gigantic explosion, all the elements from Iron (Fe) upwards were created at the same time. That was the death of that star, yet also the beginning of everything else that follows such sequences in our Universe.

For, without that final, super Emergence there would be NO Planets, Moons, or even Cosmic Clouds of matter. Literally all subsequent developments in our Universe depend on such star-deaths!

But, let us be very clear, Fred Hoyle was unusual. He wasn't an incrementalist: he knew that simple quantitative changes couldn't automatically slide over into the wholly New! Mechanistic Quantity into Quality was nonsense. All real creation comes only out of a mammoth Crisis, which becomes a total Collapse, and only then, radically changes everything in a relatively short interval via an Emergeny Interlude of cataclysmic changes.

Note that, on first occurrence, an Emergence produces things, which cannot be predicted solely from its prior states. Single reductionist causalities are simply inadequate to explain such crucially-transforming Events.

Now, though formal equations can be produced to cover the processes, and even the continuing stabilities of this remarkable sequence, such purely formal relations cannot, themselves either explain why things behave the way they do, OR, bridge the clearly key transformations. The nearest Mathematicians have got, to these crucial Events, is in what they term Mathematical Chaos. And, as with all such extensions to Mathematics, these interesting forms are no longer descriptions of Reality, but frigs –delivered by pushing the usual forms not only beyond their normal circumstances, but also beyond their valid formal manipulations.

Mathematics is generally about Stability, and equations that are achieved work well only within the strict limits

of that context. And, when these are exceeded, the equations produce nonsense – they actually blow up! And, we call them Singularties, and even treat them as material Products - like a Black Hole, for example.

But, as has become the norm in Mathematics, the applied mathematicians seeking easier ways of getting results, began to push Mathematics beyond its limits, and effectively find ways of de-stabilising the equations to encroach upon the borders and nature of complete collapse.

The most productive ov these was to change equations into iterative relations, which actually broke steadfast rules in traditional Mathematics, and, in so doing, took the situation further into the region of collapse.

Now, we have to be very clear what was being done here. None of the crucial processes involved in the collapse were included in these tricks. So, they were certainly distorted versions of the original stable condition equations. But, they could, in a frig-like way, give some idea of a still-continuing contribution from the original equation, BUT, of course, without anything necessary to deliver what was really happening, and all the succeeding phases of complete collapse and consequent re-establishing of an entirely new stability.

I am no longer a full-time mathematician, but I have worked with a world class expert, on his researches for a couple of years, and he produced iterative versions of the Van der Pol model of the Human Heart, which I was able to explore graphically on his behalf, and, in state diagrams, produce both fibrillations and even terminal Heart Attacks. Clearly, a fundamental premise of Mathematics had been transcended, and what we were doing was in new territory.

It certainly was far from being an accurate model of what was going on in an Emergence, but it had extended the borders, somewhat, by using one known state to find another, and so on, which enabled this extension a little further out. It still blew up, as traditional Mathematics did, but gave a little more before it too bit-the-dust! By frig-like means a temporary analogistic model had been made available.

But, it was never the beginnings of a purely formal solution: it delivered slightly extended death throes only. At best, it gave extra information upon the collapse involved, but nothing about any following Emergence.

Now, these techniques were totally unreliable.

By chance, mathematicians had noticed that these "mistaken" methods occasionally produced glimpses of something similar to real world events, so they began to study them, in earnest, and they revealed that they were of two types.

First – Diverging – so that repeated use just sailed off ever more quickly to infinity.

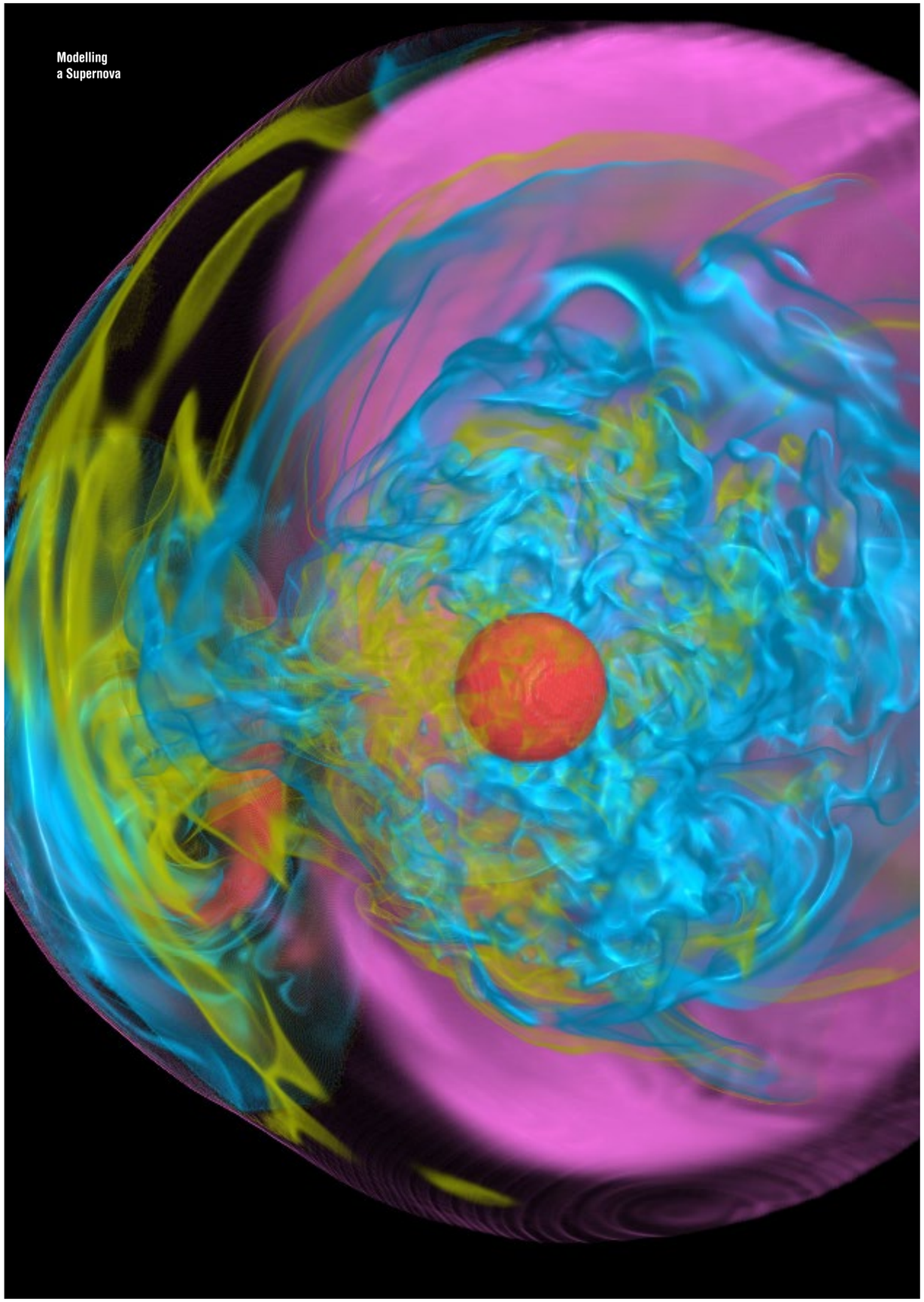
And - Converging - which, when repeated, homed in upon a certain value, which, in certain problems such as the solution of difficult equations, and hence can be extremely useful. So, long before the advent of Chaos, these frigs were becoming important in the solution of equations by pragmatic – frig-type methods.

Tests for divergence/convergence were developed to see what likely frigs could do for us.

You have to remember that mathematicians are NOT scientists. They are much closer to engineers, with the credo, "If it works, it is right!". So, in the engineers' pragmatic hands Mathematics was constantly being extended into new, previously illegitimate areas, but used pragmatically to get solutions to equations that were not available by other purer means.

NOTE: As they say, the "Proof of the pudding is in the eating", and all these force-fitted extensions, could only survive within the much tighter definition of Mathematics, by the inclusion of sets of "Rules of Thumb", which were extras and nothing to do with the original Simplification and Idealisation motive, that arrived at a system – Mathematics, conforming to Formal Logic. These additions, were turning it into a patchwork of non-conforming extensions – force-fitted by extra Rules.

This attitude has led Mathematics into being "all things to all men", and extending well beyond its original aegis to include operators and other similar areas. Of course, such extensions, beyond the original formal limits, ensured that Mathematics could never be wholly consistent, coherent and comprehensive. And Mathematical philosophers, like Russell, Goedel and Turing certainly realised that.



Nevertheless, the majority of mathematicians couldn't care less. They were committed pragmatists and could find solutions "beyond their remit", if the traditional, "pure" areas of study failed.

Now, all of this has assumed an even wider significance due to the now, 100 year-old Crisis in Physics.

For quite different reasons, triggered by both the Ultra Violet Catastrophe and the Discovery of the Quantum, Physics with its centuries-old compromises began to collapse. For, since its very beginnings, it had been an amalgam of materialist physics, mathematical formalism and pragmatic technology in use, where problems were switched between specialists, in each of these areas, to finally effect a "solution-for-all".

But, the new crisis was revealing contradictions and anomalies all the time, which just could not be "switched over". So, a significant group led by Bohr and Heisenberg had proposed an abandonment of all physical explanations in terms of substances and their properties, and, instead, a total reliance upon formal equations as the only trustworthy link to Reality.

Clearly, with the above discussion on the amalgam that is now Mathematics, it was a case of choosing either the Devil or the Deep Blue Sea. Now, this universally-believed-in Copenhagen Interpretation of Quantum Theory has led Sub Atomic Physics into a worse mess than it was while the classical three-way amalgam was considered adequate. The switch to a single basis of mathematical forms, did not, and could not, solve the problems. Indeed, it led to ever more contradictions, and in the end it became yet another extended "branch" of Mathematics

Yet, the lack of any physical explanation was so debilitating, and the necessary use of things from concrete Reality still so perplexing, that the clear lack of any way to understand things was filled with what can only be termed pure speculation.

The String Theory developments, things like Quantum Loop Gravity, and ideas like the Multiverse, were both clearly neither provable nor useable, and the now total lack of material confirmations meant that the supposedly supportive "theories" became ever more weird and unbelievable!

The mess that has become Mathematics was now fully infecting Sub Atomic Physics and pulling it down too.

So, clearly the philosophic stances in Mathematics and Physics cannot be maintained as they currently are. The way forwards has to be philosophical. And the first step must be the replacement of the pluralist position by a holist one. But, such a radical change will have repercussions throughout the whole enormous area.

Why Does Dialectics Emerge
and consequently effect
The Origin of Life on Earth?

What, in concrete Realty, leads to Dialectical features in revealed Natural Relations and occurs at absolutely every single Level?

Since Hegel, and then Marx, the idea of Dialectics has emerged as a significant feature, initially exclusively of Human Thinking, then, in a revolutionary transformation, concerning in addition the whole nature and development of all aspects of concrete Reality itself!

Now, not everyone agrees with this, or at best they accept only a part of such a claimed scope. But, as with all discoveries of real merit, there is always a strong temptation to make literally everything fit-the-New-View. So, it is clearly unavoidable, but also absolutely essential, that all such conceptions must be taken to the limit, to correctly define their scope, And, crucially, thereby, begin to understand "Why?" each new view leads to new Objective Content - to a closer approach to Truth.

And, this stance certainly did not, by any means, conquer all past and present philosophers. And, in addition, even fewer scientists were moved to take it on - for it ran directly-counter to their long-established, indeed often founding, assumptions, premises, and even their relied-upon, and universally-employed experimental methods.

Many pre-Hegel thinkers saw things very differently indeed, and many aspects of that long-persisting and historically-defined approach, are still dominant in many different areas of important intellectual discilines of today.

Apart from supernatural origins, which we can surely dispense with ,forthwith, we will certainly have to address these earlier formulisations, as they, very clearly, not only continue to pertain, and can also still be used, with an undoubted, if limited, measure of success, to this day - but only as long as the determining-conditions that are arranged-for, are entirely appropriate, and steadfastly-maintained throughout!

So, to get a real feel for the unavoidable trajectory of development of Mankind's attempt to Understand-its-World, we have to start with the earliest approach, which we now call Pragmatism, that "in a nutshell" can be seen as:- "If it works, it is right!"

This successful principle long-preceded what we now call Science - for it has nothing to do with Understanding, but only with clearly-identified ,and accurately-described processes - which can indeed "be-thereafter-employed-to-some-useful-end".

For, Mankind always were intelligent, able and flexible users of anything they came across, and they also successfully bent most revealed natural entities and phenomena to their needs, if they possibly could.

The question "Why?", even way back when, did occur, but the actual Knowledge of Man was, for millennia, totally insufficient to deliver either any achievable explanations, or any consequent reasoning.

So, in such circumstances, the Process itself "became the cause", and as it didn't always work as expected, there arose a set of prescriptions about what was to be used, coupled with what precise circumstances, and also involving an essential set of "incantations" to elicit a

favourable outcome, via appeals to The Gods, or other magical powers.

Even, during-and-after the colossal gains of the Neolithic Revolution, such "Magical Rites" persisted and even grew, for they certainly made the retention of all the right-moves easier to remember and re-employ. They were not completely discarded until the beginnings of a re-invigorated and investigational Science, which attempted to reveal the essential physical circumstances, and, within them, the real concrete Causes for studied phenomena.

Science meant that many new things, once merely seen as "differently-coloured-rocks" became, instead, named-resources (ores) for producing important products like Tin, Copper, and Iron.

So, instead of spiritual appeals and rituals, things changed into well-described processes, and even causal-relationships began to be attached to these wonderful techniques. Things could no longer come out of Nothing. They had to require specific causes.

And, very soon, the means of production of a more complex metal, like Bronze, was discovered with more than one producing "Ore", to give a sharper edge and more strength to their "now-alloyed" products.

Mankind was set upon a new path, seeking out the "Elements" that made all things, and these became an ever growing list, from which new possible processes could be tried, and occasionally successfully established. It was still mere Alchemy, long before it became Science: but ultimately there arose a stance termed Natural Philosophy, which began to be applied to long unaddressed phenomena - such as the motions of so-called Planets - the "wanderers" about the unchanging celestial dome of the stars.

But, the various Principles that were devised to be applicable, to all studied phenomena, were simply not true: nor could they be, at that stage.

But, they would work in certain situations, that were adjusted and manipulated in certain ways - so, following such sucesses, they were mistakenly, generalised so that one or another of them supposedly applied, in various sequences or sets to absolutely everything!

On some new elements these methods worked, while on others they didn't. Mankind, pragmatically of course, kept to those that did, and began to gather various different series of reliable processes that "seemed to define" a reliable, overall approach.

Experiments were limited to those that seemed-to-fit, and a narrow, yet often useable, definition of The Nature of Things began to grow.

This was still, at least in part, pure Pragmatism, and it still exists in diverse forms, and in many areas, to the present day. Indeed, it is the credo of what were, and are still, called technicians, who always delight in their Knowledge of "How?", but couldn't care less about "Why?"

Nevertheless, a growing number of the Natural Philosophers also wanted to know "Why?", and, to apply their extracted hypotheses, as to why things happen, into wholly new areas - and occasionally they worked effectively, in at least some of them. They began to seek new Elements, and, thereafter, try to find their properties and their potentialities.

True Science was born, but its philosophical basis was still an eclectic mess: it certainly was not yet consistently and soundly philosophically established! Gradually, sequences of causes-and-effects began to be linked together, in more complex explanations, and the Principle of Reductionism was devised and widely accepted as the appropriate guide to ever-fuller Explanations.

Ultimately, it was believed that a sequence of causes could be unearthed - one-below-the-other, which would, in time, arrive at the bottommost substances, from which everything could be produced. And, coupled with this was the considered-to-be-essential Principle of Plurality, which saw all known relations between Causes & Effects as Natural Laws, that were both entirely separate frm one another, and also eternal, and could, therefore, be merely added together in various proportions to produce absolutely Everything that exists.

Such Principles, though assaulted on all sides, STILL survive to this day, and have finally halted Science, as a possibly consistent, and comprehensive interpreter of phenomena in many important areas.

Indeed, the Logic employed presented many situations, in which the required and usually-available and rationally-decided-choices appeared to be unavailable - situations where Dichotomous Pairs of contradictory concepts seemed to be equally applicable. But, at the same time, absolutely no incontestable reasons were available for the correct choice to be rationally made between them.

Naturally, the "old-and-reliable" Pragmatism was employed - by trying each alternative to see which one had-the-legs-to, thereafter, allow a continuation of the reasoning. It could thereby lead to intended outcomes, but they were NOT the result of continuous sequences of reasoning based upon the supposed Natural Bases.

Hence, all such Theory was full of ghese rational holes - patched by pragmatic, rather than explained, links, at some of the necessary steps.

The most dramatic example, currently, is in Sub Atomic Physics, where attempted Explanatory Theory led to the same entity being dealt with sometimes as a Particle, while at others like an Extended Wave - the infamous Wave/Particle Duality delivered a contradiction that simply couldn't be theoretically resolved.

The chosen answer was (remarkably) to abandon Physical Explanation entirely, and wholly replace it, by Formulae and Rules-of-thumb, to achieve the required results - and then, quite wrongly, call that Theory: it, of course, is no such thing - it is, at best, merely a succinct and useable description, but it cannot, and indeed never can, say "Why?"

Clearly, there was something very wrong in the universally applied stance and methods, which had brought Science to this terminal rationally-undevelopable state, not only once but all over the place.

Clearly, this had both to be diagnosed and corrected, for real Understanding to proceed!
But, it never was, in either Philosophy, or in Science!

For, since its initial discovery and employment in his famous Paradoxes, by Zeno of Elea, 2,500 years ago, a pragmatic get-around known then, and as described above, has ever since been re-employed whenever such Dichotomous Pairs emerged in reasoning.

Both alternatives were tried and the one which led onto further rational developments was taken as "the right choice" - even though no rational reason had been revealed. "If it works, it is right!"

It took a further 2,300 years after Zeno, for the German Idealist Philosopher GWF Hegel to consciously decide to address this important Flaw in Formal Logic. And, his extended period of research into Thinking about Thought came up with a damning criticism of Formal Logic.

It certainly couldn't ever cope with Qualitative Changes. And, even ordinary everyday Thinking that arrives at something wholly new, could not be explained within the usual methods of reasoning - for NO way could the "wholly new" be purely-rationally derived. They were just "added-in" to the current content without any rational-justifications for embedding them within past Knowledge and Understanding!.

Now, Hegel knew this to be incorrect!

The usual "solution" was yet another pragmatic addition. He knew that he, personally, actually arrived at new ideas by reasoning, but it wasn't by mere Formal Logic. It involved, what he termed a Logic-of-Change, and he determined to reveal what was involved, and to create such a New Logic himself!

Now, of course, Hegel was an Idealist, so he put Thought first - therefore, he was, unavoidably limited to the processes and rationally-arrived-at products of Thinking and nothing else!

Of course, when you do that, you set yourself an impossible agenda, for everything has to arise only out of prior thoughts, wholly-new-things have no source in such a schema!

You have a closed system driven by fixed Laws and it can only use these, and nothing else to reveal "all possibilities". Of course, nevertheless, Thinkers do introduce new ideas, but they handle them only in the prescribed ways. They cannot deliver the origins of their additions, and, if pressed, attempt to explain them in terms of established ideas via the inadequate means of Formal Logic alone.

Needless to say, even Hegel didn't succeed with his chosen undertaking! But, his best student had a solution!

The actual source of the wholly New was the Real Concrete World outside the Thinker: a solution to the impasses generally would only be possible if the stance was changed from Idealism to Materialism, and the necessary processes-used extended to include concrete investigations in the Real World!

That student was Karl Marx, and he changed his philosophical ground into what he termed Dialectical Materialism - using the methods which Hegel had established within Thinking in a very much wider realm - including all of Physical Reality too. In other words, the sources of new concepts would be there in studies of concrete Reality itself. Philosophy would have to be extended to include Science!

And, by establishing crucial links between Thoughts and concrete Reality, he even found the same features in concrete Reality that Hegel had revealed for Thinking alone!

Now, Hegel, being an Idealist, couldn't do that, but he could very carefully seek answers within Thinking, and he did make a significant breakthrough. It was, of course, his attempt to deal with Dichotomous Pairs, and the consequent unavoidable impasses in ordinary Logical Reasoning.

He discovered that situations that led to these impasses, always, in connected reasoning, had certain assumed-premises, and he decided that it was in these that the problem lay.

His task, then, was, therefore, for any Dichotomous Pair, to reveal those premises, in full, and work out which were either mistaken or even missing, and then by a correcting adjustment of those premises, he would not get an impasse, as previously, but instead a straight-forward fork in reasoning, at which a strictly rational decision was possible to correctly and easily transcend the difficulty.

Hegel realised that instead of either:-

1. ignoring the impasse and getting around it purely pragmatically, or alternatively

2. Trying to determine which arm was "primary"

Instead, he would seek out Dichotomous Pairs, AND their necessary premises, in order to, if possible, reveal and correct those premises to always attempt to open a pathway for a clear, consistent and comprehensive form of Reasoning - to address absolutely Everything.

Of course, it turned out to be an infinite, onerous and debilitating task - the same processes would have to be followed at each and every impasse, which repeated forever. And, was actually impossible within any current and necessarily incomplete state of Knowledge.

So, a half-way house alternative was proposed which constantly re-stated the problem by always first finding, and then juxtaposing the absolute opposite to every concept! So, to every Thesis, he required an Antithesis, and it was then up to the individual involved to attempt a particular Synthesis.

Now, this wasn't a means to the same end at all!

Indeed, the contradiction began to be taken as only being such, because the contributions of these opposite concepts to the actual problem were not being adequately considered. So, instead of a flat sought-for Reality, the task became a Struggle of Opposites, either side of which could dominate in the particular selected circumstances.

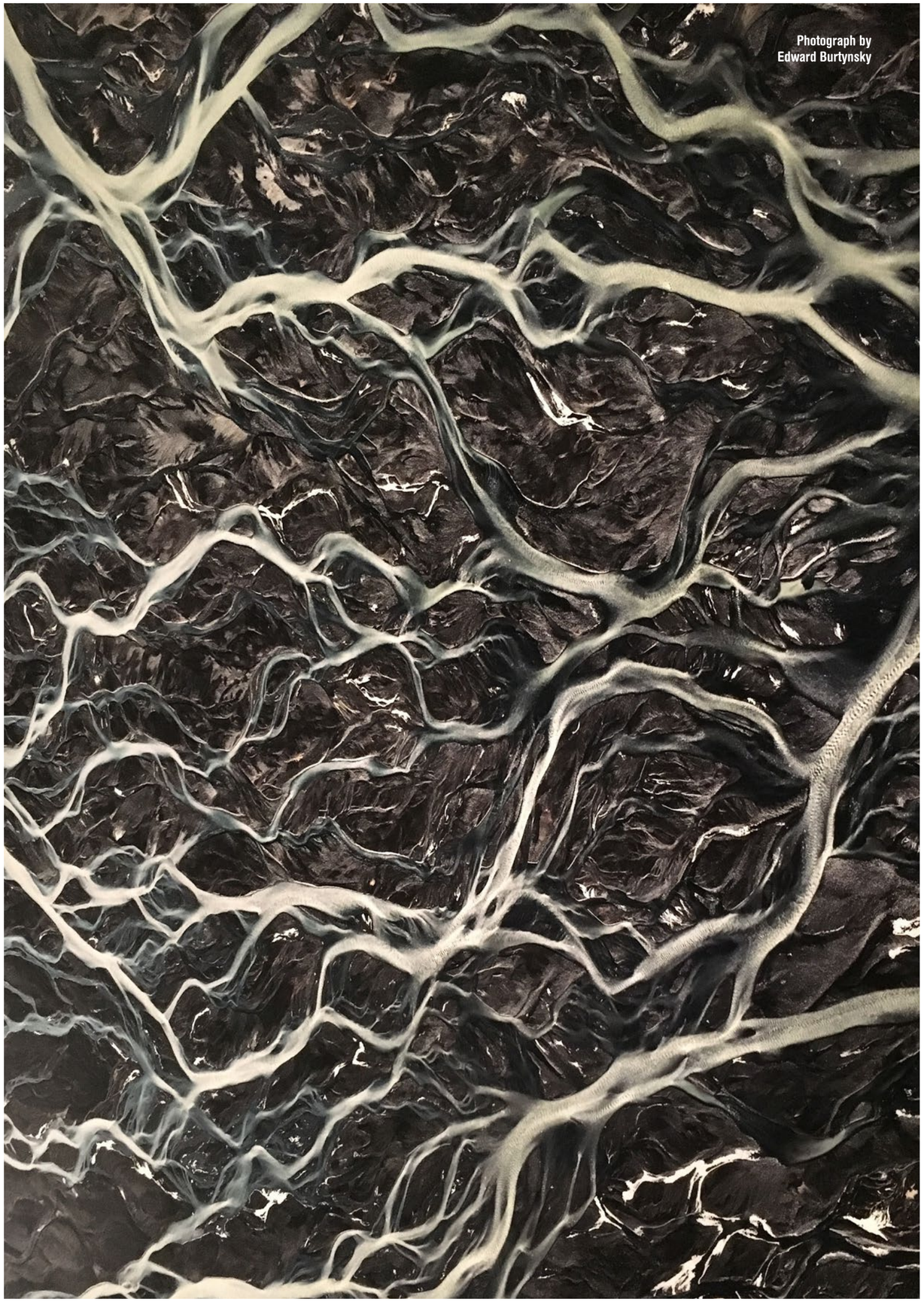
It also, introduced a "kind" of dynamic for Events-of-Significant-Change, if there were embedded in the situation Two-Direct-Opposites, which, with a changing situation, could lead to an seemingly-irrational transformation.

These simplified tenets arose:-

Thesis-Antithesis-Synthesis
Extremes Meet
Quantity into Quality

And, beware, many a false "dialectical argument" has been constructed blindly upon such tenets.

Only Marx, with his Dialectical Materialism, could take such arguments beyond Human Thought, and consider concrete material Reality too! He couldn't, of course, do it with every impasse in Thought, but Marx applied the approach to the History of Human Societies, and took the things to be considered away from mere conceptions alone.



By vastly widening the scope of Hegel's discoveries, he also extended the sources of possible causes of contradiction, and hence made it about Reality-in-General!

NOTE: At this point it seems appropriate to show how these ideas work for a Dialectical Materialist, which would never be possible for an Idealist such as Hegel.

The problem for this Physicist, Jim Schofield, was to find an alternative explanation for the famed Double Slit Experiments, which had become the major cornerstone for the Copenhagen Interpretation of Quantum Theory, and the consequent Dichotomous Pair of the Particle and the Wave explanations, which both were extant in different conditions.

Hegel's flawed premises had to be sought, but here the missing premise could be physical. It was assumed to be a missing ubstrate, and the correcting of the key premise was to re-instate that ubstrate, and see the effect. Every single anomaly in those Double Slit Experiments was totally removed by the re-instatement of a Substrate -using only already known particles and properties to construct it.

Now, in this attempt to get to the bottom of Real Contradiction, we, of course, have still to go very much deeper, and explain why contradiction is so important, and why it emerges at every single Level in concrete Reality just as it does in Thinking!

And, in so doing, we will surely arrive once more at Hegel's paramount problem with Formal Logic - namely its inability to deal with Qualitative Change, Development, Evolution and finally Revolution too!

And, perhaps surprisingly, the beginnings of a solution came not from Science, Philosophy or Dialectics, but from a detailed Holistic study of the Origin and Evolution of Life on Earth!

Origins?
The Key Phase, in that Origin, had to be in the transition within an initially, purely non-living, chemical world, of a wholly-new and very-different kind of process possessing the very first instances of an extremely primitive form of Life!

These entities would have been very different to any that survive today, but, surprisingly, rather than having only a very-weak, precarious existence, they would have survived, and grown in numbers, for the very opposite reasons: as "chemical-systems" they would have been more vigorous and strongly-persisting than other simpler chemical systems that surrounded them, and competed with them on all sides, when necessary,for the very same resources. For, these new systems would both grow faster, and persist better, than everything else.

Now, this is a surprising position to take!

You would expect ordinary substances, and their interactions, to be more persistant, as Stability was their modus operandi, while the new forms were much more subject to change. But, this changeability made them more conducive to changing contexts, so "adaptable", while the "one-song" substances couldn't change!

Clearly, at such a stage, we are still not yet talking about Evolution: these systems would be mostly chemical, but, for some reason, were also exceedingly persistent, and could very quickly grow in numbers of individual processes.

Even after a major calamity, they would also have some significant advantage over ordinary chemical processes - perhaps with access to energy not so easily available to the usual purely chemical processes, surrounding them.

Now, of course, we don't know anything-certain about these initial systems, but from what certainly happened later in their vast History (it is reckoned that such a period must have spanned around 3,000,000,000 years and is characterised crucially by what we call Evolution).

Now, clearly, our earliest "living systems" could not yet do that: Evolution involves living-competition, and the first entity would have no living competitors - only ordinary chemical processes to contend with. So, initially, its success would be in the increasing amount of its actual substance. It would, because of its advantage(s), become locally abundant. Yet no evolutionary change could yet be possible!

Yet, the presence of this successful variant system would actually, in time, ultimately-change the nature of its local environment: and hence it would also convert itself from being an odd variant, among a population of purely chemical processes, to becoming more of a context-for those individual chemical processes, at least locally.

And, this would ultimately have two different effects.

First, it could, and often did, affect the conditions for those other strictly chemical processes!

and
Second, it could compromise its own growth or even existence by separating areas-of-itself, progressively, by-itself, from the crucial resources it essentially required.

Now, such obvious and physically simple constraints would begin to put various limitations upon our almost-living systems' future, and increasingly re-define the best situations for optimum success.

It may have been limited to only surface positions on solid stable substances, or even to extensions in length rather than in area, or volume.

Certainly, once in existence, and proliferating, it would certainly encounter successively-less conducive conditions, either natural, due to local surrounding substances, or even due to its own dominating presence.

Conducive Circumstances?
But, before we go any further, it is clearly essential that we clarify those optimum conditions (as best we can from where we are trying to visualise this never experienced situation), for the appearance and continuation of life to have actually and finally occurred.

The extremes of within a star or so-called Empty Space would certainly prohibit the sort of developments we are considering, and the very presence of life over billions of years on Earth points strongly to a planetal origin.
But, of course, not on any planet, and certainly not in all possible conditions.

The primary states of Matter - namely Solid, Liquid and Gas certainly will present many very different constraints upon life's origins. Perhaps the main one is the capability of movement for our life-scraps, not initially via its own means of locomotion, but, passively, due to the nature of its context.

Movement through a solid is not conducive, but it is certainly possible both in liquids and in Gases. But, within a gas, seems too agitated an environment, while a liquid would certainly be significantly better.

Yet, we also know Life did originate on Earth, so, perhaps, we are considering a context with both solid-for-stability, and a liquid with currents and tides for passive transportation, as the most conducive situation.

And, clearly, the simplest common liquid, Water (H2O) would require a very constrained range of temperatures for it to remain liquid, at least somewhere. And, only large amounts (as in oceans) to both cause currents and tides, and allow the necessary movements to ensure that our pre-life-scrap will find where-it-needs-to-be.

Clearly, Stanley Miller in his famous Experiment considered these conditions too, and constructed his transparent-yet-sealed apparatus, containing what he knew of the Earth's primeval atmosphere, as well as water. He sealed them absolutely from our own contaminating environment, and adding-in only heat (from a supposed Sun) and electrical sparks (from supposed Lightning).
He also included a condenser to turn water vapour back into liquid water - via "rain".

He set his sealed apparatus in motion, and left it to see what would happen.

Within only one week, when he inspected his apparatus from the outside, he saw that the contained liquid water had turned browny-red, which upon subsequent analysis was shown to contain amino acids - crucial building blocks in the subsequent DNA of present-day living things. It was an excellent demonstration, if undevelopable at that time.

NOTE: the writer of this paper, Jim Schofield, has devised a whole system consisting of a sequence of experiments - each devised from the lessons learned from its predecessor, and all of them developed from Miller's prototype, but using inactive barriers to channel internal flows, and with non-intrusive regularly-timed monitors, positioned at intervals along these channels, to deliver, each time, a "changing" account of what was happening. Each experiment was designed only to provide appropriate data for following re-designs of the inactive channelling. It would, overall, be a major and expensive undertaking, but certainly worth it!

But, returning to the topology of potential situations for early Life to occur, we have to consider all interactions, whether non-living or our early forms of Life, in various topological contexts, and also consider the consequent

non-living development of such contexts - entirely due to their own intrinsic multiple processes, and passive distributions, as well as the possibility of stable niches, that were possible due to stationary, immersed solids to provide protected enclaves to allow a wide range of early possibilities to be tested-first, in the most conducive situations.

Admittedly, such wide ranging requirements may seem inhibiting, but as has been proved with Miller's foray into his area, and possibly also by Schofield's suggested developments, well-designed experiments in developmental sequences, could be employed here too!

I am drawn to returning to an earlier pre-Life stage to consider the development of multiple, non-living processes, all requiring resources and delivering products, BUT, involving no pre-existing purposes: in other words, entirely determined by what was available, and what was possible within the available contexts.

You can see why a liquid (water) medium would facilitate maximal mixing, and hence present the widest possible range of conditions and possibilities. And, if we assume large numbers of possible processes, we can, (even long before Life) still consider what I have termed Truly Natural Selection occurring at the pre-life level.

Indeed, such developments and the topology in which they occurred, would be invaluable both in our originally stated objective, and perhaps also in revealing the concrete (rather than intellectual) origins of relationships such as Opposition - directly opposite processes, and at higher levels perhaps Dialectics too!

[You can see why this writer, being a scientist, as well as a philosopher, would naturally be drawn to such extended objectives being considered.]

So, following the above extensive, though absolutely-,necessary detour, perhaps we can, in the sorts of contexts considered above, begin to address the origins of Dialectics, at a non intellectual, and hence purely concrete, level! That is , of course, within concrete Reality and its natural processes! The ideal context for such considerations has to be a maximally varied, maximally mobile, and rich environment.

Let us assume a body of liquid water, with a history (at least) of access to further stretches of water, solid land, and interchanges with a global atmosphere. Such a context would guarantee, a maximal number of dissolved molecules, and even suspended tiny solid particles, and thus ensure a truly large range of processes going on simultaneously!

Needless to say, these processes will not be going on entirely independently of one another.

In our Holist World, they would constantly affect one another, and, even in some circumstances, promote both conducive (supportive) relations, while also causing inhibitions, due to competition for the same resources. Indeed the original primitives - formed in specific conditions will soon encounter other processes - some entirely complementary, and hence allowing combined sequences, while others potentially competing for the same resources and being detrimental to one another.

And, in those latter situations, one or the other may dominate, or an active balance between them may be caused. Clearly, in a complex and chaotic mix of multiple different processes, one significant determinator will be such diametrical oppositions - indeed Opposites!

NOTE: Indeed, such totally opposite processes have been used in research to get oscillating pairs of processes, which with differing colours, have enabled the solution of the actual nature of reaction-fronts in liquids, which revealed them to be in the form of Toroidal Scrolls - the maths was done by a friend and colleague of mine, Jagan Gomatam, when we worked together in Glasgow Caledonian University.

While, at the same time, the majority of other processes may be so random as to present a general background "noise", minimally affecting both each other and our opposing pair.

But the opposites, which, though competing, are likely to be producing very different products, will certainly affect one another, and in dominance-outcomes change things for the context in general.

Indeed, we must consider a range of outcomes for these opposing processes, ranging between the dominance of one, via various proportions of each, in a particular, possibly-oscillating, balance, all the way to the dominance of the other exactly opposite process!

Let us consider the trajectory of such a relationship over time. The usual changes will be towards one or the other's dominance, which are likely to persist once established. Indeed, it will require quite major changes elsewhere in the local mix to challenge a current dominance, and perhaps, in quite a short period of major transformation, flip the situation over to the dominance of the other alternative.

Now, such considerations may seem unlikely to prove anything sibstantial, but that would be a mistake!

Another product of Hegel's Dialectics was "The Emergence of the Wholly New", and with Marx's revolutionary transference of these to a Materialist stance, he could include Chemical, Physical, Biological and Social Emergences of the wholly New too. Indeed, at much higher levels, Marx explained Social Revolutions in just such terms.

This paper is certainly NO pluralist attempt to explain the higher in terms of the lower, and, indeed the lowest-of-all levels, but does indicate clear resonances at all the different levels, with ever more novelty as things developed.

In a hierarchy of such Levels, the most primitive examples of the change-overs will be both easily reversible and repeatable. But, as things complicate, with a regular increase in wholly new additions, such repeatability will become ever-more-difficult, and at some point become impossible - that is, it will cease to be "exactly repeatable" - for the outcomes will get more and more different, and future significant changeovers will be from very different contexts from their initial immediate predecessors.

Now, another significant kind of process will also be changing its initial context from a merely additive set of primary processes, to something increasingly more complex. For, in addition, individual, conducive processes could be effectively joining together, where the product from one becomes the resource for the other. The basic nature of their successes will be the same: for as Process-A increases, it will also cause the consequent increase in the linked Process-B. And not only in pairings, but even in longer chains, and occasionally in the closed-loops of processes, that will also occur.

Independent Primary Processes (à la Plurality) will gradually (à la Holism) form Systems-of-Processes. And, these too will also tend to have opposites - that is, systems that do the opposite, so similar Systems Possibilities could occur as they did with Primitive Processes.

But, in addition, the survival of a System-of-Processes could be severely challenged in a new way. For, the chains of such a System don't always involve only the linked-Product-Resource kind, but others too, and if these are taken away by a competing process, the whole system could begin to be undermined or even ultimately dismantled.

Remember "Everything affects everything else!"

And such Spoilers are termed dissociative, indeed parasitic processes, and they will become increasingly important as things develop ever further.

The point, I am making, is that though some patterns will recur at higher levels, others will be changed, and make exactly-repeated oppositional flips less and less likely. Indeed, by the time we consider Human Societies, the major changeovers - Revolutions, can never be exactly repeated, and both successful, and even failed, revolutions will always permanently change both what is produced by it, and the nature of any future Revolution. For, too much has been transformed for things to be ever returned to their prior states.

Clearly, there is still much to be addressed in this area. And though many phases of the overall trajectory are beyond our reach at present, much can be done in the still accessible areas, such as in the study of past revolutions (the works of Michelet, Marx and Trotsky come immediately to mind). But, also, with a steadfast holistic stance, and incisive and innovative thinking, new forms of experiment can be devised to research particular past developments, often in an imaginative "transferred" context (here the brilliant "Walker" contributions of the French scientist Yves Couder come to mind, as does the mathematical researches of the writer of this paper, with his demonstration of the appearance of Double Helices, as in DNA, in his three-dimensional "Soma Strand").

Real Transforming Development

Truly creative not merely complicating...

This is a crucial area in Human Thinking, for it took human beings most of the time since their emergence as a separate species to even ask the question in this particular form.

And, it is highlighted in the battle between supporters of the ideas inherent both in Plurality and in Holism, as to the actual Nature of Reality.

Yet, though these conceptions both emerged at roughly the same time in Man's intellectual development - around 2,500 years ago, it was Plurality that dominated, initially following the Greek tradition, in the West. While Holism did likewise, following the Indian tradition, in the East.

They each, to use a modern conception had a significant measure of what we call Objective Content - significant aspects or parts of the Truth, but, they were, as conceived, diametrical opposites - totally contradictory with each other.

For while:- Holism insisted that "Everything affects everything else!" Plurality insisted that "Reality was built out of totally separate eternal Natural Laws!" They, seemingly, could not both be true!

Now, most would conclude that, looking at History since that crucial time, Plurality, having fathered Euclidian Geometry and Formal Logic, and also become the most fundamental premise of both Mathematics and Science, had trounced Holism completely, to become the single, sound basis for all future developments in Human Thought.

But, that "faith" has proved to be unfounded, as even the assumed pinnacles of pluralist achievement, have begun to rationally self-dissociate in crucial areas of study. The prime modern example has been, of course, the important area of Sub Atomic Physics, which since the latter years of the nineteenth century, and thereafter ever since, has been revealing things at variance with the Pluralist Premise.

But, the seeds had always been present, believe it or not, from the very outset of the parting of the ways, when the Greek, Zeno of Elea. had revealed a whole series of non transcend-able contradictions within Formal Logic - in his famed Paradoxes.

Yet, it took a further 2,300 years, before the German idealist philosopher Hegel, de-interred the same problem via a whole series of Dichotomous Pairs of totally contradictory concepts in Formal Logic that were also un-transcend-able within the structure of that constituted System.

He realised that the problem was Plurality-itself, because it could never cope at all with any undoubtedly natural qualitative changes: its eternal Natural Laws and fixed conceptions could only deliver Complexity, and never-ever predict the emergence of the wholly *New!*

Real Qualitative Development was totally excluded.

But, for Hegel there was still another major problem! He always had great respect for Science, and said that the sincere philosopher had to study it, as an essential grounding for establishing a comprehensive Philosophy. The problem was that the other increasingly-dominant discipline in both Human Thinking and in real world investigations, was also totally committed to a Pluralist Stance too.

So, at that point, both Idealism (with Hegel uncomfortably), and Materialism (with the scientists, very comfortably) all locked into the same cul-de-sac intellectually: they were both still entirely pluralist.

Hegel, of course, sought a Science-of-Logic, which would cope with qualitative changes intrinsically, but he was a

committed idealist philosopher, and was only concerned with Human Thinking. To have any chance of breaking-out of the walled-enclosure that was his subject, required a vast widening of its areas of study, including those currently dominated by Science.

The Young Hegelian followers of Hegel decided upon a radical revolution to their basic stance: they would carry on the objectives of Hegel in his transformation of Logic, using his Dialectical extensions, but henceforward as committed Materialists instead of Idealists. They would thereby increase the range of their studies to include all of Reality, AND, crucially, also the gains and methods of Science!

The leader of this tendency was Karl Marx, and he christened his new stance Dialectical Materialism.

Now, Marx too was also confronted with a major problem. not only was he not a scientist, but the scientists themselves were also avid pluralists too. So, he didn't fully realise the size of his task, on both fronts, but, in addition, he also wasn't currently adequately equipped to tackle it.

He had been an Historian, though, so with the brilliant example of Michelet and his History of the French Revolution, to aid his studies, he could indeed launch into tackling qualitative development in the march of systems and civilisations across the ages, and particularly their clearly evident tumultuous transformations via Social Revolutions.

But, even this, within-a-well-known-area, produced new requirements, particularly in the nature and development of the Economics intrinsic to the various Social Systems. He found it necessary to embark upon a detailed study of Capitalist Economics, which literally took him the rest of his life.

So, in spite of the great gains he made in his Dialectical Method, the even bigger task of addressing Science in general was never even started. The crises in Physics, precipitated by the failures of that same Plurality, began in earnest towards the end of the 19th century, and have accelerated ever since!

NOTE: Now having been occupied for some time recently criticising the professed-Marxist, Slavoj Žižek's ideas on Modern Quantum Physics [I, unlike him, am both a philosopher and a physicist], it had become increasingly clear that his "Dialectics" was more like Hegel's than Marx's, and a clarification of the Dialectical Method has become absolutely imperative! Žižek's lauded *Interpenetration of Opposites*, no matter how skilfully employed, is not yet at all sufficient.

The Key, as yet unexplained, feature is to do with why opposites actually emerge - not solely in the head of the thinker, due to the very methods he uses (very idealist), but actually in concrete Reality itself.
That has never been explained!

Let us consider what the most general features are of any natural situation, to see how changes occur. A holist considers that such a situation would always involve many different factors - all happening simultaneously, and the particular set that are present, are NOT as believed by the pluralist to be independent of one another, merely changing in the amount of each present at any moment. But, on the contrary, a constantly varying set with variable contents, each and every one modified to some extent by each and every one of the others, there present.

Now. exactly how these effects actually make the changes is not immediately evident, but a clarification of what each effect is, and what it needs-does-and-produces, will certainly help in determining the overall effects upon any particular one we choose to concentrate upon.

You can see why the pluralists take their stance. Firstly, any effects will only for them be about quantities of its products available, so some kind of summation overall would give the quantitative effect upon it. In other words the results could be addressed by a statistical approach.

And, even better still, if as many factors as possible have been removed, and only a minimal number allowed to remain, finding an overall effect can be made easy enough to be able t come up with a dependable Law.

Let us once more switch back to the holist view! Clearly, to get anywhere, the effects of a single factor upon our chosen one will need to have been somehow discovered, and it will certainly involve a change in it - not just a change in the quantity of the result, but in the nature of that result as well.

Now, it becomes clear why the holist approach was so unpopular: for with each factor, to some extent modifying every other factor, it will make it impossible to merely SUM fixed effects, as the pluralists are able to do. Instead, the only possible overall-process would have to address all possible effects: the cycle will need repeating recursively (forever?).

Now, if this sounds like infinite regression, you are indeed correct! But, that is only the case if all the factors are effecting other factors result in overall effects which consequently move all over the place. And in Reality that is NOT what occurs.

The crucial determinators here are whether factors form relatively-coherent-groups, which can home-in on a final overall effect - at least for an extended period. For, that makes that group relatively predictable and hence an explainable sub-system.

Now clearly, sets of factors, which do NOT do that, will not be predictable, and will never arrive at the sort of stable state described above. But, that means that they will always be changing, UNTIL ,out of the many factors present within it, another sub set of factors that can home in upon a stable final result will emerge.

Now, what must the holist scientist do with these relatively stable sub sets of factors?

Well, what he shouldn't do is carefully farm a situation so only such a stable set is left, measure all variables and extract an overall law - and incorrectly call it an eternal natural law! Because that isn't true!

It is indeed just another farmed situation with its own "law". Change any of the factors and it will, if you are lucky, give you a different "law" for a different farmed situation.

But, what is really needed when such a stable set has been isolated, is to consider all the factors acting within it, and attempt to discover their inter-relationships.

NOTE: I cannot develop this analysis further without saying something about Yves Couder's remarkable "Walker Experiments". He too had found himself presented with holist complexes of multiple, mutually-affecting factors, which led him a merry dance, chasing his tail with incessant and general recursive effects everywhere.

So, he attempted to successively simplify the situation, until all he had left was a Substrate - silicone oil, and absolutely nothing else! It seemed that absolutely nothing could possibly happen, so he merely added Energy - primarily as a vertical oscillation of the whole of the substrate, and then also as the releasing of a drop of the same substrate onto the surface of his main volume of substrate. With only adjustments of his drop-size, height from which it was dropped, and changes to the applied frequency of oscillation, he made the drop, not only BOUNCE, but keep on bouncing until an associated surface standing wave arose surrounding it. And the resulting local entity (within the substrate), which he called a "Walker" persisted permanently and showed various properties, including at one stage by tracing out quantised orbits across the surface of the substrate. None of this was predictable originally, as too many factors were acting so no such coherent form could emerge. But, by radically reducing what factors were present he removed the usual overall cancellings and revealed a sub set and its hidden capabilities. I'm not sure whether he would characterise himself in this way, but Yves Couder is a *Holist* experimental scientist!

This paper is clearly not a record of a completed and understood area of study. It is an attempt to outline a very different Holist Experimental Approach from the entirely Pluralist Approach which currently dominates world wide.

NOTE: Elsewhere, this researcher has also redesigned Stanley Miller's famous Experiment upon a possible primeval Earth Climate, by which h was able to generate amino acids, into a whole consequent holistic series of experiments with inert changeable channels and time-based monitoring to enable some chasing of the multiple changing processes involved, in order to get a great deal further than Miller was able to do.

Unacknowledged Philosophical Bases

Flawed Foundations always lead to Catastrophic Collapses

I: An Introduction

When watching a recent YouTube video of an hour-long discussion between Robert Wright, a Buddhist expert in Philosophical Psychology, and Jeremy England, an orthodox Jewish physicist, whose remit was the developmental processes that must have occurred prior to the Emergence of Life, within wholly non-living circumstances - I came across something surprising.

You might expect what the scientist's premises were, but, on some fronts at least, you would most likely be significantly mistaken, whereas, your preconceptions of the bases assumed by the philosophical psychologist might be assumed to be less rigid and materialist, but in fact the clearly-evident, major philosophical flaws actually came from this latter side of this discussion, and effectively tried to defeat the scientist's current unconventional researches with either Classical or even Copenhagen premises usually widely employed in Physics. It was the very inverse of what you might expect!

Now, as a philosopher and a physicist, myself, I have spent some considerable time tracing the development of philosophic stances from their clear inception with the earliest Homo sapiens - in the almost 180,000 years-long Hunter/Gatherer Phase, of their means-of-life, wherein only Pragmatism, in which. "If it works, it is right!" was Mankind's single available intellectual methodology.

But, note, this limitation didn't stop this physically, ill-equipped descendant of the Apes, successfully spreading itself into all of the then accessible World. And, this only stepped-up in tempo with the remarkable Neolithic Revolution, wherein permanently-static domiciles replaced the prior constantly-wandering mode-of-life and very temporary, moveable homes, which was only enabled by the methods involved in Farming and Animal Husbandry. And, thereafter, very quickly also led to a wide range of new skills including pottery, weaving, and ultimately metallurgy, and a vast development of social relations and communications, finally achieving what we term Civilisation.

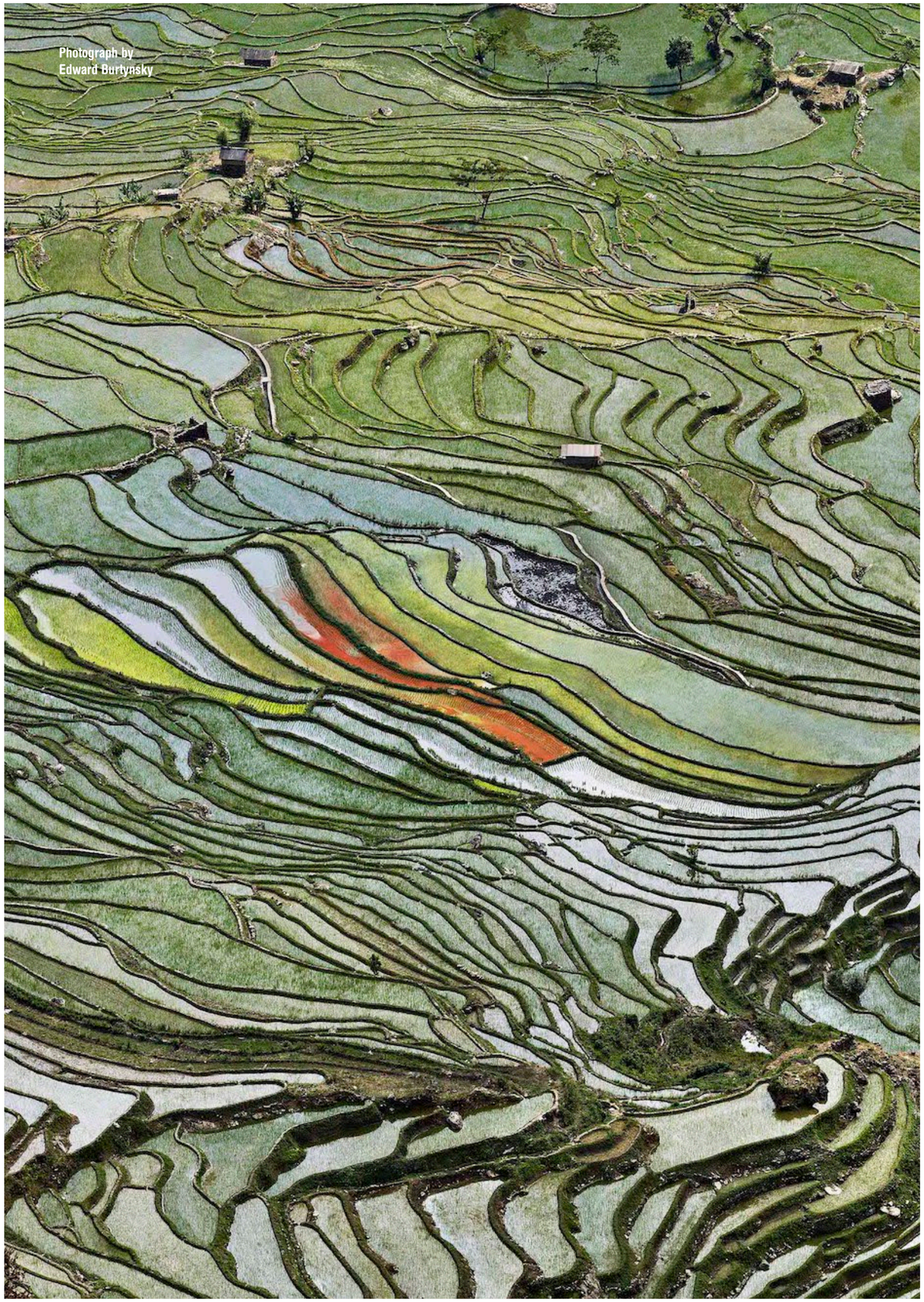
Then, around 2,500 years ago, in Ancient Greece, the intellectual foundations were dramatically changed, initially by the development of Mathematics (Euclian Geometry), and thereafter by Formal Logic, both of which brought in Idealism (via Plato), but within a generation also had also, via Aristotle, included Materialism.

But, of course, these were far from delivering a coherent and consistent set of alternatives: they were, instead, specific to given situations and with only ever strictly local applicability.

So, all three stances were used "when each was appropriate"! The overall stance was a remarkable-and-piecemeal amalgam of Idealism and Materialism - held together by Pragmatism!

Nevertheless, many only-glimpsed relations were somehow grasped from Reality, which, more often than not, actually failed when they were attempted to be applied in the real World.

And, it was found essential to purposely limit and maintain a much simpler situation, in order to "hold Reality still", farming it in various different appropriate ways, in order to extract any relations at all!



Now, perhaps surprisingly, this did not stop effective use! As long as the precise conditions-of-extraction were exactly replicated, then the relation could be effectively applied.

But, to then allow these relations to become eternal Natural Laws, which was always assumed, an absolutely essential tenet had to be crucially attached to such processes.

It was the Principle of Plurality, which stated categorically that all such Laws were zlways totally separate from one another: they were eternal and could never be modified in any way.

All complex situations were onceived of as merely complications of some subset of these laws, in various different proportions. Individual Laws were totally un-modifiable! And, this was also instituted for the, also new, processes of Formal Logic too.

For, the model for both had been the precursor achievements within Pure Mathematics, where the absolutely essential idealisations that were always used DID legitimately conform to this Principle!

The Crisis in Physics, which led to he Retreat that became Copenhagen, was precisely down to this contradictory amalgam of stances, which became totally untenable there, long before its evident emergence in non-investigative, and primarily cerebral-only disciplines - like Wright's for example.

In other words, and perhaps surprisingly, my critique of both Classical and Copenhagen Physics turns out to be also exactly correct in damning Wright's stance, as it too is totally pluralist (whereas, as a Buddhist, you would assume him to be a holist!).

So, it seems productive to concentrate upon England's evidently progressive diversions from the usual preoccupations of the vast majority of physicists, and primarily address where he is diverging from the current consensus, and looking to how Physics played a role in the Revolutionary Origin of Life, before criticising his short-comings.

II: Jeremy England's stance & Purpose

On watching the video of this hour-long debate, for a second time, I began to discern the debaters' differing Grounds, from which the various areas dealt with were tackled. So, perhaps, the main contribution here should start by revealing these, in contrast to my own.

Wright, as the interviewer, was obviously the major determinator of what was discussed, so it was he who also set out what to him were the probable bases common to them both.

The primary basis was clearly assumed by him to be Thermodynamics, and, in particular, its Second Law, about the Universe inevitably running down (which, of course, does not sit well with a natural Origin oof Life). He, secondly, also was clearly a subscriber to a belief in eternal Natural Laws (or Plurality) though all this was never overtly spelled out!

Finally, whenever his set of bases weren't able to take things further, he would switch the ground, sometimes quite dramatically, into areas where he felt more confident, or to where he thought England's position might be less defensible [Something like "Yes, but arguing", but not quite as blatantly dishonest!

Nevertheless, as long as the observer of this discussion disregarded Wright's God-like stance' the responses of England were able to show what he and his colleagues are researching, and some of the strengths and weaknesses of his grounds too.

His area of study is pre-life, purely-physical developments, that were contributary to the ultimate Origin of Life in specifically conducive situations, and with already-existing natural processes.

He chose, as a physicist to follow the usual assumption of Physics being the most basic science, and looked only for physical processes that were so endowed.

Now, the writer of this review has also addressed a similar set of questions, but, instead, based them upon pre-life chemical reactions.

Now, in the Wright-England discussions the whole question of a non-living process as being similar to Darwin's Natural Selection, concerning the evolution of living things, could not be avoided.

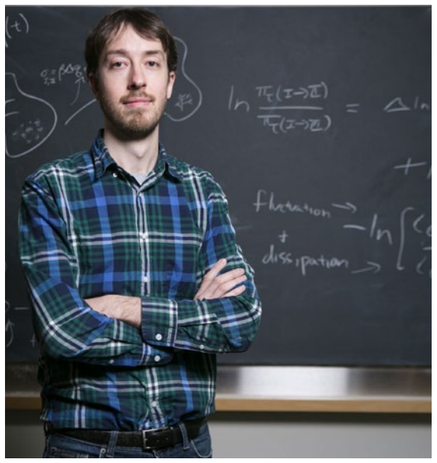
All, including this writer, agreed that both the Reproduction and Competition of life forms, especially with their changed genetics, could NOT be replicated in pre-life conditions, but by restricting the discussion to Physics, the gap, to Natural Selection, was so large that a very different approach had to be taken - basically also thermodynamic, but with England playing down the usual Entropy abstraction, and preferring "work" instead.

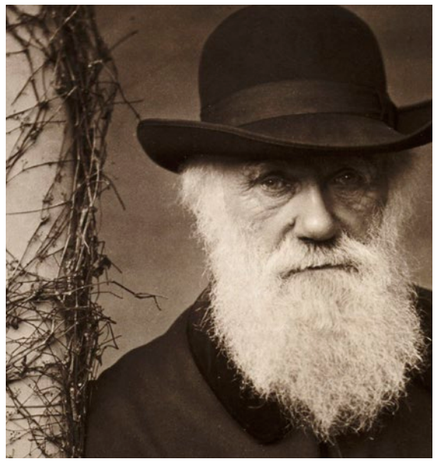
Now, we never got to hearing about his physical examples, which would have been crucial, but nevertheless, absolutely NO route to Life was evident.

In the writer's own researches, however, concentrating upon pre-Life Chemistry, rather than Physics, much more similar processes to those in life could be addressed. And, something akin to competition could be included, where different processes required the same resources. Indeed, the "competition" for such resources simply boiled down t a preponderance of one process over its competitors, along with differences in the speeds of such rival processes.

In addition, sequences of processes into "conducive strings", and even "conducive cycles", made revealing links to what is already known of Metabolic Pathways in Life.

And, with all these considerations, situations such as Dominances and paucities of required resources, showed how mixed populations of multiple processes could





change and even lead from dominance to paucity, and the dynamics of alternative developments and different dominances.

Of course, such a clearly relevant set of investigations wasn't involved in the Wright-England discussion.

But Jeremy England did reveal a much sounder attitude to so-called Natural Laws, as being "arranged for" by the involved specially-tailored domains, and consequent methods of investigation, and also, therefore, depended upon as man-made models, in those given circumstances.

Nevertheless, the errors of Plurality undermined both sides of the discussion, for neither went beyond Law, and certainly didn't address the essential role of Emergences in developmental creation of the wholly new. What was implied was that such miracles as Life, simply emerged from adequate complexity, rather than ONLY occurring following a Major Crisis and Collapse, thus precipitating the ONLY situation in which the Wholly New could possibly emerge - that is in a veritable Revolution or Emergent Interlude.

As the writer has spent many years upon such studies, he has formulated what he calls Truly Natural Selection for the non-living era, and ended up with his Theory of Emergences, it is clear that this discussion never approached these relevant, indeed, absolutely essential topics.

Dichotomies

Contradictory Pairs in both Thought and Reality

There is a fascinating feature that has emerged in my extensive scientific and philosophical researches, spread over many decades, which certainly requires an explanation. It is the crucial and disturbing occurrence of Dichotomies in many different, and totally unrelated, contexts!

And, this being the case, I assumed that their appearance was sure to be as much to do with my flawed thinking, as it was to do with such widespread contradictions occurring in concrete Reality itself.

So, I determined, whenever I could, to address the issue on both fronts, initially accepting various origins, not least in the way I was dealing with what I knew, and thought I understood, and chasing any contradictions that emerged, with a view to finding their causes and remedies.

Let me, therefore, start by listing just a few!

When I was deeply into Computer Programming (in what was usually called Systems Design), and where I was occupied with authoring various Computer Language Compilers (translators into computer codes), I came to use, with powerful effect, what are termed Flowcharts in designing algorithms, that were a means of attempting solutions relating to various problems, which after coding into a machine-readable language, would be entered into a computer to then deliver the required results.

The surprisingly-simple technique that such flowcharts used extensively, was the Decision Box - a unit, within an algorithm, which had one way in, and two ways out!

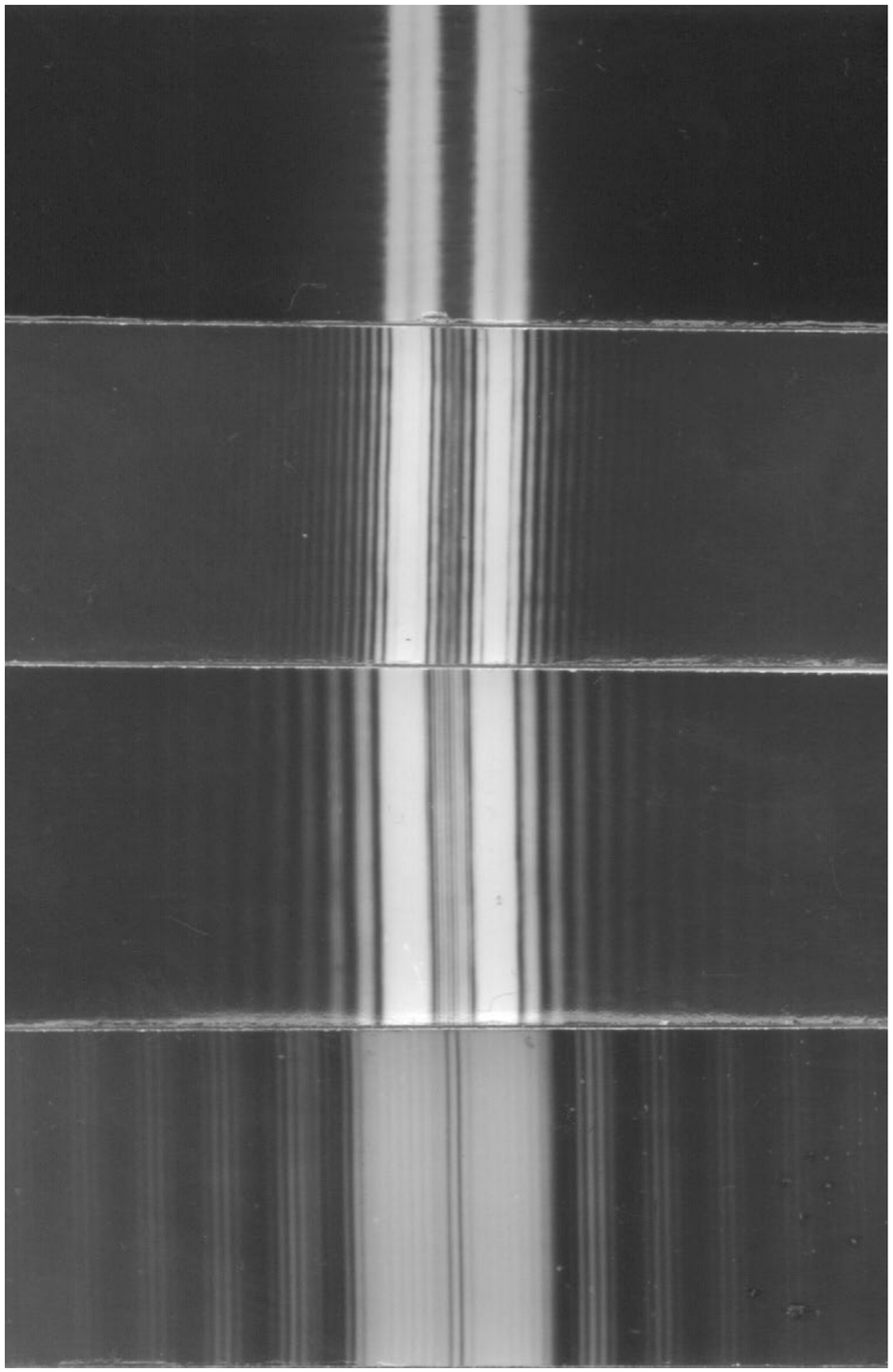
The Box would contain a question with only two allowed answers - either Yes or No! And, depending upon which of these were chosen, the algorithm proceeded with two quite different sequences of instructions to be followed. Indeed, workable, and even varying, instructions could be remarkably effective, with only these Dichotomous Controls necesssarily involved.

Then, much later, when working with a biological graduate researcher upon his building the first Taxonomy of what are termed Tardigrades (Water Bears) (he, of course, was the discipline expert, while I was an assisting programmer). His then objective was to construct an identification Key for all known species, but, hardly a week went by without another new discovery being communicated to him. It caused him to literally start again each time, because new, previously unknown features were involved, and would have to be integrated into what was called a Dichotomous Key.

I was to turn what he came up with, into a generally available computer program, but clearly that also meant a restart for both my colleague, and for me too.

So, I changed tack, and wrote for him a Key Generator, which allowed him to easily insert any new species, with its identifiers and decisions, so that all previously existing-pointers, in the prior Key, would be automatically-updated, Into a new version, incorporating the new information along with the old. It worked like a dream, and we published!

What was even more interesting was that you could still use the Key even if certain questions could not be answered with either a YES or a NO: indeed, an “I don’t know” option was included with the necessary steps to still allow a completed run, by allowing the Key to be traversed in appropriate alternative ways. Though, now, instead of a single identified result, it would automatically traverse all now possible options, consistent with the answers entered, to give a graduated range of results,



so that choosing which of these was correct was greatly facilitated.

NOTE: A related achievement, of the very same features, was a computer program, which allowed two people to play a game of chess, which recorded the game as it was played.

Not only could the game be automatically stepped through thereafter, but, in addition, the users could intervene and play the rest of the game differently. Indeed, as the modified version was also recorded, and as many alternatives as could be conceived of could also be added in, and a whole, spreading Tree of related games could be available for training purposes.

Then once again, this time in Philosophy, I finally, after a long gestation period, got a grip upon Hegel's ideas of Dichotomous Pairs of concepts. These consisted of two diametrically opposed concepts, so that they couldn't both be true. So, in any given set of circumstances, only one could be effectively used, but not the other. It was yet another YES/NO choice, but without the wherewithall to decide which to pick! Now, Hegel discovered that such Dichotomous Pairs were always caused by errors in the assumed basic premises upon which this line of reasoning was based.

Indeed, he was able to show that this was an unavoidable and regularly recurring feature, and did so many, many times. And, whenever it did, it signalled a major error in the premises involved, via the total impasse logically caused by the involved dichotomy.

Now, Hegel also went a lot further, and described just how such an impasse could be transcended: it involved the exposure of the premises involved, their trenchant criticism, and finally, the finding of significant correcting replacements, in those premises. For, such turned the impasse into a logical bifurcation based on actual sound reasons (exactly as in the above mentioned Decision Boxes).

Now, their occurrences in very different contexts, says something very significant about how we think, and make sense, of Reality. His discoveries are clearly no panacea, but could indeed reveal a series of approximations, every one facilitated by the signalling of premise-error by a Dichotomous Pair and its faulty premises, which always meant the final demise of a current explanation.

Hegel's Dialectical Reasoning, which became known as Dialectics, was a more correct alternative than the universally accepted Formal Logic, and its rules of reasoning.

So, what has so far been undertaken here, has merely been a description of these occurrences. What is now needed, is a much more detailed investigation, to reveal exactly why these things occur. And, in addition, why partial solutions can be achieved, if only temporarily.

There is a very interesting example in Sub Atomic Physics which may throw a different light upon this phenomenon.

In experiments, referred to as The Double Slit Series, similar dichotomies occur, in which some natural entity was "clearly acting sometimes as a wave, while at others as a particle".

It was clearly yet another YES/NO dichotomy - sometimes the wave explanation would deliver, while at other times the particle explanation would work perfectly. But, this wasn't to do with Thinking, but concrete Reality itself. Clearly, this is significantly different, and would not be solved by a mere change in conceptual premises. For, that could never convert a localised Particle into an extended Wave. So, though similar to Hegel's Dichotomies, this had to be explained physically!

Yet, I managed to solve the problem in a surprising way! I simply added-in the presence of an invisible Universal Substrate, in all of space, and, surprisingly everything could be physically explained, and every single anomaly just disappeared!

It turned out to be due to recursive, yet time-delayed interactions, between the Particle and the Substrate, that produced all the observed phenomena. Clearly, here the flaw in the assumed premises of the experiments was the omission of the Substrate, and not as I had initially thought, an incorrect or missing concept as a necessary oremise.

The truly vital question immediately arose - "Could all cases of supposed Wave/Particle Duality be similarly addressed?".

Was it merely Key omissions, in assumed premises, that always forced Dichotomous Pairs to emerge, while

a correct re-insertion would then allow both options as separately-caused, and entirely logical and valid outcomes to be traced through?

Various other different features have emerged in my extensive and long career, both in Science and Philosophy. What has been clear is that, when presented with many difficulties by Reality itself, Mankind was initially only able to make some kind of progress in making sense of its innumerable processes, by intervening-in, and thereby changing situations to make them much easier to deal with.

Historical evidence, particularly from the time of the Ancient Greeks, revealed that both Simplification and Idealisation enabled some valuable, of modified, aspects of Reality, to be not only clearly displayed, but also both extracted and thereafter used -effectively, in various ways.

The classical, and long-persisting achievement, had been via the invention of Mathematics. Now, it is important that we are very clear, what this remarkable new discipline was, and still is, all about! It is where observed natural shapes were idealised into pure and perfect Forms, like circles, squares, triangles and the like. For, these were found to be much more easily investgate-able and indeed useable, and perhaps most remarkable of all, could be analysed and manipulated in many different ways, to reveal a host of intrinsic formal properties.

Indeed, this particular kind of transformation involved two key aspects! First, complex and confusing Reality was simplified by both removals and restraining controls, converting things into much more easily considered situations. And secondly, the Shapes, if they were idealised into those Perfect Forms, enabled many useful techniques to be both devised and used to great advantage.

Now, all this was, indeed, a great step forward, and opened up many previously hidden possibilities. But, it also created unavoidable, and usually not evident, limits to what was produced.

The same pattern to development, in Mankind's thinking, recurred time after time. It certainly always enabled new things to be achieved, but in every case it also led to problems, because Reality is NOT exactly like the simplified and even idealised entities and ideas that were delivered into our hands.

Now, it happened that, at about the same time, as the Greeks were making these momentous discoveries, a very different approach was emerging in India. The spiritual leader - The Buddha, saw Reality very differently, for his reaction to its confusing complexity, was to concentrate upon Man himself, and his remarkable assets and abilities.

To him, simplification and idealisation were anathema - for they took complex, ever-changing Reality, and nailed-it-down into a false man-made Stability. He was more interested in Reality's incessant changes, and even more crucially with Man as the essential central and constant interpreter. And, the philosophical principle closest to his ever-changing conceptions was termed Holism - "Everything affects everything else!".

This was the exact opposite of the Greek stance, where summations of fixed and abstract Laws supposedly produced everything. That alternative in its further development, was later termed Plurality.

Immediately, we see a mutually-exclusive pair of stances - effectively the exact opposite of one another - Holism & Plurality

They couldn't both be true!

So, the earlier personal experiences of the writer, were just reflections of something common to Mankind's general attempts to understand the World. Yet, the key question is necessarily posed, "Why is precisely-this diametrical opposition always the case?"

We seem to be able to extract Subsets, from Reality, that in one way, and for a limited span, can match something within Reality. But, they will all ultimately fail, due to their own self-imposed limitations. And, when they do, the event is signalled by the emergence of Dichotomous Pairs of concepts.

It is as if those limitations get focussed into such a logical impasse! Now, each arm of the Dichotomous Pair can be still used in certain unpredictable circumstances, but as conceptual principles they are totally contradictory. How can they possibly be correct, and used theoretically to explain things?

Whatever is wrong, it still allows successful forays, using one or the other.

But, which and why is certainly never evident! So, rather than looking at such forays as exploiting really-existing aspects of Reality, we must, surely, instead attempt to discover what the assumed-premises were that produced the Dichotomous Pair: or what was actually omitted, and how such omissions could naturally focus into the resulting logical impasse.

I am becoming more and more convinced that answering this last question has to be paramount!

Some omissions are both easy to see and describe, as with those that are inevitable, such as with a purely formal approach, as is embodied in Mathematics and Equations alone, for example. For, what is omitted there, is absolutely everything except Form, which means that qualitative changes and development can never-ever be addressed.

In considering Reality as an active "living", and mutually-interacting system, Formalism is merely equivalent to an Analogy: it selects from Reality, studying individual fixed Forms only, because you can begin to get a handle upon Form, though absolutely nothing, on how, and why, it may change into something else! Form, as portrayed by Mathematics, allows NO qualitative changes, only quantitative changes within an assumed-to-be-permanent Stability!

The 20th century demise of Sub Atomic Physics was, and still is, predicated upon the total abandonment of causal explanations, and a sole dependence only on Pure Forms, and absolutely nothing else! Can you ever imagine addressing Human Behaviour by such evidently inadequate means?

Returning to Hegel's remarkable discoveries in Human Thinking, he recognised these inevitable impasses, by means of the emergence of Dichotomous Pairs of concepts, that, even though they were mutually-exclusive, could still be very useful, in appropriately prepared contexts.

The questions surely have to be, "Why is that the case?", and also, "Why should only Dichotomous Pairs always emerge?"

Clearly, whatever the causing stance was, it still must have included some measure of Truth, to be as useful as it was, and indeed, still is, even after an impasse has terminated further rational explanations. For, the "classic solution" to that event, is to find which arm of the dichotomy works in a given situation, and use it, only to immediately switch to its opposite, whenever it fails.

So, purely pragmatically, both arms of the dichotomy are kept and merely switched between entirely pragmatically.

Now, the fact that this can be done, proves that each arm is correct in appropriate circumstances, AND, crucially, we do not know in advance what those circumstances will be. And as, if one fails, the other usually succeeds, an old fashioned "suck-it-and-see" technique will suffice to pragmatically bridge-over every impasse.

Of course, without that clearly crucial missing information, the theoretical explanations across such impasses are totally scuppered!

These impasses, therefore, tend to form boundaries between different Specialisms or even complete Subjects! And, with thousands or even millions of such unresolved impasses across the whole experiences of Mankind, it has still managed to survive for an immensely long period of time, and still made some kind of progress, in spite of the Knowledge that Man had achieved being fragmented into a vast number of these theoretically-disconnected areas of Experience.

Nevertheless, the consequences for the structure of Man's overall Thinking is that it is, unavoidably, in a permanent state of increasing Mess!

To demonstrate what is caused by such a situation, let us consider current Physics. And, this would surely be by roundly condemning the Copenhagen Interpretation of Quantum Theory, with elementary particles at the sub atomic level, but, also via a basic study of Nature at the macro level also, which is now in dire straits too.

The proof of this has been demonstrated by the brilliant French physicist Yves Couder. who decided upon a very unusual type of experiment. He simplified the situation that he had been studying, by removing absolutely everything apart from a single substrate - a particular type of Silicone Oil. Then, he decided that without using any other material components, he was going to inflict only various purely energetic changes - unserting absolutely nothing but energy!

His tray of silicone oil first had a tiny drop of the very same oil released onto its surface, from a certain height above it. Now this, as you might imagine, created a transient set of waves emanating outwards from the point of contact of the drop. He then applied a regular vertical vibration to the whole tray of oil, and, by adjusting the various parameters involved, managed to get a subsequently released drop to actually bounce!

Now, of course, the drop would simply rise up a certain amount, and then fall again, back towards the surface of the oil. By simple, yet careful and precise adjustments, the repeatedly bouncing drop became, itself, an insertion of yet another frequency oscillation, into the overall situation.

Finally, with appropriate adjustments to all parameters that were available to him, he produced a stable system, upon the surface of the oil - composed of the bouncing drop, the vibrating tray of oil, and a circular standing wave, surrounding the position where the bouncing drop was situated.

Couder called this surprising entity a "Walker", because it could move about, and even bounce back from the edges of the tray, and off any other Walkers added to the system, by the same methods.

Now, these achievements were entirely new!
They didn't need any expensive equipment and complex idealist theories. His experiment only consisted of a single substance, which was not even changed by the arrangements involved, but, seemingly, entirely out of nothing, Couder had managed to create a persisting and stable entity - from a substrate and vibrations, and absolutely nothing else!

Now, all of this was remarkable enough, but he noticed that new inserted Walkers would follow prior ones, along identical paths, and even organise themselves int serried ranks. Clearly things were happening within the substrate that hadn't bee recognosed before. And, also, by simply adding in a steady rotation. of the right speed, to the containing tray, he caused his Walkers to perform orbits, but only at certain quantized radii.

All this was achieved at the macro level, now ignored by the world's leading physicists. Yet, he had produced quantizations, without any of the idealist paraphernalia of the Copenhagen stance, or anything like the rather expensive Large Hadron Collider. Now, what on earth was happening in Couder's experiments?

Clearly, he was getting resonances between the various closely-related frequencies, and also feedback from effect-to-cause (or, more properly, recursion). And, finally, with the quantized Walker orbits, he was also getting "resonant feedbacks" between vortices caused by orbiting Walkers in the silicne oil liquid substrate on the tray, and the Walker orbits themselves.

As the reader may have guessed, the exact same reasoning, as outlined above, has been applied to, and explained, in the same way, the quantized orbits of the electrons in atoms, merely by the assumption of an undetectable, but existing, Universal Substrate, capable of related phenomena to those in Couder's Experiments.

While, the best physicists in the world eagerly queue up to use the LHC at colossal expense, Yves Couder using a tea tray filled with oil, and nothing else, has probably delivered a great deal more, and also put the whole Copenhagen Interpretation of Quantum Theory under severe threat!

Postscript:

There still remains the $64,000 question concerning the evident regular appearances, due to flawed premises, of just TWO, always-diametrically-opposite possible outcomes.

Now, this is close to being explained, but requires a detailed and historical investigation into the more general interactions of Non-Living Processes, as have already led to the Theory of Truly Natural Selection, which is currently being extended to address this important factor too.

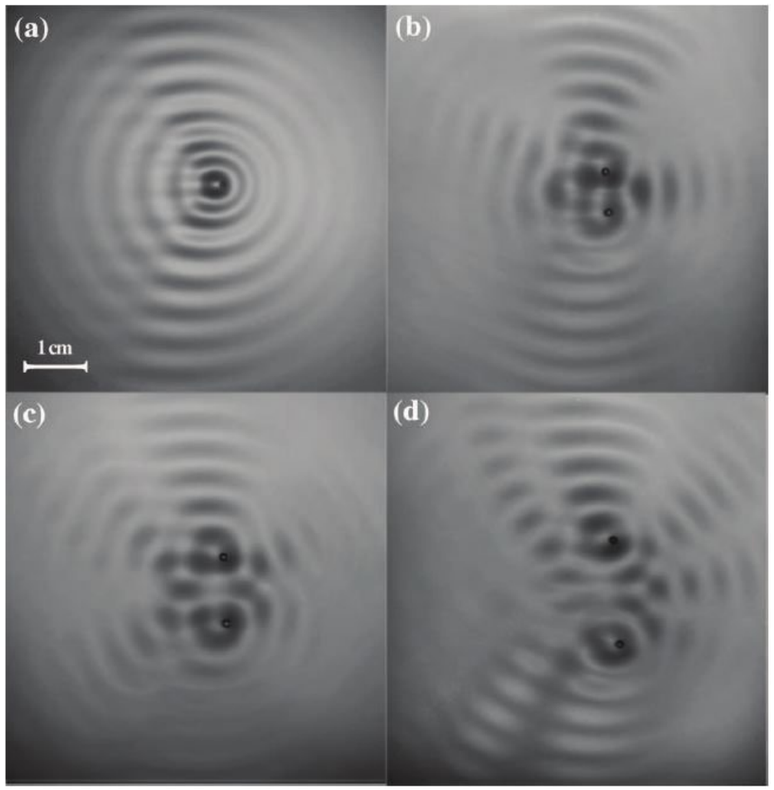


FIG. 1: Photographs of the wave fields. (a) A single walker of velocity $V_0 = 9\text{mm/s}$ at a memory $Me = 100$. (b-c) The wave fields of two droplets bound into promenade modes $n = 1$ (b), $n = 2$ (c) and $n = 3$ (d) at a memory $Me = 50$. The ratio of the velocities of the bound pairs to the free velocity of the droplets are, respectively, 0.55 ($n = 1$), 0.75 ($n = 2$) and 0.85 ($n = 3$).

The Generation of Opposites

in ABSTRACTION

One feature of Abstraction, which is rarely investigated involves the transforming effects of simplification upon what is actually extracted from Reality. For, Reality-as-is is invariably made-up of many, often-competing, factors, so it usually defies any immediate analysis: we may glimpse significant components, but such could never be enough to actually lay-hold-upon them for effective future use.

The problem initially seemed insoluble, and all that the ancients could do, was to attempy to define these glimpsed-factors, as best they could, and then speculate upon how they might work together to produce what we actually have.

The problem stemmed from the mistaken assumption of "Determining Essences" - usually considered to be hidden within the "evident ly confusing complication", but capable of being revealed by informed simplifications of the situation under study.

But, to understand the inevitable trajectory of Mankind's efforts to make sense of Reality, we have to remember the conditions under which early humans had struggled to survive for literally hundreds of millennia.

Man was then still only a remarkable Hunter/Gatherer, with only Pragmatism to guide his conceptions of things: The tenet "If it works, it is right!" did not help his understanding, so, he allocated all Causes in Reality to all kinds of "hidden essences".

Then, following the Neolithic Revolution, Mankind's control expanded considerably, and in a particular area - the Patterns and Shapes of things, he began to find a means to effectively simplify them, in a way that apparently "revealed" their "Essences".

He idealised the shapes into the simplest Forms - Squares, Circles and Triangles, and studied these to take investigations much further. And it worked! This was indeed a revolutionary event! By transforming observations into simple, idealised versions, he began to find ways of dealing with these instead, which he characterised as revealing "the essential features involved"!

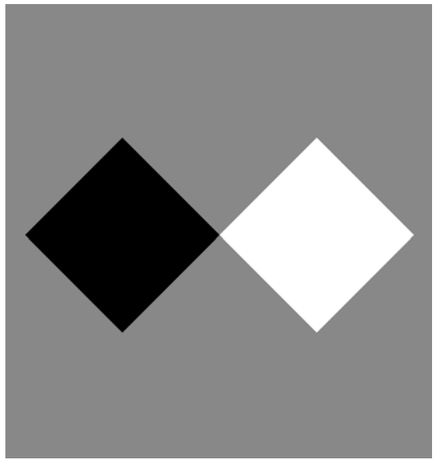
And, it did open the way to many useable developments, but it was also misinterpreting these idealisations as something more than a useable simplification.

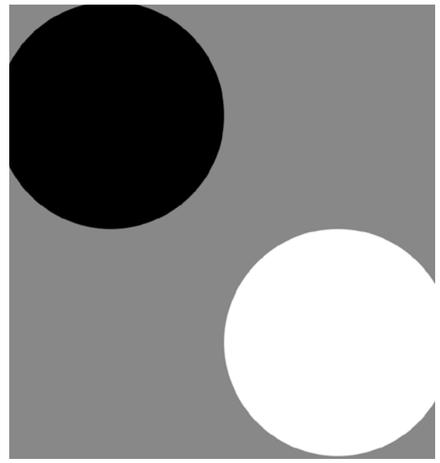
The same approach was also exported to Reasoning and resulted in Formal Logic on the exact same basis, and also began to be applied to concrete phenomena and their causes too!

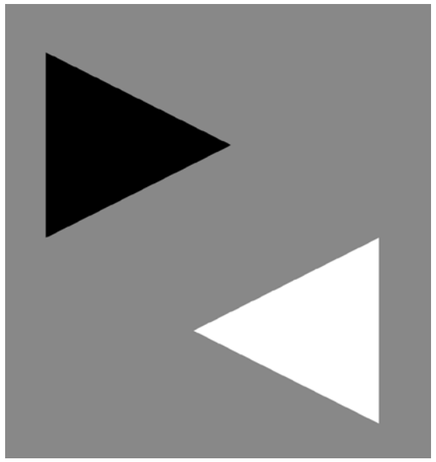
Now, these developments were vital and were a vital component in Civilisation, but they would never be entirely sufficient, and the flaws in this approach would always be there and would ultimately limit how far Mankind's understanding was able to reach using such modified versions.

To address those problems, we will have to return to Simplification, to see where it would also lead in crucial developmental changes of various kinds!

Believe it or not, the flaws in these methods were apparent very soon after their discovery, due to the revelations of the Greek, Zeno of Elea, with his famous Paradoxes. Zeno concerned himself with Movement, and Man's usual simplifications of Continuity and Descreteness, when attempting to analyse movement situations. These alternative concepts when applied to explaining certain situations of Movement, such as a Race between Achilles and the Tortoise, and the Movement of An







Arrow through the air, for both led to unacceptable contradictions. Yet both could indeed be used effectively in certain situations!

The usual answer was to use which one worked, but BOTH were about the Nature of the very same thing, namely Time!

Was it infinitely divisible, as assumed by the Continuity simplification? Or, was it divisible only into descrete intervals, as assumed by the Descreteness simplification?

The very same thing, Time, could be simplified in two totally opposite ways, yet could be effectively used in different real circumstances! Let us attempt to define what Simplification actually does to a real world phenomenon!

Clearly, it throws away some of the intrinsic components of a naturally-integrated situation, as being of lesser importance, with a view to revealing the more important components more clearly.

But, you can only do that with impunity, if the assumed Principle of Plurality is true: that is, if the components of a situation are unaffected-by and independent-of their joint, and their surrounding, context. But, alternatively, if the Principle of Holism is truer, then the context is part of all the components, and to eliminate any of them will change what remains!

In a Holist World Simplification always modifies what remains: you have thrown away something more or less essential to what you are attempting to understand. In some circumstances you will be able to get away with it, while in others you certainly wont!

Indeed, even the very-same-situation can go either way: it depends upon what you are investigating. Even a gas composed of descrete molecules can act as if it is Continuous when considering the propagation of sound, but will require the simplification of Descreteness when considering the effects upon particles of smoke - as in Brownian Motion!

Indeed, it depends upon what components dominate, and how they do so, in various different phenomena!

Also, in detailed researches carried out, by the writer of this paper, into pre-Life developments within complex mixes of chemical processes, it has been established that exactly opposite processes are likely to dominate, but at different times in the competition for the same required resources.

It was termed Truly Natural Selection and replaced the previously known Darwinian Natural Selection in developments during the pre-life era on Planet Earth.

NOTE: A thorough-going study of such things still has to be applied to Hegel's Dialectics, Dichotomous Pairs of contradictory concepts, and his collection of rules for extending Formal Logic beyond strictly stable circumstances.

But, of course, following Marx's wholesale transference of Dialectics to a Materialist Stance, the task becomes vastly wider - by being applicable to the whole material World, and its study via the Sciences too.

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