

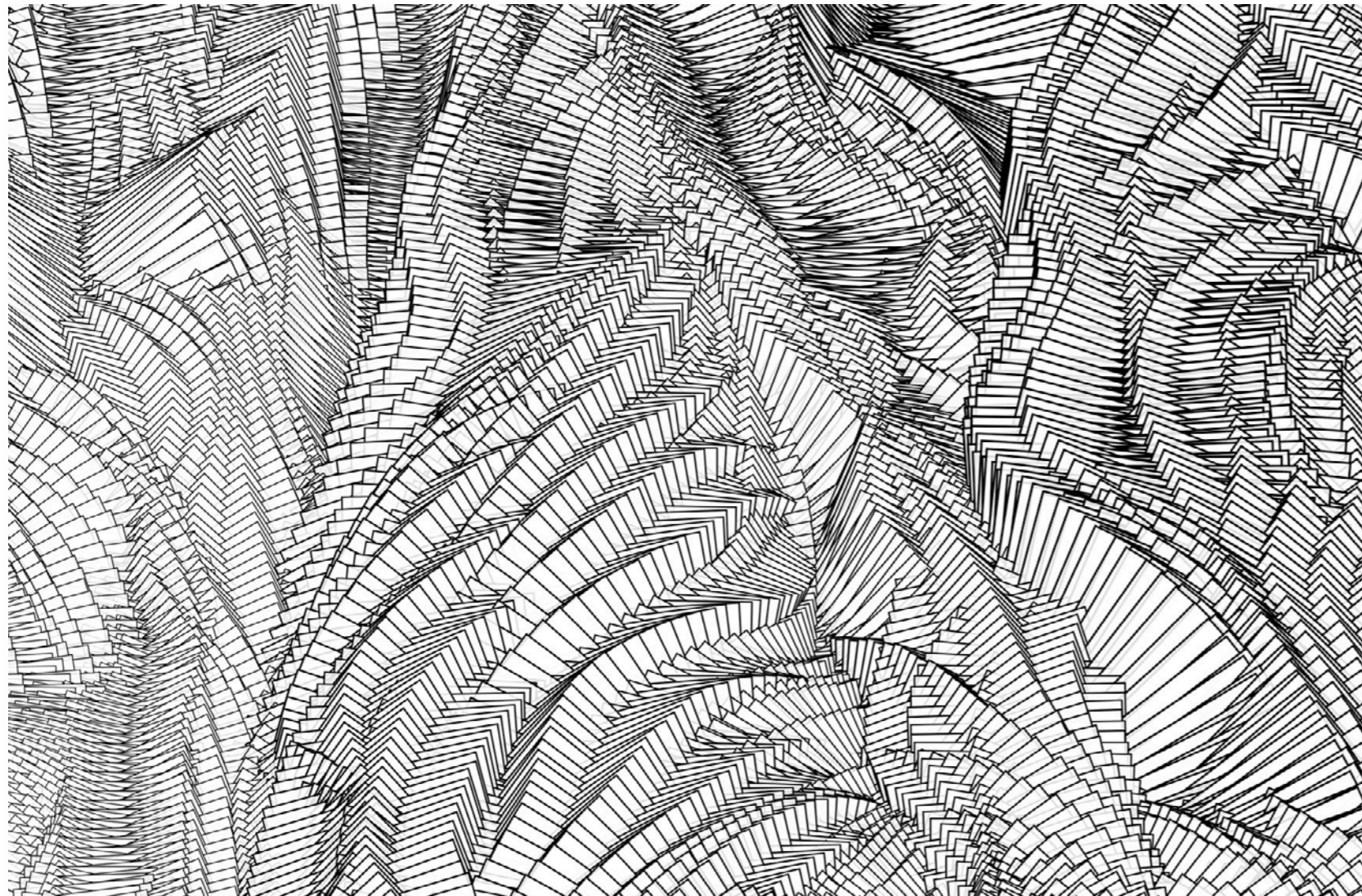
SHAPEJOURNAL

ITERATION

THE BORDERS OF IDEALITY AND BEYOND / LOGIC AND DIALECTICS / CHAOS AND STABILITY / CHAOS IN A HOLIST WORLD
HOLISTIC ITERATIONS / AN ITERATIVE FORM DIRECT FROM DATA / A NEW ITERATIVE METHOD

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Featuring art by Holgar Lippmann

Iteration

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Introduction

Iteration:

Exploring the Borders of Ideality and Beyond

Welcome to the 59th special issue of the SHAPE Journal entitled *Iteration*. But what do we actually mean by this term?

In Mathematics it is a way of trying to find answers through repetition, but it certainly isn't the usual way of using equations. Originally an invention of pragmatic engineers it then became an extension of Mathematics, giving birth to all manner of wondrous inventions, from fractals to Chaos Theory. It is a fascinating area for sure, but it isn't what the mathematicians like to pretend it is.

Iteration is a discrete way of approaching the continuous - and a static way of dealing with movement and change. It embodies all the chaos, paradoxes and infinite blow-ups you'd expect from such internal contradiction.

The papers in this short collection are presented in a different way from the usual updates. For it is such a difficult, and yet crucial, area that "the latest" seems both too esoteric and too abstract, and its relevance not immediately apparent.

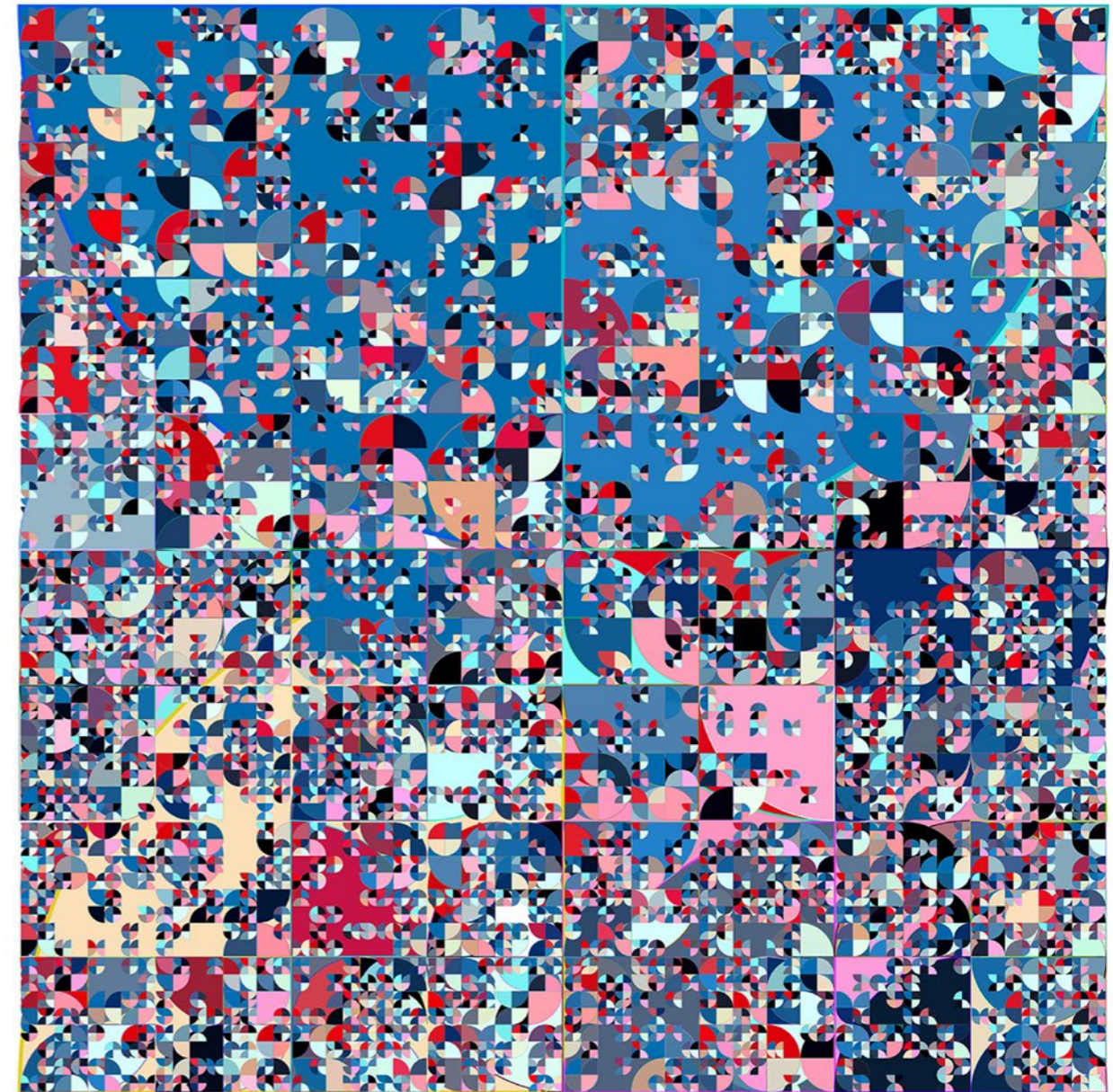
It certainly wasn't obvious to me! It has taken about 30 years for me to finally begin to understand iteration's importance, in providing a very different approach to both Reasoning and Science. So, clearly, delivering the latest developments, without some idea of how it was finally achieved, would also leave most areas unexplained and unacquainted readers cold. So, this collection spans, one way or another, all the significant steps in that ascending trajectory.

First of all, these papers are not part of a complete and final narrative. They, instead, each and every one, come out of an only partly referred-to past, which had certainly left the necessary traces-and-questions in my head, but not yet upon the written page. Nevertheless, the fact that each poses as yet unanswered questions, does ultimately connect up with later papers, and, as it does so, begins to light-up a wholly new path towards Truth, inaccessible from the usual approaches.

As a whole, it brings together the inadequacies of disciplines that cannot deal with real Qualitative Change, such as Mathematics, with the finding of evidence for possible solutions actually within the very tricks and extensions that infer something beyond those steadfast limits, and which become attempts to solve the inherent problems of that discipline's usual and in fact essential approach.

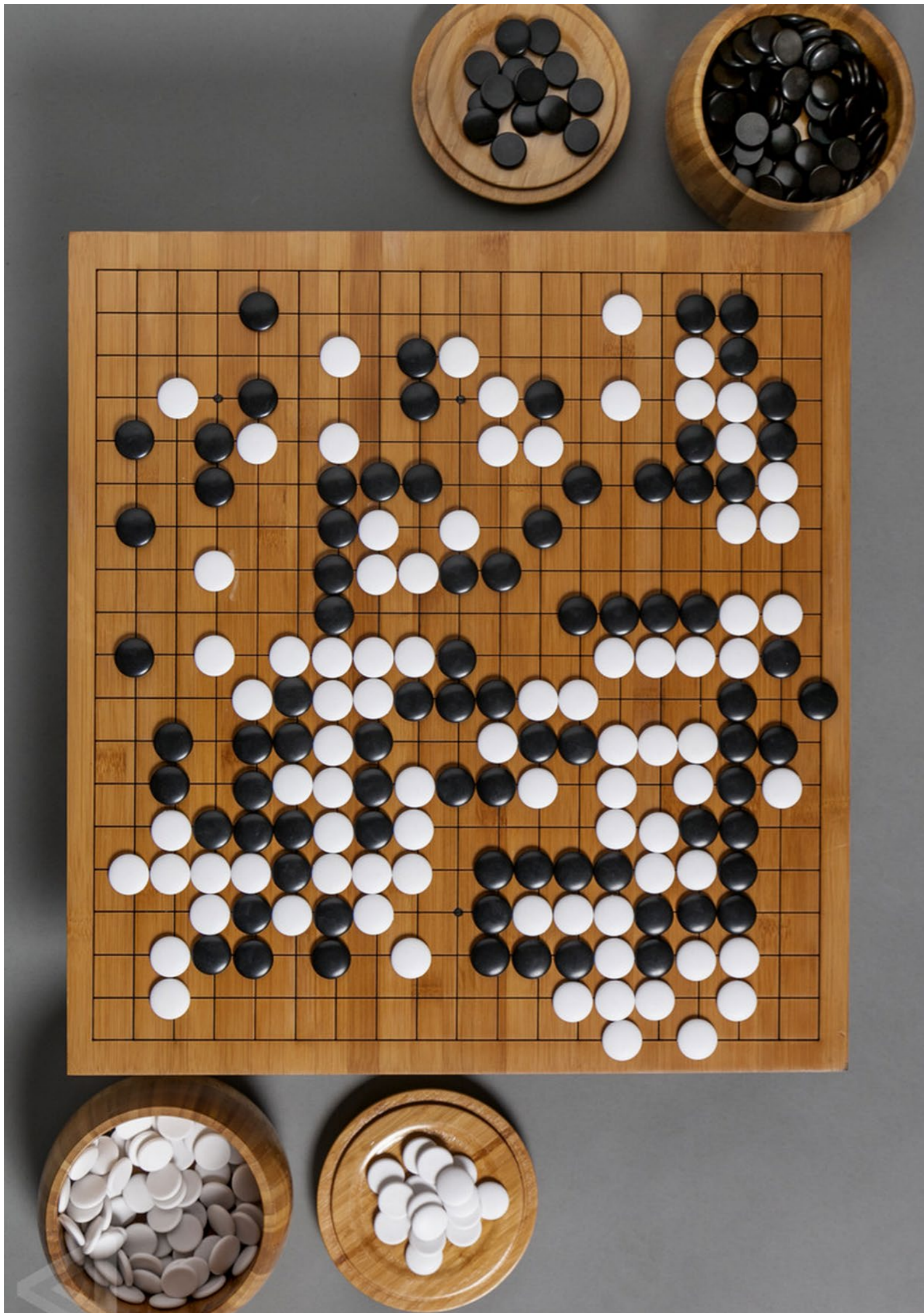
Indeed, as Hegel had always insisted, progress only resides in what appear to be untenable contradictions.

Jim and Mick Schofield
June 2018



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iteration sc (2013-14) by Holger Lippmann



Logic and Dialectics

The Dialectical Resolution of Contradictory Concepts via the Addressing of Qualitative Change & Development

Hegel's correction of the impasses caused by Dichotomous Pairs of contradictory concepts, could never be sufficient in itself, to finally complete the abandonment of Classical Qualitative Change and Formal Logic, and its replacement by something better.

Somehow, the actual Qualitative Change and consequent Evolution of Reality had to be given its own and fully appropriate framework. "Jigsaw-like-Explanations" just couldn't do it, and, with a very different agenda, just had to be replaced by something that could effectively deal with such transforming changes - and, most crucially of all address-

The Emergence of the Entirely New!

The answers could simply never be found in the old ways. Summations of fixed, indeed eternal, Formal Laws could never do it.

Instead, a real holistic understanding of Qualitative Change had to be the new basis, and it meant a veritable revolution in the necessary means employed.

It amounted to a switch from the study of maintained-Stabilities, to that of their interludes of Creative-Transformation! Hegel's best student, Karl Marx, knew that the new philosophical stance had to also embrace Science, and therefore become fully materialistic, rather than idealistic, and how to tackle that had to be sought in qualitatively-changing Reality, at a rate that Humankind could study:

It had to start with a wholly new study of History!

And, a History of a very different kind - embracing a vastly extended sweep from Man's hunter/gatherer beginnings, via the absolutely key events of the many clearly-occurring Social Revolutions - up to and including, the very recent (then) French Revolution of 1789-1815.

The means to understand holistic-change had to be extracted from new approaches both in History and in Science.

But, the revelation of the required Methods, would not be naturally implicit in those areas of study at all: they would not, and simply could not, fall into our hands, directly and ready-made, from the mere study of those necessary sources. For, in both areas, those normally involved in such studies, invariably, had their own a priori agendas, which necessarily excluded the required new approach.

But, nevertheless, there was, in existence, a serious tradition, based upon a holistic stance, that had been around since the very same period that had produced the dominant ideas of the Ancient Greeks, but, it was fundamentally different, and was then situated in the even more ancient culture of India, and had been effectively established by the great spiritual leader - The Buddha!

It was ignored by western civilisations, because it never developed ever-increasing uses via Technology, but, in India, its whole basis was Qualitative Change, where, it dealt with actually deliberately-effecting-changes, but in Buddhism, only within each individual human being: and to do this, it turned simultaneously

outwards to awareness of Nature, and inwards towards a transformation of the self!

But, nevertheless, it suggested a new kind of method for approaching reality. In the famed Loka Sutta, this present-day, materialist philosopher and scientist found a crucial feature, that was the crucial feature at the very heart of all Qualitative Change. Each step in a necessary-transforming series should always involve Recursion!

Any process necessarily delivered a product, which then inevitably modified the very context that had produced it - and, hence demanded a re-iteration of the process in that unavoidably-changed context, to see if-and-how it affected the process, and, perhaps, sometimes, produced a different outcome.

Throughout the Loka Sutta, these recursions are repeated at every single step, and in every single phase. Now, as the original objective, by the Buddha, was always the development of the human-being-involved, so, it could never be an infinite regression. It was guaranteed to arrive at some, at least temporary pause, and hence became, thereafter, a perpetual cycle (involving recursions and re-appearances) rather than a linear progress. [Such cycles would, crucially, recur in the New Methods, but at many different Levels, the most dramatic being in the Development of Societies!]

Unlike the pluralist traditions of the West, holist Buddhism could deal with Qualitative Change: indeed, that was its spiritual purpose for those involved and committed to it. But, of course, it was there embedded within a solely spiritual context, with none of the multiple impasses proliferating in the West.

The Key to the emergence of the wholly new, was, certainly, Recursion - it was absolutely essential because the fixed Formal Laws of the pluralists, forever merely produced the exact-same outcomes, while the feedback in the recursions, involved in the holist method, meant that such rigid-certainties were NOT always the only possible outcomes!

NOTE: I feel I must, at this point, include an important aside! For years I realised the importance of Recursion, and, for me the establishment of that Abstraction was a decisive-gain. But, as with all Abstractions, it also constituted a kind of "pause", for whenever the appropriate circumstances occurred, the prior idea of

Recursion, immediately came to mind, and similar unchanged reasoning would proceed. But, it would only do so in the original way, in which that Abstraction had first been realised. Yet, the deeper significances of Recursion were still not yet understood: to get to that would require some new contradiction to arise, within that initial conception, and only in the resolution of that, would more be understood about Recursion.

Now, without any doubt, Hegel realised there had to be a great deal more to Contradiction than the correcting of mistaken premises within Classical Formal Logic. Originally, the more obvious concepts had, presumably, been arrived at individually, they were not considered as Dichotomous Pairs until Hegel associated them with impasses in Reasoning. They may have been noticed to be opposites, but for millennia had pragmatically been switched between, to use the one that allowed a continuation of Reasoning. Hegel realised that they were intrinsically-linked in the Nature of Thinking, and actually sought-out many such opposites to currently employed concepts, to deepen understanding of what was being studied. He often considered both-of-these, in a given situation, to see if doing this pointed towards possible changeovers between them. You are doubtless aware of the consequent tenets!

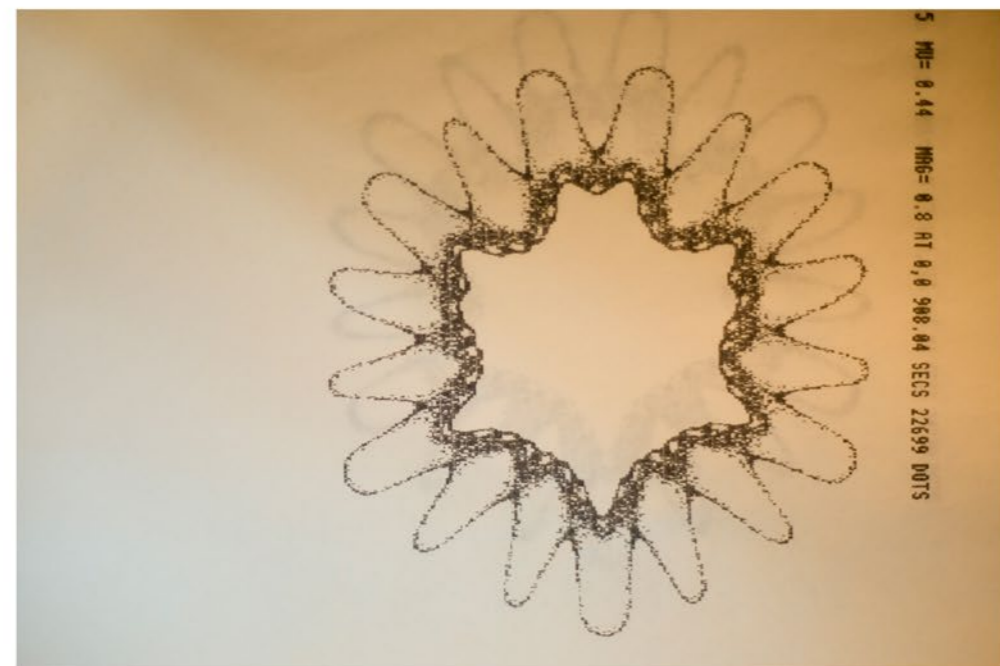
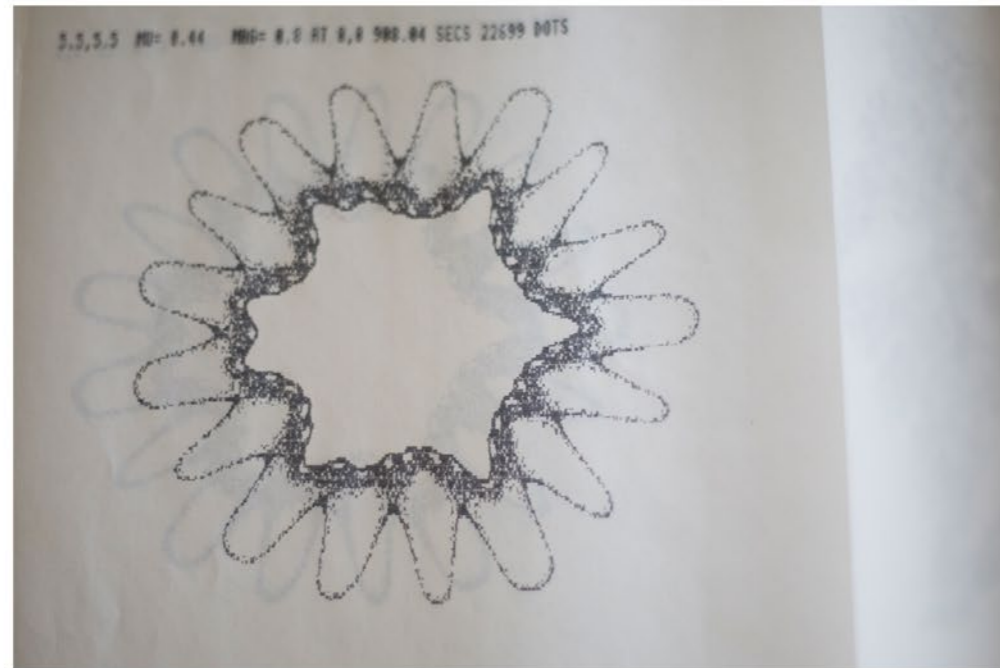
Extremes Meet!
Quantity into Quality!
Thesis-Antithesis-Synthesis!

The so-called Dialectical consideration of such situations can be profoundly informing, and something of the switching between opposites began to be understood. Qualitative Change was certainly beginning to be addressed! And, a great deal of rhetoric could actually be dismantled, that previously had just been an on-purpose use of contradiction to "prove" a point!

But, the "biggy" was still to be addressed: and it wasn't really carried through until Karl Marx transferred Hegel's Dialectics, wholesale, into a Materialist Stance.

All these things happened in concrete Reality as well as in Human Thinking.





Chaos and Stability

A Holist Approach to Studying Reality

Having spent a great deal of time in the 1980s assisting a mathematician producing Chaotic behaviours, graphically, from Non-linear Iterative Equations (see images on the left), I got something of a feel for the area, particularly in using Van der Pol's equation (in derived, iterative forms) to emulate a beating heart, and producing therewith both Fibrillations and Heart Attacks by particular minor adjustments to the given forms. Unfortunately I had to move elsewhere, as soon as I had delivered what I was asked to do, as it wasn't my research, and I had only been included to contribute my skills as an expert in Computer Graphics.

Much more recently, I have been seriously investigating Stability in general, and its crises and its ultimate collapses, in many different areas of Reality, BUT mainly from a purely philosophical standpoint, and have finally been able to deliver, thereby, a suggested Theory of Emergences.

And it was in these conclusions, wherein stable situations (indeed seemingly-permanent Stabilities), at first totter, and then finally actually collapse into total dissolution, but, in so-doing, deliver previously-unavailable conditions, which, entirely-of-themselves, creatively build up into a wholly new Stability.

But, none of this took the now-usual mathematical route, so I originally did not link the two areas in my own work.

However, after managing to describe in detail what actually cause Stabilities, and even what then, at some crucial point, makes them begin to dissociate, I realised the resonances with my earlier contributions

in Mathematical Chaos, and, of course, also with all manner of real-world major transformations, all the way up to even their applicability to Social Revolutions.

Clearly, both areas, when treated primarily scientifically, via Physics (and not Mathematics), were actually about the same kind of systems-phenomena, though at very different levels of Reality, and diverse rates of transformation.

I, therefore, decided to return to my old mathematical stomping ground, but with new eyes and means!

Of course, as is always the case with seemingly significant contributions from Mathematics, they usually originate for very different, and often purely pragmatic reasons, as "merely formal means-to-an-end" - what are often termed as "frigs", and frequently use the intermediary of the Geometry of Graphs.

[see *The Myth of Graphs* by this author]

But, though such manipulations are valid within Mathematics, they reside only in Ideality (the World of Pure Form alone), they cannot properly be directly transferred to Physics - a Science of *Reality*, without requiring good causal justifications. NOTE: I cannot do full justice to this important point here: for it requires an extensive explanatory treatment. But, it is so prevalent in Modern Science that it will have to be undertaken fully very soon.

But, what must be tackled now, if the revealed connection, mentioned earlier, is to be investigated properly, boils down to:-

“Why do iterative forms derived from normal formal equations, reveal more of Reality than those original equations?”

Why should the iterative forms derived from Van der Pol's Equation (when applied to the beating heart) deliver instabilities like Fibrillations and Heart attacks?

The questions turn out to be vital to a holist scientist, but perhaps not a mathematician!

And, it must be because in addressing Qualitative Change, instead of just quantitative changes (embodied in a fixed equation), it involves the whole dynamic trajectory of the actual initial achievement of a persisting Stability (where formal equations then work), followed by its crises (fibrillations?) and ultimate collapse (heart attacks?) - where iterative forms can be made to deliver something invaluable!

Now, any initial muse must include the fact that iterative forms do not, and indeed cannot, deliver adjacently-connected-sequences-of-instances. Instead, one known-instance, substituted into the iterative forms, takes us to another, usually distantly-situated instance elsewhere in its probability space. So, though a “Graph” can be built-up, by such repeated use, it ultimately “involves” visits to all-parts-of-the-possible-instances, in arriving at that overall description. This seems to indicate that at least something from “all-parts” is included into all the generated points.

Let us be clear what is happening with the iterative method! The iterative forms are often only those derived from the usual formal equation, so those relations are certainly involved. But, the inclusion of instances from all parts, allows as well, something of those diverse conditions, to affect things too: conditions from diverse parts of the possibility space are constantly involved! Clearly, the very-same idealised equation means something different in different parts of its possibility space, and this can be indicated via iterative methods.

NOTE: It reminds me of the work that had occupied me, for an extensive period of time, in delivering reproducible-and-studiable movement in Educational Dance Multimedia, wherein a real moment-of-a-movement was totally unavailable within a given Still-Frame, yet brilliantly available in an analogue Video-Frame.

It was because instances from the whole of the one twenty-fifth of a second of movement, were available interlaced in the video frame, and this allowed the observer's brain to actually *grasp* the movement, almost as it does in directly-observing actual movement in Life.

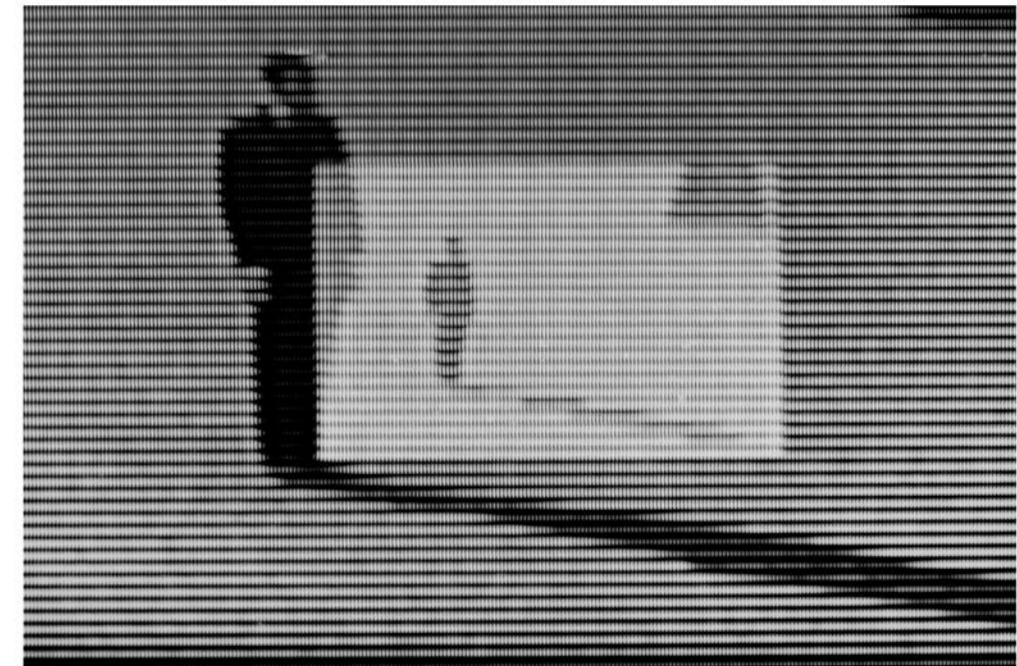
Clearly, these experiences are causally linked: and though it doesn't mean that, in these cases, the full truth is delivered, just as with the human brain being able to reinterpret the mixed-dual-field information of a single video-frame, so it can also get something of Reality from the formally-mangled processes of mathematical iterations.

Indeed, the most profound realisation, for this scientist, came from reading the Loka Sutta, an account of what The Buddha had said when dealing with perception of Reality. The most profound structure in his account was the absolute necessity of Iteration. Instead of perception being a merely linear sequence of stages, it involved repeated recursions at every single step. Every result was repeatedly re-introduced to the very question that was being addressed: it was essential!

Now, this doesn't solve the problem generally.


It has merely revealed what happens, and why, in particular cases. For, the solution found in delivering Dance movements appropriately, or in revealing nascent instabilities within an apparently stable process like the beating of a human heart, cannot be generalised: they are particular solutions made possible by a holistic view - often revealed by a relatively long-winded process of revelation, which turns out to be greatly superior to the short-cut of fitting an idealised mathematical form to carefully-farmed circumstances.

Clearly, many more such holistic successes will have to be revealed before this can be encapsulated into a generally-applicable holistic approach.



Evidence of Time Travel by John Karborn





There are many examples of fractal-like forms in nature, but what can we really infer from this?

Chaos in a Holist World

What are the implications of Mathematical Chaos for concrete Reality?

Sadly for the formalists, it certainly isn't Fractals!

For, they really only come to fruition in Ideality – the World of Pure Form alone. No, I am talking of the inferences of such an approach in the real, concrete World – for Reality.

So, let us demolish a particularly debilitating assumption, which, heretofore, has led us to misinterpret Reality via solely formal or mathematical means, and hence has totally hidden its real Causal Nature.

There are two opposing principles, on which to assess what is actually going on in Reality. The current favourite is Plurality, but there is also its usually rejected alternative is that of Holism. The key asset for formalists, in Plurality, is that it sees entirely separable Natural Formal Laws as the motive forces of all of Reality's phenomena. And, this means that such Laws can be both isolated and extracted, to, thereafter, be used one-at-a-time, or in a sequence, to produce anything desired, as long as all the necessary Laws are in our hands.

It is the basis of Analysis, and hence also of Science itself.

But, its opposite alternative, Holism, rejects such inferences, and inverts the causal relationship – insisting that multiple, simultaneous factors actually and always modify one another – relations are NEVER separable from their concrete context. For, to do so makes them eternal and unchanging, and this is simply untrue! It is always the effects of the full set of present factors, upon each other that deliver the seen results, and as that context is varied and selectively changed, so also will be the overall effects.

Indeed, the “ideal” of so restricting and maintaining a context, so that a targeted relation is clearly revealed, does NOT deliver an eternal Law, but, on the contrary, the Law applicable in that precise context alone. It is an arranged-for simplification, and ultimately also an idealisation of the sought for Law. But, because of the Principle of Plurality we turn it into an eternal Natural Law. It certainly isn't that!

Put simply, the “Law” is not the *creating* relation, but the *created* relation, and each one only holds, as such, in the very conditions in which it was isolated and extracted.

Let us reiterate what has been established for the alternative holist position.

No Law is eternal: it is, in fact, simplified by the arranging of appropriate circumstances, then idealised by the fitting up of a formal relation from Mathematics, and only thereafter seen (incorrectly) as eternal.

Now, what has all this to do with Mathematical Chaos?

The answer is that the above revelations are extremely significant! For, idealised relations are tailor-made for a determinist standpoint, and deterministic equations are the results of that same stance in Mathematics.

What Mathematical Chaos does is to push situations away from strict determinism into the areas of possibility directly adjacent to the strictly determinist pure “line”.

The phenomenon's Possibility Space is extended.

Now, as it stands, currently, Mathematical Chaos, as it is conceived of by the mathematicians, certainly does NOT address that constituency in any knowing way. It merely plays with it in Fractals, for example!

Mathematical Chaos and Reality

But, in fact, though enabled by the use of iterative formulae - themselves derived directly from deterministic equations, it actually moves from each known state, in the possibility space, to a new state, which is certainly NOT necessarily upon the determinist line. The method of using these formulae brings in, with each iteration, a series of near-the-line adjustments.

When you think about it, it is precisely those areas that a true holistic approach would be forced to include, due to its stance on inevitable mutually affecting changes which would be ever-present, even in an apparently stable situation, so the near-to-the-line possibilities would always be being included at some time or another.

So, there you have it!

Mathematical Chaos, if philosophically and scientifically pursued, could throw light upon the real, holist World.

Do you fancy some really important tasks?

NOTE: Once again, such postings as this can only scratch the surface of what is involved here. Much more detailed arguments have already been written, and the first of two Specials on Mathematical Chaos and Holism is currently available on the SHAPE Journal.

So, what on earth are Mathematical Chaos and non-linear equations really about?

We are pressed, these days, to consider that these extensions to Ideality (the World of Pure Form alone, and the realm of Mathematics) are actually about “qualitative changes”, and are the means by which transitions between forms occur, or are even the “source” of the seemingly “new”!

For, the rigidity of Mathematics has been realised, and several attempts have been made to introduce (or maybe only smuggle-in) some real qualitative change into that system.

It was tried before with Eric Thom’s Catastrophe Theory. But, it wasn’t successful then, and it isn’t now! Quantity into Quality isn’t an explanation: It is merely a non-explaining description!

The whole context of the discussion is entirely pluralistic, and thus sees everything as merely increasingly complex sums of eternal Natural Laws.

So, what is unique about this new area of Mathematics? It includes powers of Rates of Change in its equations, and terms them non-linear, and it also frequently resorts to iterative forms, and these two take the action to the very edges of this formal World, close to where it breaks down completely.

We must never forget that Mankind’s purpose, in tackling Reality, could only ever be achieved, in the initial attempts by significant simplifications of the area of Reality under study, along with quite major constraints imposed upon it to simplify what would be, first, clearly-observed and then extracted.

So, what was special both, in these new extensions, as well as, in the more generally applied simplifications? To answer that question we must “think physically” – that is we must address phenomena in terms of their content, properties and causes.

Let us start with iterative equations!

Though these forms are based upon the usual formal equations, they are used in a very different way.

Starting from a single known “point”, where the values of all the involved variables are known, and then, by substituting those known values into the iterative forms, we get another single derived point.

And, thereafter, to cover the whole range, this process must be repeated, time-after-time, until a “full set” has been determined.

This is very different, indeed, from the usual use of the formal equations, which can deliver all points over the whole range. The user then is never located at a particular viewpoint: it is a single, overall view! But, in iterative-uses that is no longer true. The user is always situated at a “known” place in the range. The trajectory of positions is generated by each position that is arrived at by each and every application of the iterative forms.

In an artificial way, the user is taken on a journey about the whole area of applicability. Indeed, the action zigzags about, and does not ever deliver sequential, adjacent points.

And this alternative “exploration” actually delivers a “different” landscape. Though, from a series which looks initially very similar to the usual sequence, such a succession of iterative steps often moves things away from the usual pure form, to describe some very



surprising detours and curlicues: we do not get the usual forms at all! And, when it comes to powers of rates of change, we have to ask, “What can such terms mean, physically?” Surely, such things conflict with the idea of eternal laws – for they are clearly modified depending on from-which-direction we are approaching a given state? Though derived from a pragmatic trick, iterative methods do seem to imply that prior situations contribute to subsequent variations in the effects of the formulae.

As mentioned earlier, this researcher has been involved in such investigations before. In the early 1980’s, he was working, in Glasgow, with the brilliant mathematician Jagan Gomatam, who commissioned him to write computer programs, which investigated graphically, several non-linear equations, which he had turned into iterative forms, and they produced some very interesting results.

The most revealing were scenarios, in which the steady beat of a formal-equation-determined model of the human heart, was instead pushed inexorably, with every iteration, both into instability and, sometimes, into total breakdown. Clearly, the “eternal forms” of the equation used (that of Van der Pol) could never have revealed such failures: it would be limited ONLY to the stable-situations delivered by an idealised version of what was really happening.

Yet, even there, this researcher’s own subsequent investigations took things into a wholly new area, for he allowed the actual variation of the constants in the iterative equation, and this actually pushed the forms beyond Plurality, into something similar to Holism, for the equations varied all the time (though I don’t believe that what he did extended pluralistic studies into holistic ones). They were still too quantitative to be that.

But, elsewhere, the beginnings of a study of Qualitative Change and Development has been more rigorously pursued, but it looks nothing like Mathematics!

Mathematical Chaos, like Catastrophe Theory was just another dead end. It attempted to deal with Qualitative Changes, without departing from the eternal, and idealised, laws (even if they were mangled somewhat).

Mathematics can only ever be about unchanging Form.

It is invaluable when things don’t change qualitatively, or are purposely kept that way, but to address real qualitative change and development as it happens in Reality, solely in terms of Forms, is wholly inadequate to the task.

A very different approach has to be undertaken, which tackles the most difficult areas in Reality – the Evolutionary Changes of Reality, to make levels such as Life, Consciousness and Society, and its trajectory involving both periods of Stability (the realm of Plurality) and the episodes of significant Qualitative Change (revolutions).



Holistic Iterations

A Glimpse of Scientific Methodology for Qualitative Change?

The grave weakness of strictly bottom-up Causality (and its usual defining ground – Plurality), is that its determinations (conceptually, at least) tend to flow only upwards – from lower cause to higher effect!

Yet, in spite of this clear restriction, we can, nevertheless, erect some finite, multi-stage sequences of cause-and-effect that do indeed reflect something-of-Reality, and which we term Reductionism, with a genuine approval of its usefulness. And, we can even consider multi-strand, simultaneous complexes of such causal chains, though entirely without either top-down or even lateral causal effects between them, for, we are often hard pressed to model such situations effectively.

So, with Plurality as a basic-and-unquestioned Principle, we cannot really consider much more than expecting merely repeating, unchanging cycles, when Iteration is introduced into our schemes.

In fact, the original and soon widespread employment of such techniques was generally only considered to be as purely-mathematical-frigs, to merely get closer to the solution of difficult equations, and therefore possesses absolutely nothing concerning the possibility of a more accurate means of explaining something of Reality as it really is!

Indeed, with those algorithmic methods, as are the norm in computer programs, our attempts to model many difficult and unavoidably-holistic situations (by the usual means of pluralistic Simulation) abound with such iterative cycles, which, when used alone, are always infinite, and therefore have to be artificially (rather than intrinsically) terminated, when indicated as necessary, by

some sort of regularly applied accuracy-tests.

[The Achilles and the Tortoise example in Zeno's Paradoxes always looms large in such methods involving infinite processes with finite results]

And, apart from their use as described above, they can also figure in our thinking of more complex natural situations in Reality too.

The basic conception of such techniques involves many such cycles, and as something similar also happens in the World at large, to get closer to what actually happens there, another invented (though this time a conceptual) frig has also had to be smuggled in.

This involves tiny (often merely random) changes in such cycles, which deliver a kind of “incremental drift”, and this is deemed to finally topple the system over into a new form. By such means, therefore, we “bring-in” Qualitative Change as a consequence of purely quantitative increments.

It can be made to “fit”, but it is always a continuing process, terminated by an immediate and inevitable switch, which has been experienced previously, and then linked to a key parameter passing a given threshold value. So, it is, of course, merely a simplified model of what actually happens - a pragmatically organised event without any explanation.

But, it does NOT involve those absolutely necessary *Crises*, which can go one-way-or-the-other, and can even culminate in extended, and accelerating revolutionary transformations. For such, by their very nature, break all

of the above described reductionist sequences, and instead precipitate a cataclysmic dissociation, and a following, and indeed a totally opposite, “creative” phase, which can never be predicted from pre-event circumstances.

But, the usually applied form is an assumed model, and is qualitatively different, in that it merely accumulates to a quite natural transition point, validated by previously seen evidence, but neither understood nor explained.

And, even if our conceptions go a little further towards the actually occurring Transforming Event, they can only see the evident dissolutionary crisis maturing, never getting to the following tumultuous interregnum, and consequent change to a higher unpredictable Level, which always completes such an Episode, when it is successful.

So, it is because of this myopia, that we promote the Second Law of Thermodynamics to such an exalted and primary position, in our view of the World, and substitute “Mere Chance” as the reason for any contrary-yet-true following progressive developments. And, without any real understanding of such Emergence Events, real Qualitative Changes can never really be explained.

Now, this theorist has, after a long study, conceived of an all-embracing *Theory of Emergences* (SHAPE Journal Special No. 1 in 2010), which sees two opposite processes involved in all Qualitative Change, which always occur within these short, revolutionary Episodes. But, it is, admittedly, a very general conception, and is certainly still packed full of many of our pluralist past-methods. So, it is by no means the last word on such ideas. It is, on the contrary, only the very first word, in a

wholly new approach, for it takes all such episodes, in all circumstances, and occurring at all Levels, as Events of a similar nature.

And, to find a Common Form to cover everything from the Emergence of Matter, to that of the Origin of Life on Earth, and on even to Social Revolutions, is clearly too wide to be anything but an attempt to define a new and sounder look at, and philosophical basis for, Qualitative Change in general.

The initial point made in this paper, concerning our many attempts to model Reality, and our various pluralist methods, has to be comprehensively addressed, not merely from the correcting of our overall view of how things are statically, but also in the detailed processes of actual Creative Change too. To shoehorn all changes into quantitative methodologies such as The Calculus, is not only too restrictive, it is essentially incorrect too (as was proved (inadvertently) in the book “A Certain Ambiguity” by two Indian-American mathematicians Gaurav Singh & Hartosh Singh Bal (though their aim was the very opposite)!

By our current methods, we always impose a “contrived stability” (based, it must be admitted, upon actually occurring Stabilities in Reality), but always deliberately omitting the crucial factors and processes, which are the only possible sources for real Qualitative Change, and also how these necessary interludes of Change are precipitated.

Yet, though all these criticisms are true, they are not the only type of conceptions occurring in the thinking of Mankind. Now, though certain major areas seem to

be totally beyond redemption (such as Modern Sub-Atomic Physics for example), there are other areas, which are unable to avoid dealing with Qualitative Change throughout! These are, of course, the disciplines concerned with Life, both in the physiological aspect and the medical aspect, for Qualitative Changes are everywhere and absolutely crucial. And, even what might be considered mere mechanistic areas, where Physics, and its shortcomings, would be expected to “Rule OK!”, the longer time periods of Geology and Cosmology are also areas, where it is the explanations of Qualitative Change that are paramount.

Now, the newcomer to Science might well be perplexed at what seems to be a reprehensible set of damaging assumptions, which have seemingly misdirected our forefathers in the pursuit of the Truths-of-Reality. But, these were not only understandable, but were also totally unavoidable, because Reality is dominated, most of the time, by long periods of Stability, where our chosen assumptions are not far from what is actually occurring. We therefore quite naturally, and indeed properly, concentrate upon the commonest and easiest areas to study.

So, as the proliferation of disciplines that have to address real Qualitative Change has occurred, we do have areas to study to perhaps extract a very different methodology to what we have come to call the Scientific Experimental Method. For, that has been the source of many major mistakes.

Even within Stability, the true Holistic Nature of Reality made it almost impossible to actually extract previously glimpsed, and quite evident contributory relations, and Man could not even commence with what we term Science, until he could “hold still” a defined locality sufficiently to clearly reveal, and then enable the extraction, of, those formally-only-glimpsed relations.

Science, as we know it, was therefore founded upon the creation of Controlled Domains, and the aforementioned methodology is entirely limited to those alone. In experiments to reveal relations, the scientist must first isolate an area, and, within it, control all the major current factors involved. With nothing but experience and skill, the good experimenter can construct an appropriate Domain, and only then will the required methodology, which can allow the measurement of a selection of now clearly-visible, related factors, while holding constant or

suppressing others, to deliver the sought-for relation, via an artificially constructed Stability!

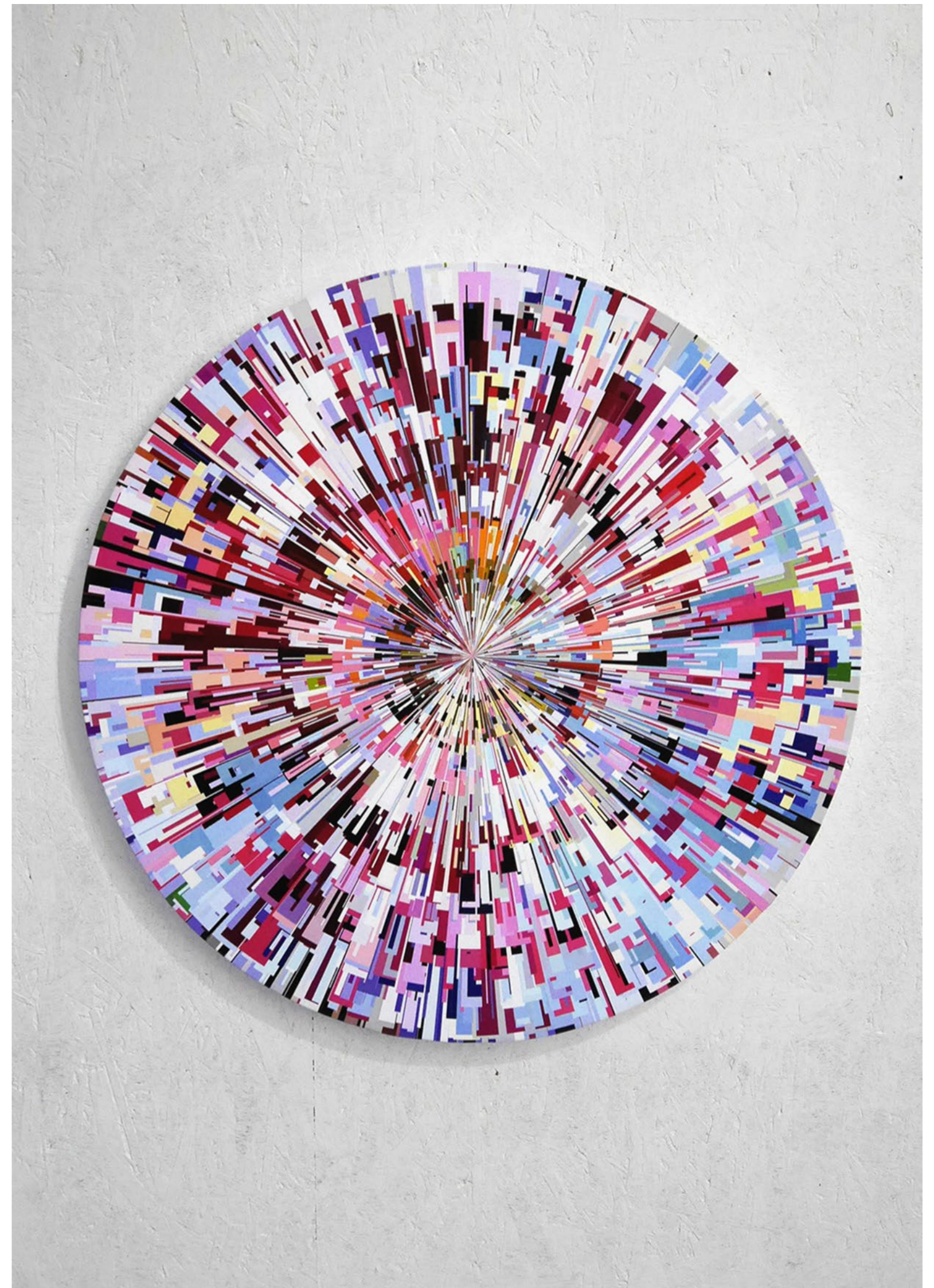
Now, I absolutely insist on calling this (the usual experimental methodology) - *The Pluralist Method of Experimental Science*, because it assumes the Principle of Plurality to justify its approach, as a sound method for extracting “really existing” and “entirely separable” relations from the confusing mix that is the norm in Reality-as-is. Hence, if we are to criticize this approach and replace it, we must be sure of our ground, while, also, replacing idealistic Plurality with real Holism.

We need a Holistic Experimental Method that is not solely based on these Domains and analytic Plurality.

Now, as is always unavoidable, when preparing for a revolutionary change, we have to address all the above features both of Reality, and of our usual assumptions and methods. And though we can lay out (and Mankind has many times in the past) an alternative Philosophical Standpoint, we must give a great deal of attention to our basic conceptions and consequent assumptions-and-methods, at the level of our interactions with, and consequent conceptions of Reality.

Thus we must address what was suggested at the outset of this paper. Let us first repeat what is necessary.

1. We must recast our Thinking to see Reality as Holistic.
2. We must remove the incorrect assumption that what we find (in pluralist investigations within constrained Domains) are truly separable elements in Reality-as-is.
3. We must, when dealing with Qualitative Change, realise that it cannot be adequately addressed by our usual pluralist methods.
4. We must admit to, and then study, the actual interludes in which such Qualitative Changes occur – the so-called Emergences.
5. We must re-invent experimental methodology to cope with holistic phenomena.
6. We must study Emergence as it occurs at all Levels of reality to begin to realise its main common trajectory.
7. We must recast our thinking as Hegel insisted was



essential to construct a Logic of Qualitative Change (what he termed a required Science of Logic).

This isn't totally new territory for science. There have been holist scientists before! Darwin was one, as was Wegener, and Hunt in his discovery of cyclin in the cell divisions within fertilized eggs did indeed develop a new, time-based methodology, which could transform the way that experiments are conducted and interpreted. Indeed, Miller's wonderful holist experiment on the origins of amino acids in the primitive conditions of the Early Earth, though it was abandoned by his colleagues, because it could not deliver what was actually taking place inside his "Black Box" approach, could be transformed by Hunt's methods.

Only yesterday (15/05/11) in a TV programme on the work of an American professor who had discovered Angiogenesis – the eliciting of new blood vessel production by some kind of emanation from cancer cells into the host's surrounding tissues. He had to suspend implementation of clearly vital medical processes for most of the rest of his life, because pluralist chapter and verse was demanded by his colleagues.

Now, the reader might wonder about the title of this paper – *Holistic Iterations*. Why did I commence upon such a topic? And, have I revealed what I considered was involved? The answer is surely, "No, not yet!" And, this is because I am in no position to deliver such a thing, currently.

It is an objective, and not an already-cracked methodology. But, perhaps the foregoing has made somewhat clearer what needs to be addressed.

Our usual modeling, in simulations, can never deliver what really happens, for we do NOT reveal causality, we just insert switches based upon experience. We terminate our "still-pluralistic" iterations with threshold switches to new ground. Whereas the proposed Holistic iterations will do things, which never appear in our current mechanisms. They will precipitate dissociative avalanches, and consequently deliver the necessary ground for creative change. Are there any who relish such a task?

By pure chance, I was recruited by a superb mathematician Jagan Gomatam, to deliver for him computed illustrations of chaotic behavior via iterative forms of modeling of

the actions of the human heart. His objectives were, of course, mathematical! [Now, the legitimacy, of such an orientation, had been proved by his purely formal (mathematical) investigations into Reaction Fronts of chemical reactions in liquids. He demonstrated (and formulated mathematically) that these Fronts took the progressive form of Toroidal Scrolls]

But, in my purely "tradesman's hands", though I delivered what he required, I could not but be amazed and excited by some of the results that I found. Indeed, these iterative methods delivered real phenomena that the normal determinist equations never could. All sorts of aberrant behaviors were produced mathematically including Fibrillations and even terminal Heart Attacks. Now, such just had to be explained!

Clearly, chaotic iterative forms were directly derived from the original deterministic equations, BUT, and this is really important, those equations were not devised from measured data. They came from a functional theory turned into an equation! So, that source plus the methodology associated with iterative forms had revealed MORE than was available by purely formal equations. This has to be crucial!

Now, clearly such methods are still man-made techniques, but nevertheless the process – even though NOT exactly what happens in Reality, must have reflected aspects of that Reality, which were impossible to get by our usual means. So, iterative methods coupled with equations derived from Theory (and NOT mere measurements and formal patterns) had to be investigated to reveal why this was so.

NOTE: We couldn't only put it down to the Theoretical source, because the deterministic equation from that when used in the usual way DID NOT reveal these behaviors. It had to be coupled with the process of iteration to achieve that.

Clearly, there are distinct stages in our commitment to revealing Reality.

The first, assuming a strict Plurality, has delivered our equations-for-use in prepared circumstances, which though NOT what actually happens in Reality-as-is, did still empower Mankind to USE what he was able to extract.

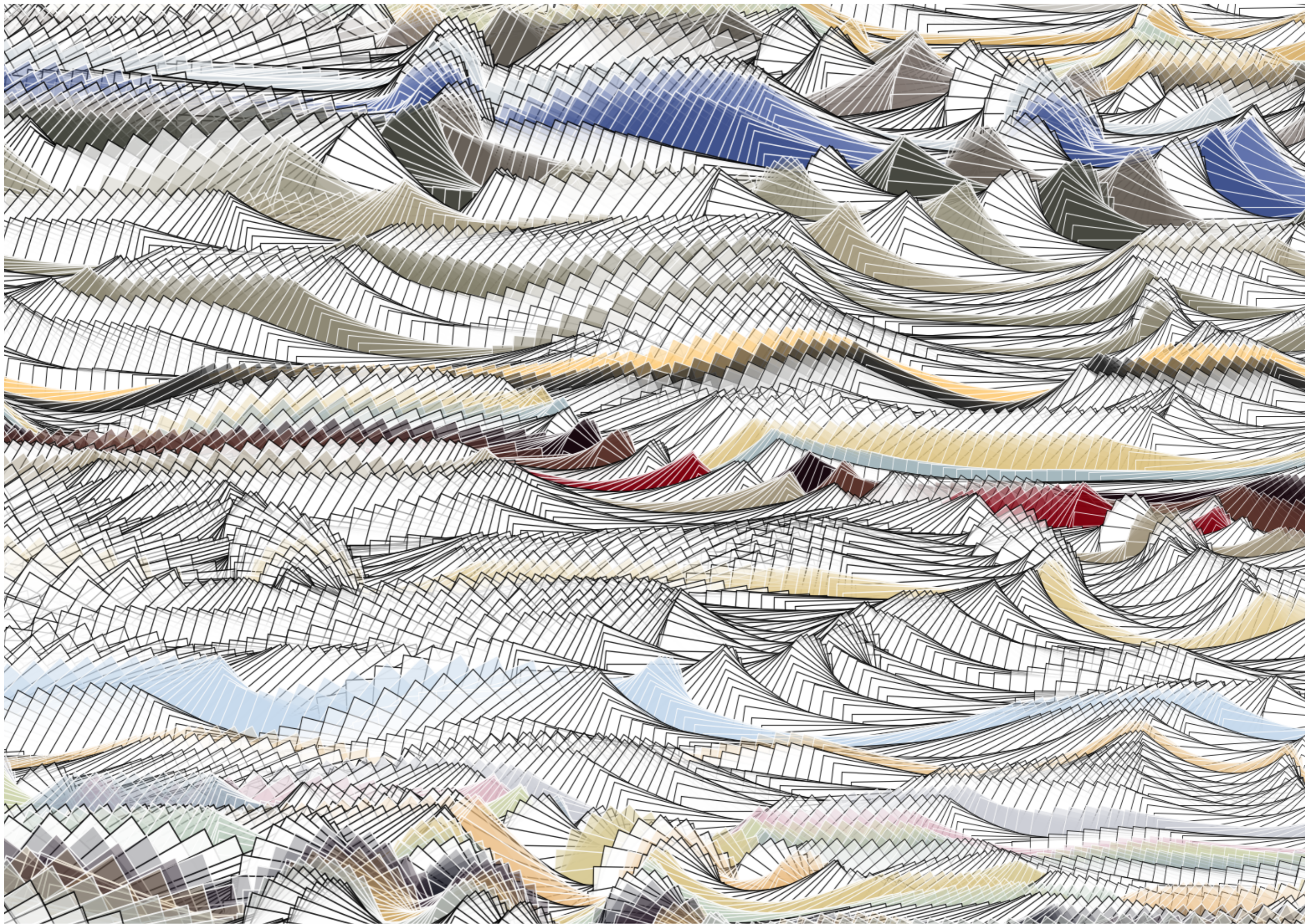
Next, we have Theory, which considers the actual causative factors in Reality and attempts, with the help of the equations based upon pluralist measurements, to formulate exactly what is going on, and why. Though, it must also be admitted that, sometimes, direct measurements are not available, and the equations may be directly-derived-from the theoretical considerations alone.

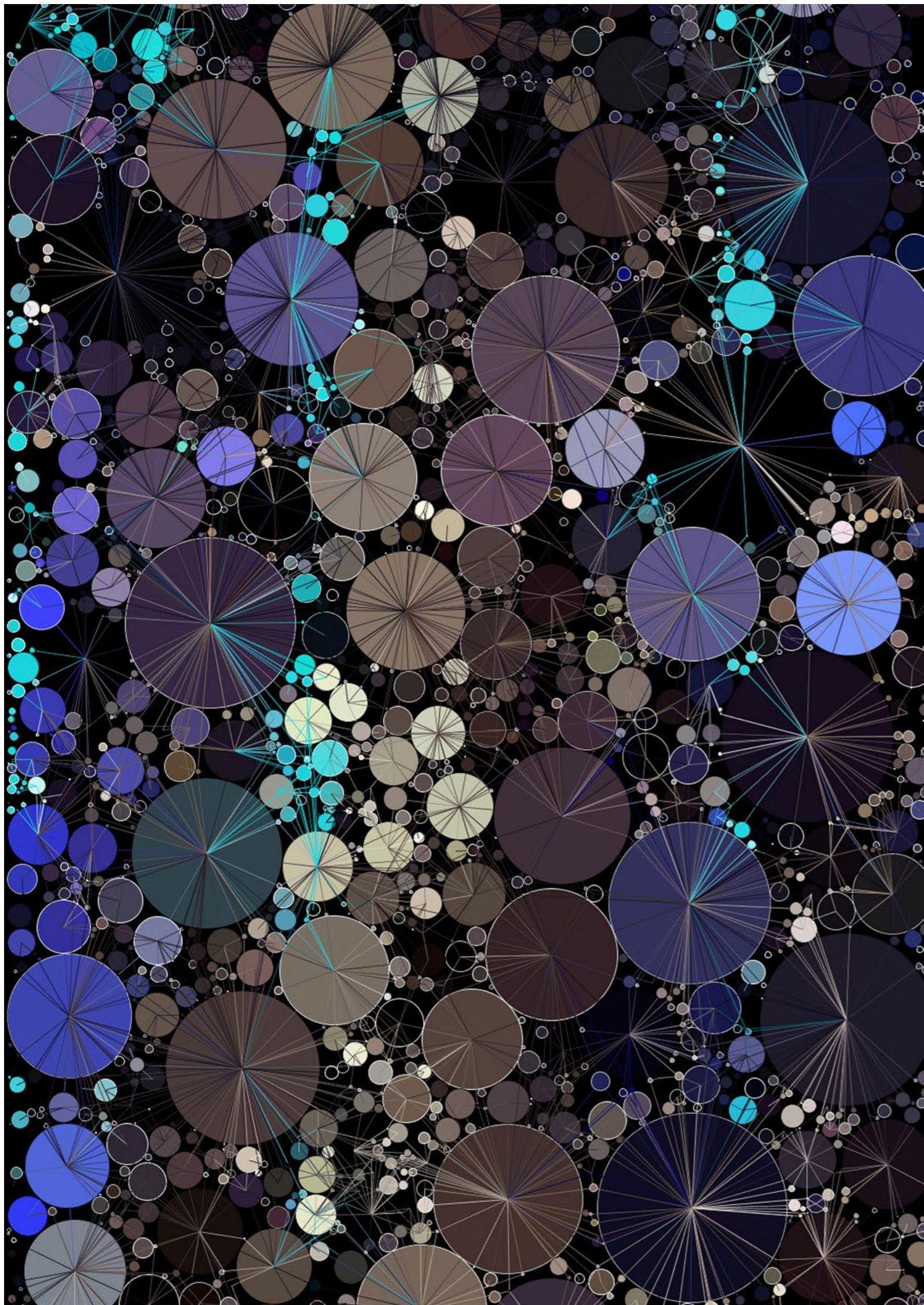
Then, finally, we have the usual iterative methods, which could get closer, as described above, and reveal further phenomena.

What had to be the-next-stage was a whole new, scientific methodology founded upon the above gains, but, at its heart, could only be a holistic alternative to Plurality.

Mankind had to address the true holistic nature of Reality, and devise a better philosophical standpoint, and a better experimental and theoretical methodology, to take things forward.

NOTE: Elsewhere, the first steps have been undertaken by this author with the redesign of Miller's Experiment [now published in SHAPE Journal].





An Iterative Form Direct From Data

Preface

I feel that I must preface the following paper with several clarifications.

First, the major objective is to consider deriving an iterative formula directly from a series of actually physically existing and measured positions of an affected body (i.e. its consequent trajectory), as it passes into an established field, (which though evident by its effects, is at present, unknown, that is with respect to its FORM.

Indeed, the objective here is the exact opposite to that in Mathematical Chaos, where the plotting of predicted positions is possible from a known situation, field and its already known iterative formula, or even as a frig to solve a difficult equation.

Second, we are aware, as holists, with the problem that circumstances could change, so that if we were to find our iterative form from only a few actually experienced positions, and, thereafter, used that to calculate the rest, we would be leaving out any new influences that will certainly have arisen from new positions.

NOTE: The sought-for iterative equation will certainly not be available after just a few points have been used. Any formula achieved cannot be absolute!

From the outset, we will be merely finding-a-form, which will only cover the data so far, and particularly with a trajectory in a field, early points will only give a simplified version of what is actually causing it.

Indeed, unlike the usual iteration formulae – always derived from a fully defined, straightforward formal equation, used totally unchanged throughout, our form will be regularly corrected for adjustments as we go!

So, though we could do that sequence of predictions, we would check their veracity by continuing to use the growing number of actual positions, and even re-evaluating the emerging iterative form.

Clearly, this two-pronged method simplifies the finding of the actual path, but also is constantly checking, and, if necessary, developing the iterative form.

Such unusual methods are meant as a contribution to developing a holistic experimental method (not alone of course!)

NOTE: A crucial feature of this method, if we can get it to work, will be that it will be the most accurate way of arriving at the actual trajectory involved. Primarily because it is using positional data - exactly as it is, without any simplification or idealisation whatsoever!

And, second, because it will not be limited to a single unchanging cause. Like considering only the Sun when dealing with the orbit of the Earth. Other contributions will be immediately included as they come into prominence, actually in the measured data.

Positions in Space

Let us imagine ourselves as a material body travelling through “space”.

We are aware of a pull upon our original trajectory, but we know nothing about what may be causing it. We can, however, establish all our positions accurately, and intend to discover our consequent path, by studying only our sequence of measured positions as we go.

This may sound odd compared with the usual methods and their assumed premises, but, nevertheless, it has a major advantage.

The data, that we will be using, is what has been caused by whatever is affecting us, and if we are regularly using them, with every new timed position, to find an iterative form to predict our next position, it will definitely always include ALL affecting factors (even wholly new ones as we move into different regions of “space”).

It may seem odd and difficult, but it is a holistic method, as distinct from the usual pluralist methods currently used.

NOTE: Remember that Plurality states that Reality is actually delivered by wholly separable and eternal Natural Laws, and, crucially, fits up simplified and idealised forms from Mathematics to measured points. Let us see what we get!

First, we evaluate our position, call it P1, at which we seem to have suffered some sort of gravitational pull, call it G1, in a particular direction, and call it D1. We know our own mass and speed, but absolutely nothing else.

NOTE: Presumably, as the thing that are affecting us will also be moving, so the pluralists, doing the usual kind of calculations, will have to use some kind of simulation to take into account everything involved.

And, as usual, make a series of further simplifications and even idealisations by using perfect forms from Mathematics. We, on the other hand, are using ONLY actual results!

After a decided-upon time, we arrive at a new position (P2), where we suffer a different gravitational pull (G2), in a direction (D2).

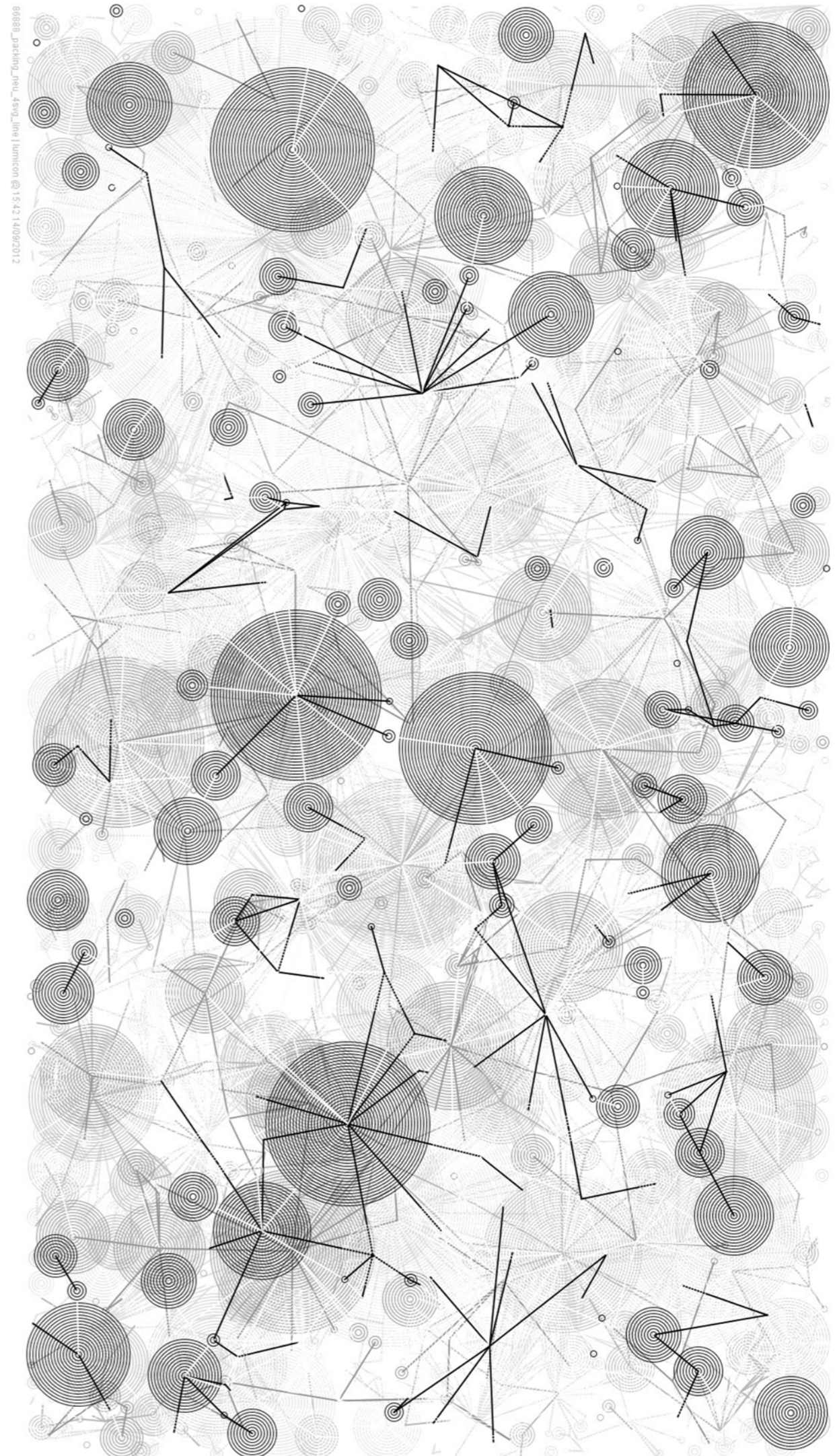
The question arises, not as is usual to assume, as an orbital direction, due to an already known equation, and a tailoring of that to fit the data – BUT, instead, as to how to use only our known and measured values to attempt to find a current iterative form – the prediction of P2 from P1, and the other measurements (notice that any derived form will change all the time: it will not be an eternal (as in Mathematical Chaos).

Now, such a form could then be used to predict P3 and we compare its prediction with its actual measured parameters!

Clearly, this is NOT Mathematical Chaos, and its usual forms and uses of known Iterative Formulae in that context. This is the entire other way round! We don't use a known iterative form: we are attempting to derive a whole series of them from real concrete data alone! Notice that the usual technique works out ALL subsequent positions from a single initial point and given iterative forms, in that area of Mathematics.

However, our objectives are exactly opposite for very good reasons.

Having, in the past, questioned my mathematical colleagues at length when I was using their methods to plot trajectories using fixed iterative forms, as to what these forms were, I discovered that they were based upon geometrical frigs developed to find alternative roots to required equations by purely approximate (and infinite) methods, that were only terminated at some decided



acceptable level of approximation. So, you have guessed it! The usual iterative techniques, with only a single initial point and an approximate, yet eternal, iterative form, will inevitably “stray”.

Yet, there is one redeeming feature of those usual iterative methods! The calculated next positions that such a method delivers are never adjacent to those calculated-from-position, so, subsequent applications will zig zag about gradually building a full pathway. In our case, on the contrary, we don't have an already devised iterative formula, but we do know successive actual positions.

That zigzagging about does take the process to very different areas of the overall pathway, and thus effectively takes evidence from very different areas to be used in the overall path, and this is what gives that method a measure of objectivity.

It is a frig, but it does include sufficient Objective Content within it to make it worthwhile! Nevertheless, the constant re-appraisal, of our iterative form, means that it isn't a necessarily approximate method, so every actual ne point is adding everything relevant that is embodied in its changed parameters. Though, it can be used to predict, it is also possible to be entirely self-correcting by this very different approach. If the producing factors are, themselves, changing, then only the new method will reflect that!

Now, such a method is particularly apt with closed pathways – such as orbits, for the regular re-deriving of the iterative formula, can be taken beyond a complete cycle if desired, which would not be possible in non-closed pathways, but completely possible in orbits (or even oscillations).

Now, clearly, the overall objectives of this method are to establish a viable, yet purely holistic, experimental method, which is no longer, compromised by the idealism of perfect forms imported from Mathematics. For, it uses only concretely produced results, so no built-in assumptions are involved. The only questionable part is, of course, how the iterative form is derived, but, as described above, even that can be addressed.

You may wonder why such a method as this is even entertained?

Well, if as we are certain, that Reality is definitely holistic, rather than pluralistic, every development isn't just obeying a supposedly eternal and totally abstract Pure Form, but, on the contrary, has multiple simultaneous causes, relies solely upon the actual measured data, with no “improving” arrangements, and this will guarantee that what we finally get, will include all the factors involved, even if we cannot explain them all!

It is the holist equivalent to Statistics, where the data, taken as a whole, delivers some overall Law, but our alternative is significantly better!

NOTE: Statistics requires stability to work, whereas our method deals with not only changing factors, but their mutually modifying interactions too!

The major problem, with attempting to develop an iterative form out of data alone, is that you have no general forms in mind.

As a physicist, myself, when presented with concrete data, presumably caused by some hidden relation, I use Difference Methods upon that data to reveal something of the sort of order of that “causing” relation. Once the order has been established, a general form can be derived. For example, if the difference method revealed that it must be a quadratic, the most general form would be something like $y = ax^2 + bx + c$, and by substituting into this general form sets of values of x and y from the experimental data, I would end up with a set of Simultaneous Equations in a , b and c , which I would solve to get the appropriate values of these three constants, to turn the general form into a particular Equation relating x and y – my actual “determining Law”.

The fact that I had a perfect general form of a quadratic relation is the classical mathematical, and hence idealist way, to turn my data into a Natural Law (in a wholly pluralist way)!

But, clearly, such means and tailoring shows clearly that ONLY the knowledge of the “perfect” quadratic enabled it to be a useful method, and the simplicity and perfection, of the form used, meant that the result could only be an Idealist solution, and NOT a real solution!

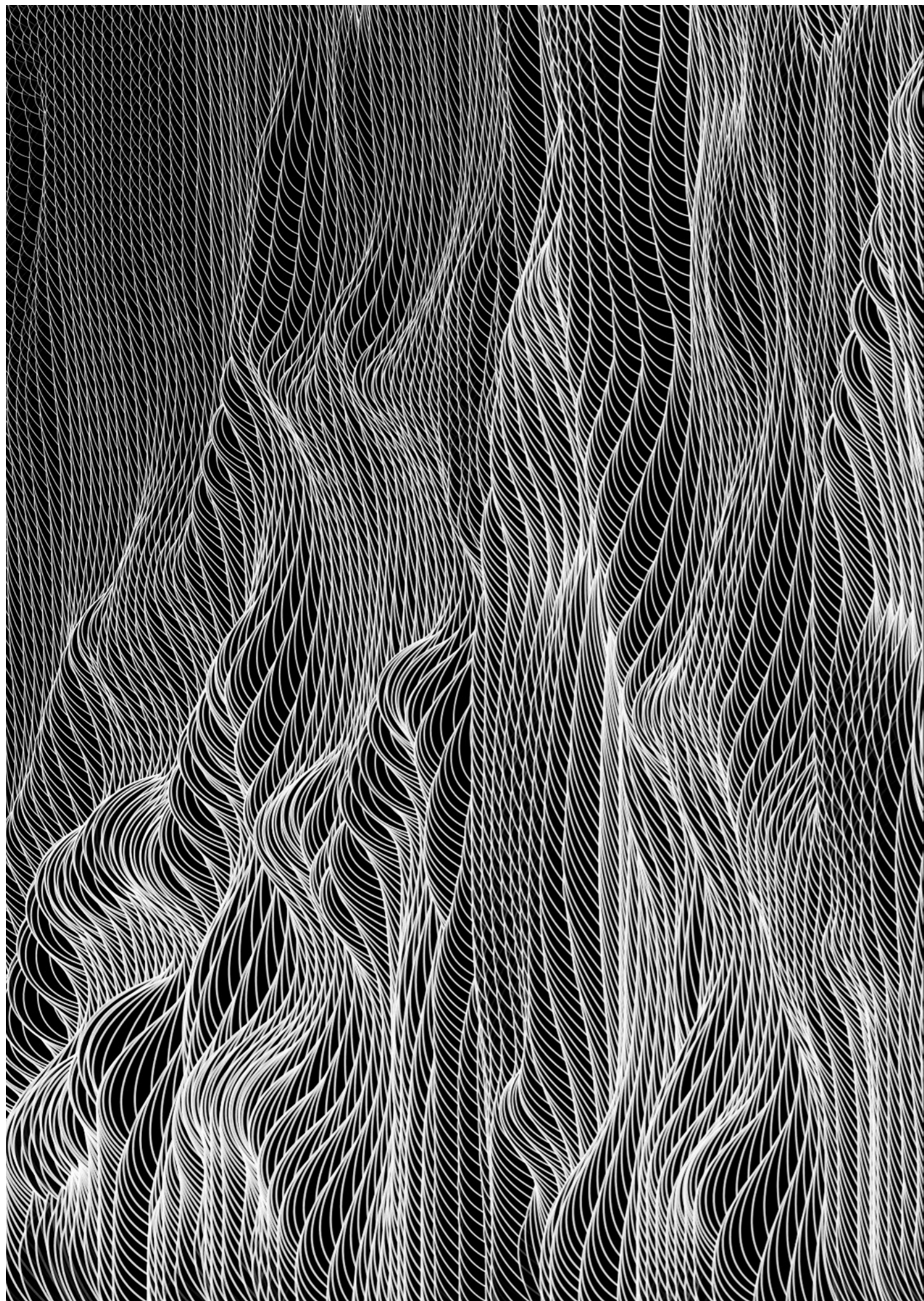
But, as my data played an important role, the acquired result, though both simplified and idealised, would nevertheless contain some Objective Content.

Pragmatically, that is precisely what we are doing with these usual pluralist methods! And, the self-applied nail in our own coffin is to, then, “legitimise” the method with the reasoning - “If it works, it must be right!” I'm afraid not!

It only delivers a clever, approximate solution, which does enable successful use of such an Equation, BUT ONLY if used in the exact same circumstances as were set up for the original experiment in which the data was acquired.

Such means are OK for prediction and production, if carried out in the appropriate straightjacket, but are highly misleading when it comes to Theory, especially in dealing with new or extended situations.

In attempting to develop a strictly holistic alternative, we are moving into a wholly new and better level, as it reflects the true nature of Reality as it really is!



A New Iterative Method

There is a key problem in attempting, as I do, to develop an iterative method, from a data sequence alone, especially if we attempt to do it without any assumed model for a relation supposedly connecting those data points, as is always the case in the usual iteration techniques.

For, without some sort of model, there seems to be no way of reflecting the factors that cause the trajectory revealed in that data.

Now, in dealing with this situation, it is essential that two things have to be made clear about the usual iterative methods.

FIRST, they always use an ideal form from Mathematics as a basis, which they then restructure into iterative-forms. Now, such a re-structuring involves a major transformation, because, it isn't merely a manipulation of the ideal equation.

It is the use of that formula in usually geometrically-finding a consequent set-of-forms, one for each variable, that use a single-known-point, and use it with these derived iterative forms to find another single point, and, thereafter, further points, each derived from its predecessor. And, the iterative forms so derived never change!

They are fixed, but their repeated-use always give new points, but always some distance from the "known" point used, so that the action moves rapidly across the whole range of the "driving" function's possibility space.

Remember, absolutely nothing new has been added to the original source equation, only-the-means-used to access the sequence of generated points, delivered one-at-a-time.

And if, as I am convinced, that original formula is NOT the deliverer of the sequence, but a simplified and idealised approximation, then all its short comings MUST inevitably be carried over into the iterative forms derived from it.

Now, the reader is certain to ask why do these forms sometimes deliver things closer to Reality than the original formulae?

It is indeed a fair question!

But, as the only significant change, in the actual plotting, has been the zigzagging-about the whole range of that ideal function, then that, and that alone, must be what is adding something extra, which can reveal something that was not there in the original idealised equation.

But, that method can surely only be some sort of purely-pragmatic-frig! It isn't taking us ever-closer to a definitive set of actually occurring situations, but just others in similar, but scattered general areas. They are certainly not due to the real physical causes (which are never even mentioned - this is Maths, after all!), but entirely to our chosen method.

Clearly, though pragmatically, it is only when our purposes can be at least partially fulfilled by such frigs, that we will use them. But, if our purpose is to understand WHY things behave as they do, then it can only mislead us in that valid, and indeed, necessary intention.

Secondly, there is the important point that current iterative methods are always pluralistic – just like the original equation from which the iterative forms were derived, it assumes the same additively arrived-at formal "cause"!

And, such will be, for the very same reasons, significantly misleading. No Real World phenomenon is driven by a single factor: the general situation will always include many different factors, and crucially, if a holist stance is taken, instead of a pluralist one, then these factors will all affect and, indeed, change, one another.

Clearly, absolutely NO other factors are included in the usual iterative methodology – it uses only ONE. So, what should be down to the mutual affects of all the factors involved, is instead friggged up by the usual method. And here it isn't the actual contributions, but something else that may deliver something "similar".

So, it is suggested that we address these problems, instead, by the use of Recursion, in addition to the use of *real* points, and absolutely none of the usual iterative methods of the past.

With each new measurement, we start by using Difference Methods (or something similar) to reveal what powers of variables are appropriate in the most general polynomial Model. Then use our data again, but now in the usual way to find the still unknown constants of that model.

So far, this sounds like something already used in the past, but there is a significant twist!

We do not stick with that form throughout.

Instead, we recursively do the steps all over again, including the next measurement made, and repeat the full set of processes, not only with this, but thereafter with every new additional measurement made. What will happen is an evolving form changing with each new addition.

Exactly what the most general form would be, may begin with the assumption of a polynomial. But, if the evidence is against that model, we could add further non polynomial terms. The crux of the method then becomes the comparison of a predicted location with the real measured one, and a subsequent judgement as to what changes in the adjusted general form might be required.

The original idea for this method was conceived of as the measurements being taken as the body in question was moving (as if we were the riders on a rocket in Space). But, of course, an extended set could be achieved, before any fitting up was attempted, and in some complex

circumstances, where many dominant influences could regularly come and go, for then this method will come into its own.

Indeed, the processes of the method could be carried out after the Event, and once sufficient had been processed to get some sort of form, all subsequent positions could be associated with its own version of the form. Also, each new, as yet unprocessed position would be predicted from the current version of the form.

Studying the varying forms could tell us more about the changing-real-influences fitting to an overall single form, and one that is both always simplified and idealised.

Postscript:

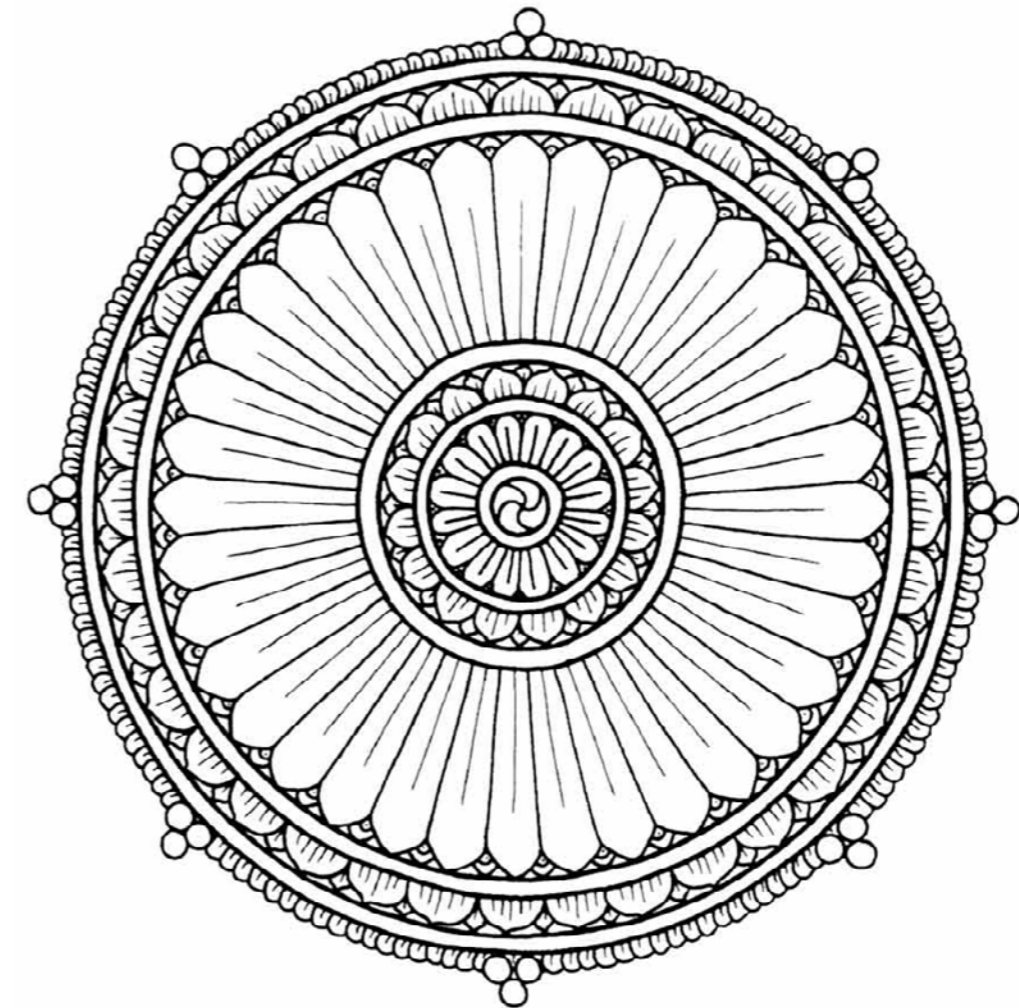
Now, the reader must appreciate that what is being attempted here is entirely new!

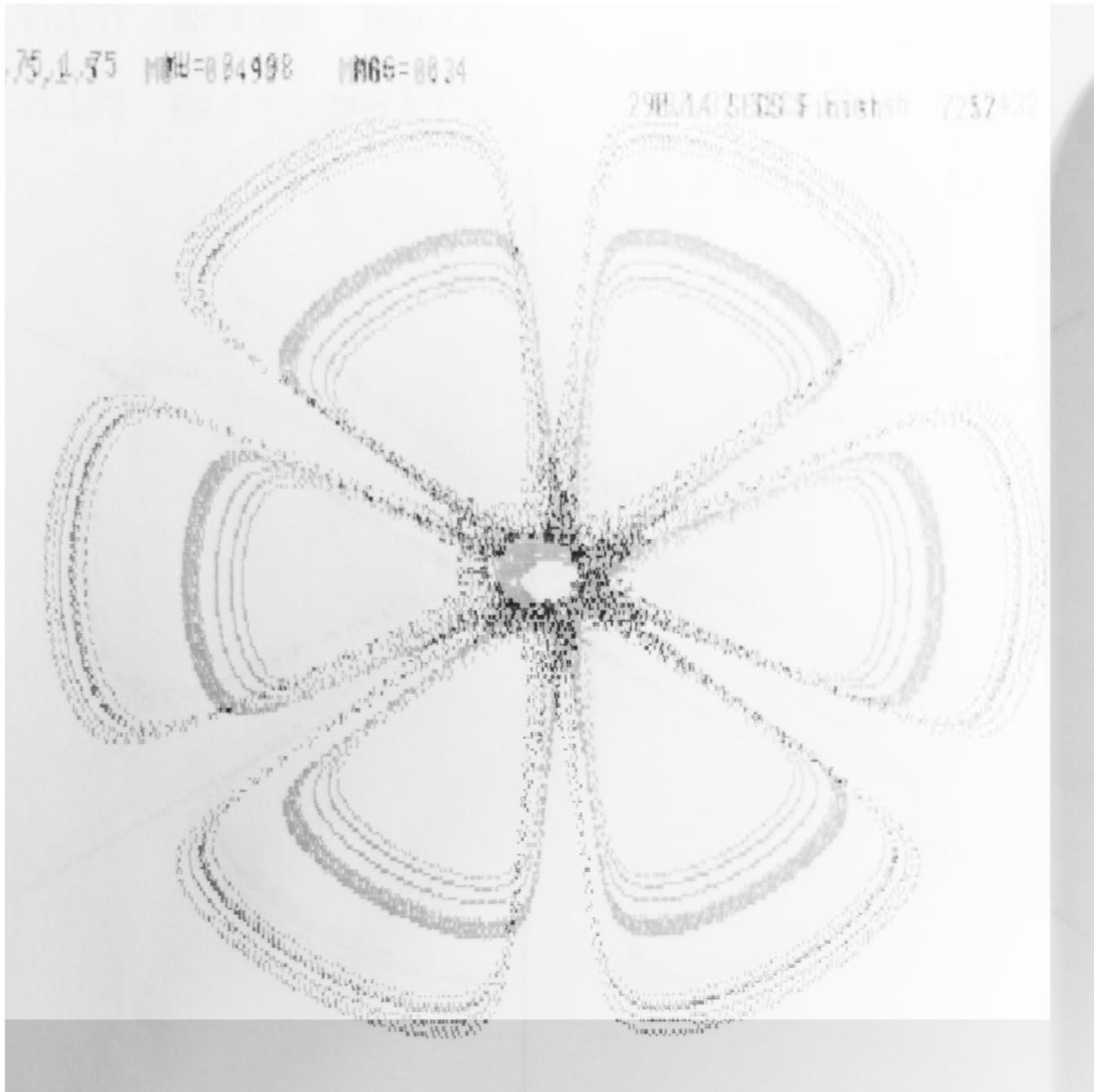
First, it rejects Plurality the current basis for such pragmatic manipulations.

Second, it is attempting to include aspects of Reality usually excluded.

Third, it is purposely recursive as in the Buddhist Loka Sutta, as a means of constantly checking upon its own validity.

It will most certainly NOT be the last word in this area: it will take us some time to break from "If it works, it is right!"





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