

Emergent Properties and Irreducible Wholes

There is an interesting concept that has arisen within the context of fractals, chaos dynamics, high temperature plasmas, Bose-Einstein condensates, holography, entanglement, consciousness research, and a broader framework proposed by David Bohm that attempts to encompass these and similar phenomena within the purview of an empirical inquiry into the nature of irreducibly whole systems.

I suspect this concept is becoming increasingly germane to the work Rossi is engaged in in that he cites the need to understand the Aharonov-Bose effect in order to understand what is occurring in the SK series.

The umbrella concept concerns emergence, and that all the emergent properties of a particular whole are only realized as the conditions necessary for their emergent evolution are achieved.

What is now known as the Mandelbrot equation is almost a hundred years old and has engaged mathematicians over the ensuing generations; it is a quadratic function that is employed iteratively in that the output of a specific calculation becomes the input value for the subsequent operation. When the initial value of <2 is fed into the equation all the products of this process fall below certain values that are expressed as positive and negative real and imaginary numbers; this iterative process was widely assumed to generate random numbers within a narrow range.

The Mandelbrot set, as distinct from the equation, remained hidden from view until the computer age when it became feasible to run millions and then billions and trillions of iterations of the equation and present this data in graphic form; at that juncture an intriguing hidden order emerged. The graphic representations at these high information densities revealed that the set is, as a whole, infinitely recursive, that intricate 'structures' are thematic across vastly different scales no matter how deeply you delve and that though the emergent image appears to be finite in space the length of the fractal boundary of the set is, essentially, infinite.

You can start with any value that falls within the set, as the initial input number, and reconstruct the set; the information that defines the set is distributed throughout the set, which is a phenomena common to whole entities.

An exposed holographic plate is directly perceived as an inchoate nonrepresentational maze of swirls and moire patterns, however when you shine a LASER through the plate an embedded 3D image emerges in space, for example a vase, that can be directly perceived as a complete 3D representation of the original from any angle excepting those interrupting the beam path.

When you shine a LASER through a tiny part of the plate the complete vase emerges in lower resolution. No matter which part of the plate is illuminated, and you can actually smash the plate to pieces, the complete vase will emerge from each piece, or location, when the necessary condition is met. The embedded information is distributed throughout the plate, as it is in our brains according to contemporary research.

Exposure to holography inspired an epiphany, to which we'll return, in David Bohm as the implications of embedded nonrepresentational nonlocal information who's hidden order could emerge under the right conditions sunk in.

Chaos dynamics postulates that dissipative structures will spontaneously reorganize as a whole when more energy is introduced to the structure, but that the threshold level and the emergent properties cannot be predicted prior to the threshold being crossed and the event of emergence transpiring. The SAFIRE project demonstrates this principle in the series of images of the plasma as it spontaneously reorganizes at progressively higher energies.

Bose-Einstein condensates were proposed decades before the conditions to produce them existed but no one postulated that one of the emergent properties is their ability to slow light down as low as a few meters per second, or that the emergent condensate would express as a single irreducibly whole.

The simplicity of condensates clearly delineates what is meant by an irreducible whole. On one side of the threshold condition there are a finite number of individual atoms each of which have properties well defined within our understanding of the periodic table and quantum mechanics, on the other side of the threshold these atoms have become a singular irreducible whole with completely different properties and this singular entity can not be defined by, or reduced to, the properties of its constituent atoms; the emergent whole can only be understood in its entirety and on its own terms of reference.

Einstein dismissed the possible existence of the phenomena of entanglement as improbable 'spooky action at a distance'; it turned out that he was incorrect when it finally became possible to perform a validating experiment decades latter. This validation presented a fresh conundrum when the emergent properties of entanglement became apparent; unlike any other known phenomena entanglement acts instantaneously, violating the principle that the propagation of information and energy in this continuum can not exceed the speed of light, without regard for the distance between the linked quanta.

Equally disturbing to the status quo is that no existing instrumentation can detect the modality of the information and energy transfer inherent to entanglement, nor can it be blocked from occurring by any currently known methods.

Quantum particles are scaled at one three billionth of the atomic scale; within the atomic scale there is no requirement to evoke 'virtual' atoms to explain atom interactions, at the quantum scale none of the interactions between particles can proceed without reference to 'virtual' particles that mediate the events between particles. Quantum mechanics as theory doesn't work without the concept of 'virtual' particles to bridge a gap about which we have no information as to process.

The conundrum this presents is of a piece with the issues raised by entanglement; while it is evident in the data that a process has occurred, and must be accounted for in a comprehensive explanation of the witnessed phenomena, there is no evidence, to date, that these processes are occurring in the continuum we know through contemporary science.

We have discovered, through recent experiments, that gravity propagates at finite speeds through this continuum even if we can't identify the mechanism involved and, inferentially from sparse data of the expression of Higgs bosons at CERN, that a ubiquitous invisible Higgs field probably does imbue fermions with the property of mass, by mechanisms unknown and currently undetectable, that gravity is postulated to act upon.

This catalog of known unknowns is of a piece with the subject of the Aharonov-Bohm paper that Rossi informs us is critical to understanding the conditions leading to the emergence of energies of unknown origin in the SK that lies at the heart of his current work. That paper stems from the experimental observation that a line of magnetic force effects the behavior of electrons that are located outside the boundary of the magnetic field generated by the line of magnetic force, again by mechanisms unknown and currently undetectable; in short yet more non local 'spooky action at a distance'.

Bohm's first notable work also ties directly to the evolution of the QX and SK series Ecats in that its subject was his observation, while a graduate student under Oppenheimer at SRI, that the electrons forming the plasma in an operating vacuum tube behave as a single whole entity rather than as disparate individual fundamental quantum particles. The resulting paper attracted the attention of Einstein whom Bohm worked with at Princeton for a number of years.

The epiphany Bohm experienced, while contemplating holography, was paradigmatic in the profound sense that the Copernican revolution didn't change the accumulated body of observations of the cosmos, it reinterpreted them in a way that completely changed shared reality by reframing these observations in a way that had greater explanatory power.

The earth had been assumed to be stationary while the visible cosmos circled around it in periodic fashion, Copernicus demonstrated that the earth revolves around the sun, as do the other planets. This reframing of the data resolved a number of anomalies that had plagued astronomy up to that juncture, and it was the critical first step towards an empirical understanding of cosmology.

Bohm's recognition that electron plasmas had to be understood as an emergent indivisible whole with unique properties that could not be reduced to the relationship of its constituent parts is foundational to the body of his life's work. The step that really upset everyone was a reframing of the extant data about the nature of the whole of reality, and he used the metaphor of holography, the source of his inspiration, to illustrate this new point of view.

It is useful to embrace Bohm's terminology as he is deeply thoughtful about the nuances of language and we'll translate between the elements of holography and his descriptors for his paradigm. In his terminology the implicate order would be the embedded information on the plate out of which the explicate order emerges, our image of the vase, at the prompting of the super-implicate order, the laser in his metaphor, and meta super-implicate orders that engage the laser.

In this scheme of things we consciously exist in an explicate order, the known universe, that emerges from a foundational implicate order. The explicate and implicate orders are aspects of a whole that is interpenetrated, i.e. distributed, at every scaling and the emergence of the explicate order is a continuous ongoing process that he calls the holomovement.

Hopefully the Copernican reference will have some resonance here in that Bohm's paradigm is completely congruent with our existing knowledge of the explicate order, his interpretation changes our perspective on the data but the data itself is not in dispute here just as Copernicus didn't alter the sun and planets, he reframed the interpretation of the known observations.

The utility of Bohm's view is that the accumulating anomalies that fall outside our standard descriptors of the explicate order; entanglement, virtual particles, hidden field effects like the Higgs and gravity, magnetism, the fundamental weirdness of condensates, the otherwise inexplicable results from para psychological research, the behavior of photons in various two slit experiments, fractal equations that

graph out to reveal evocatively familiar forms from the natural world, the non locality of consciousness revealed in the remote viewing experiments by Puthoff and Targ that DARPA funded, and a considerable list of other known examples of high strangeness find a home. These manifestations display the subtle properties of the implicate order in a more obvious way than the equally emergent bowling ball.

From Bohm's perspective Rossi has evolved the conditions for the emergence of another hidden aspect of the implicate order similar, in principle, to emerging a condensate; and now that the brute force Ecat versions have given way to the subtle and increasingly precise application of non local field effects Rossi has taken to characterizing the output energies of the SK as arising from an unknown source.

In toto this is why the non local field effect described in Aharonov-Bohm matters to Rossi and why it's important to view Aharonov-Bohm from within the context of Bohm's broad paradigm for it to be of practical consequence. The recognition that he has been manipulating the implicate order with non local field effects in order to produce an emergent event in the explicate order is the key concept that has put Rossi at the head of the field from the inception of this work and why he now expects to be able to throw that door wide open so that his particular emergent phenomena becomes a stable durable feature of the explicate order.

The final phase of this emergence is to peel away the last vestiges of the epiphenomena that have obscured the essential event, which is the emergence of dense clusters of coherent electrons as the first order energetic manifestation of the SK series as explained in his paper on Long Range Particles Interactions, and to facilitate the direct harvesting of these electrons as electrical current as they emerge in the Leonardo version.

That is the SK Leonardo running in SSM.

Upwards scalability of individual units, zero fuel consumption as the 'fuel' is now a catalyst, indefinite operation limited only by the MTBF of the materials of the apparatus, the production of highly desirable clean low cost electricity that can be located adjacent to and directly responsive to the imposed load, radical simplification of the total system design, rock bottom capital costs and a durable strategy for maintaining control of the intellectual property while widely disseminating the benefits.

Small wonder Rossi seems excited, and that the business plan is expected to re-orientate around this development.