Which of our basic physical assumptions are wrong?

Georgina Parry 1st July 2012

Edward de Bono's thinking hats are ways of thinking. First his white and black hats - facts and problems are considered. Next the red hat- likes and dislikes. Knowing what must be included and what overcome, the necessary relationship of ideas to provide a working explanatory framework can be given. Having this it is possible to see some of the basic physical assumptions that have been wrong and why. That insight then allows informed consideration to be given to some interesting directions for future research and development.

White hat- The facts

1. a) Einstein's relativity works to describe what will be observed. b) Its a mathematically complete theory. c) It corresponds with experimental results.
2. a) QM works mathematically. b) It corresponds with great accuracy to experimental results.
3. Together they seem to account for the phenomena of physics at all scales. (Although they are seemingly incompatible.)

Black hat- The problems

1. Einstein's relativity is completely deterministic but QM relies upon probabilities and so is non deterministic.
2. QM and classical physics including relativity appear to work at different scales.
3. How the transition occurs has been unclear.
4. Classical physics can't explain; the probabilistic physiological effect of radiation, the photoelectric effect, line spectra, black body radiation, wave properties of the electron. QM can.
5. Gravity can't be explained at the quantum scale.
6. There are a number of paradoxes associated with relativity.
7. There's a measurement problem at the quantum scale. This is how selection of a state by nature prior to detection occurs.
8. There seems to be an arrow of time that is inexplicable by Einstein's relativity or QM.
9. Relativity and QM appear contradictory.
10. Complete determinism is at odds with; concepts of choice, free will, evolution of the ability to think and make decisions and choices, functional morality, altruism and selection through competition. As it implies that all responses and outcomes are predetermined. Therefore fully automatic, despite the strong feeling that this is not so.
11. Definite alternatives and never super positions are observed. The what, where and how it is decided what an observer shall see needs explanation. The Copenhagen interpretation requires a classical domain that will only allow one particular outcome. Many Worlds has branching of the wave function but an observer who is only aware of one branch. Neither model is wholly satisfactory.

Red hat- Likes and dislikes

An alternative is that it is not either QM or classical physics and relativity that is needed but their correct relationship.
Neither black and white thinking nor linear building, (either by logic or mathematics), can resolve the problems.
Creative thinking should be used, and esteemed in science, as well as data acquisition and analysis. (Whether used consciously and systematically or subconsciously.)
Some problem solving tools suggested by Edward de Bono are; Splitting, taking apart ideas that are usually combined; Sticking, linking ideas, making connections / associations; Synthesis, putting ideas together for effect; Construction, building, often but not always step by step; Design, re-arranging the connections that have been made for better function; APC, considering alternative possibilities/choices; OPV, considering other people's views.

Creative thinking can provide the provocation for new kinds of exploration and lateral thinking, including humour, can bypass seemingly impassable roadblocks.
Physicist and creative thinker Max Tegmark wrote: "Evolution has endowed us with intuition only for those aspects of physics that had survival value for our distant ancestors, such as the

parabolic trajectories of flying rocks." [1] Neither intuition nor unacceptable outcomes of linear analysis are sufficient. Open minds, better and diverse thinking styles are required. There may even be ways of thinking not yet thought about that we may learn from advances in neuroscience and / or machine learning. Max Tegmark warns, "….if we dismiss seemingly weird theories out of hand, we risk dismissing the correct theory of everything, whatever it may turn out to be."[1]
In Edward de Bono's words, [2] " The future well being of the world is going to require good thinking . Personal life has always required good thinking but in the future the increasing complexity of demands and opportunities will require even better thinking."

Philosophical / Theological matters

1. A fully existing space-time continuum is a merciless universe in which created cruelty and atrocity persists rather than ends.
2. It makes redundant: a) functional morality b) choice and fee will c) The Creator, since the job is done.
3. A Many Worlds Multi-verse, where everything that can happen does, is a terrifying fantasy when worse case scenarios are imagined. Worse than a singular, cruel and merciless, fully determined universe.
4. Neither the space-time continuum nor Many Worlds Multi-verse can be the home of objective truth. Both rely upon subjective experience of what has happened out of many different possible perceptions.

Green hat- Exploration

Q. How do we know there must be more than we already know / understand and should be considering?
A. Because there are persistent contradictions, paradoxes, unanswered questions and philosophical problems.
Re. Problem solving Edward de Bono suggests asking, "How broad a view am I taking? In what other ways is it possible to look at things?" [3]

We observe our food by the transmission of EM data, from the food (source) to our sensory system. However we do not live by eating EM data. Food with atomic structure is necessary for growth, repair and fuel for metabolism. Richard Feynman said, "The question of whether or not when you see something you see only the light or you see the thing you are looking at is one of those dopey philosophical things that an ordinary person has no difficulty with. Even the most profound philosopher, sitting eating his dinner, has many difficulties making out that what he looks at perhaps might only be the light from the steak but it still implies the existence of the steak which he is able to lift by the fork to his mouth. The philosophers that were unable to make that analysis of that idea have fallen by the wayside from hunger." [4]

Biology explains how a perceived image is formed by the structure and function of the sensory system. The output of the sensory system can't be the source of the sensory data that was input. Therefore the object source of the sensory data must precede the image fabricated. Differentiation is needed. The object in external reality will be called an actualisation and the image of it fabricated by an observer will be called a manifestation.

Transmission of sensory data including EM radiation is not infinitely fast. There is delay between an event and its perception. The amount depends upon the separation of the actualised data source and the observer- organism, device or sensitive material. This makes the observed present (now) a patchwork fabrication. The time dimension of the Image reality is a consequence of that data transmission delay. Thus emergent from data processing, not part of the foundational reality. There is still passage of time by continual sequential rearrangement of the Object universe.

Between production and receipt the potential sensory data exists within the environment. A pool of all possible present (now)s that might be observed when the data is received and processed. That is many alternative pre-written futures, that may or may not become the present of an individual observer. Which present is selected depends upon where and when

the observer detects the data. That is the position and iteration of the Object universe in which the selection is made. Chosen time and position selects what data, emitted from which specific, actualised, material arrangements / iterations of the Object universe. This is relevant to the measurement problem of QM. The data related to the same source iteration of the Object universe could be received by different observers, at different positions and during different iterations of the Object universe (which would be different clock times for them.)

Everything is in continual motion even if it appears stationary. As motion occurs over many scales not just at the single scale in which it may appear stationary to an observer. Even a substance at absolute zero in a laboratory will have energy associated with the Earth's universal movement. The motion within the Object universe is continual because a Universe in motion will continue in motion unless acted upon by a Universe stopping force. Also it is known from chaos theory that small changes can develop into large changes. This is also seen in nature for example in weather systems. Nothing can be isolated from the Object universe.

Magic

I have no doubt that my dog knows, with certainty, that the biscuit obscured from view still exists. Magic is real if material objects only come into existence upon observation. In that case the magic rabbit was not in the hat prior to it being removed by the magician. I know this illusion well though. However it looks, the rabbit must be put, or put itself, into the hat before it can be removed from it. Observation produces a manifestation from received data, it does not create objects. Magic is misdirection, distraction and skilful handling /manipulation. Causing a subjective reality to be constructed by the audience based upon incomplete information, playing to the "what you see is all there is" bias, the human tendency to draw strong conclusions from incomplete information. [5] The difficulties and incomplete information obtained from quantum scale experiments can lead to similar misinterpretation.

Where is the Image Reality?

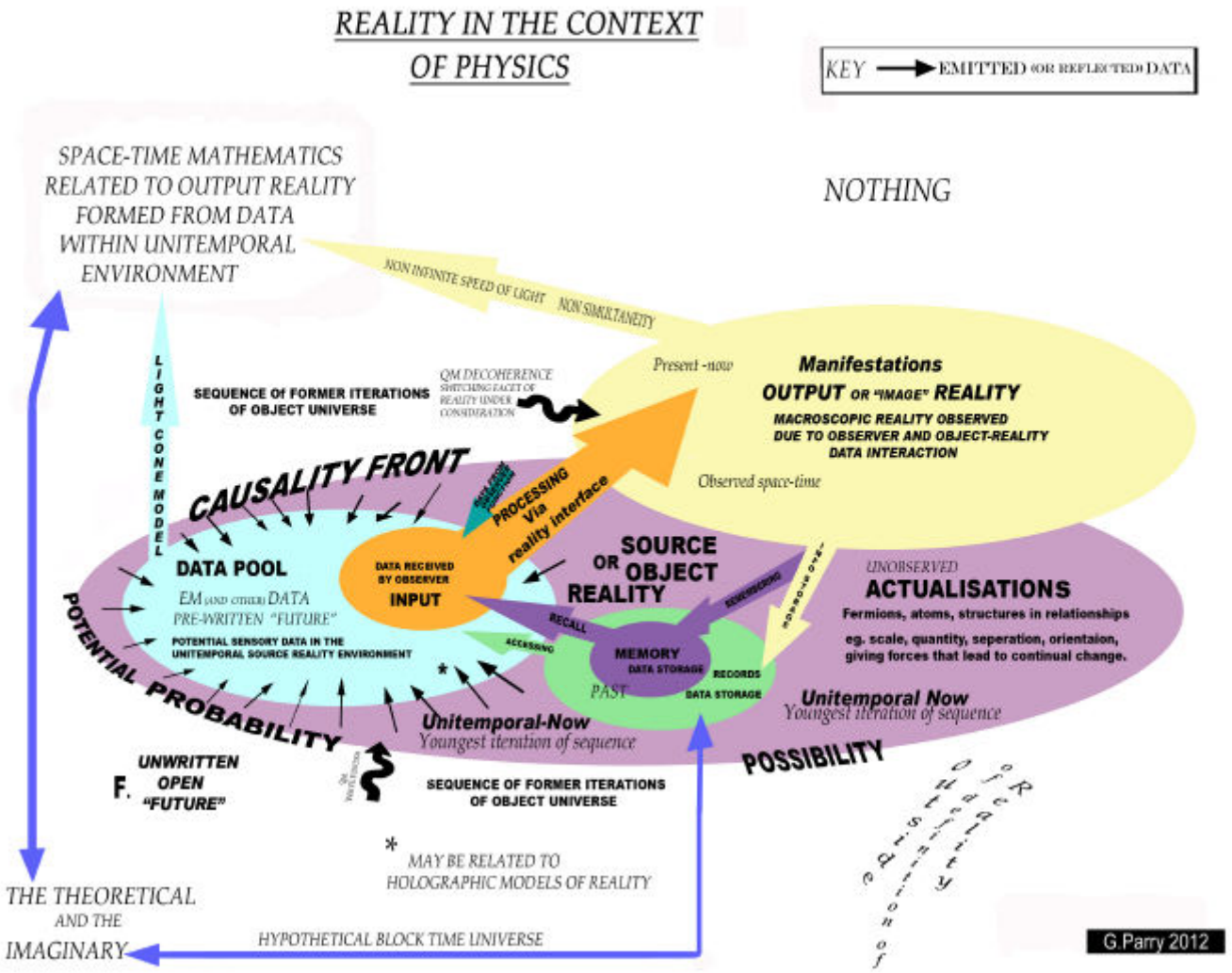
The Image Reality must exist within the Object Reality and thus also, in a way, be a part of it. For analogy the fantasy realm of a book is not the real world even though the book and reader must both exist fully within the real world. The fantasy realm is a fabricated world within a world. The perceptions that appear to be external reality too are a fabricated world within a world.

To show this diagrammatically the image reality is shown on a different level to the Object Reality that contains it, which indicates its separateness. It is not simple spatial or temporal separation. The Image Reality can be described by different mathematics to the external Object reality.

Yellow hat- What works and why/ advantages

This framework (See Diag.1).
1. Allows the temporal paradoxes to be overcome, (see below).
2. Allows Einstein's relativity and QM to co-exist without contradiction.
3. It shows there is a home for objective truth.
4. It explains the arrow of time, due to continual sequential change of the arrangement of Object universe and unidirectional input of data from Object reality to Image reality. That continual sequential iteration gives passage of time and gives the "preferred foliation" necessary for QM models.
5. Allows partial non-determinism overcoming the philosophical and theological problems highlighted earlier. Each material output becomes the next input upon which the laws of physics, and biology act. This is not fully determined as there will be balance points and the "direction" in which the outcome proceeds will be due to the slightest perturbation from the internal or external environment. This might be said to be the locations where "God plays dice".
6. Allows the measurement problem of QM to be understood. As received data relates to a specific iteration of the universe in which it was produced.

Diagram.1


REALITY IN THE CONTEXT OF PHYSICS
KEY EMITTED (OR REFLECTED) DATA
SPACE-TIME MATHEMATICS RELATED TO OUTPUT REALITY FORMED FROM DATA WITHIN UNITEMPORAL ENVIRONMENT
NOTHING
NON INFINITE SPEED OF LIGHT NON SIMULTANEITY
LIGHT CONE MODEL
SEQUENCE Of FORMER ITERATIONS OF OBJECT UNIVERSE
QM DECOHERENCE SWITCHING FACET OF REALITY UNDER CONSIDERATION
Present -now
Manifestations
OUTPUT OR "IMAGE" REALITY
MACROSCOPIC REALITY OBSERVED DUE TO OBSERVER AND OBJECT-REALITY DATA INTERACTION
Observed space-time
CAUSALITY FRONT
PROCESSING Via reality interface
DATA POOL
EM (AND OTHER) DATA
PRE-WRITTEN "FUTURE"
POTENTIAL SENSORY DATA IN THE UNITEMPORAL SOURCE REALITY ENVIRONMENT
DATA RECEIVED BY OBSERVER
INPUT
SOURCE OR OBJECT REALITY
RECALL
REMEMBERING
ACCESSING
MEMORY
DATA STORAGE
RECORDS
DATA STORAGE
PAST
UNOBSERVED
ACTUALISATIONS
Fermions, atoms, structures in relationships
eg. scale, quantity, seperation, orientaion, giving forces that lead to continual change.
Unitemporal Now
Youngest iteration of sequence
Unitemporal-Now
Youngest iteration of sequence
POTENTIAL PROBABILITY
POSSIBILITY
F.
UNWRITTEN OPEN "FUTURE"
SEQUENCE OF FORMER ITERATIONS OF OBJECT UNIVERSE
* MAY BE RELATED TO HOLOGRAPHIC MODELS OF REALITY
THE THEORETICAL AND THE IMAGINARY
HYPOTHETICAL BLOCK TIME UNIVERSE
G.Parry 2012

7. Allows the transition of QM physics to classical physics to be understood. Not as a matter of scale and not requiring environmental wave function collapse or Many Worlds. It is the transition from considering one facet of reality (the unobservable Object reality) to considering the other facet of reality (observer fabricated Image reality).The observer sees just one version of reality because data is selected from the possibilities within the data pool, according to position and iteration in which the selection is made. That data is processed into a distinct Image reality output.
8. Good explanations are difficult to vary while retaining the same explanatory power. The complexity of the explanatory framework can't be shaved away with Occam's razor as its structure is necessary for its function.
9. It's a better outline map of the territory explored by physics.
10. It highlights some misunderstandings allowing an answer to the essay question.
11. As space-time is emergent output from data processing not an observer independent reality, the curvature of space-time is not the cause of gravity.
The apparent curvature of space-time is instead an effect caused by alteration of light paths. Due to disturbance of the uni-temporal environment by a massive body with continual universal motion (it's motion considered over all scales.) A very small body will cause very little disturbance and have little gravitational effect.
12. The pathways of particles and objects through the historical sequence of iterations may be regarded as strings. Though they are imaginary as only the youngest (most recent) iteration of the Object universe exists. So they only ever have one position not a super position spread over many iterations. Although they do not have concrete existence considering the pathways and interactions through the iterations could still be useful.
13. The EM data in the environment might be described with quaternion algebra (or related algebra). Roger Penrose has described the light cone this way.[6] This may also relate to the mathematical model of Joy Christian.[7] Observers at different positions and different chosen times may observe entangled data related to the same origin event, as the data spreads out from the source. The entangled data might be though of as distributed over the surface of spherical shells, getting larger in each new iteration. Nested *if* the historical sequence is considered, as the iterations of the Object universe exist in sequence not in a continuum. This may also relate to holographic ideas as the data correlated with an event occupies the surface of a sphere.
14. Entangled photons are related to the same source iteration of the Object universe in which they were emitted, however far apart they are taken. Until a new interaction occurs that alters the frequency and/or polarisation of the photon that is reemitted. Correlation with photons still carrying data related to the earlier event will be lost. Information is not conserved in Object reality.
15. The entirety of physical reality is more complex than a platonic block universe or a simple branching Multi-verse. So there's lots for scientists and mathematicians to explore.

Re. Paradoxes

What is an object and what is a clock?.
1. An object/ device with an existence independent of the observer?
2. Spatially extended data spread within the environment?
3. Or the processed output from data received from the environment - produced, observed and measured by an observer?
With regard to the paradoxes: If the answer is 1, then it is nonsense. Independent inanimate objects such as rods and clocks do not change in response to being observed in different ways. They have a chemical structure and associated internal forces that set the form and function.
Answer 2 is closest to Einstein's idea of an object. In his opinion it is spread over (externally existing) space-time, in his words spatially extended. How it interacts with the observer, ie. which parts of the data are received when determines how it is seen. Answer 3 is the output formed by the observer from the received data. That output does not exist externally but is an internal fabrication representing the external reality. It is perfectly reasonable that different observers fabricate, and thus see, different things - according to their particular position or reference frame, that affects what data is input when.
The object-data-image thing is all 3 of those things; an independent actualised object (or former object), data spread within the environment and output manifestation. Any one of its

aspects might be referred to by the name of the object leading to confusion. What is observed 3 is possible because of 2 and 2 exists because of the source 1.

The paradoxes are not unresolved. 1, 2 and 3 together can explain why there are paradoxes. An analogy is foreshortening, something well known to artists. A foreshortened object has not become shorter as a independent object in space but the manifestation observed is shorter. That is not seen as a great paradox but like perspective necessary for realistic representation of objects in art.

Barn pole / bug rivet paradox: = assumption that the measurement as seen by the observer -is the object- as it exists according to that observer, rather than being just a manifestation fabricated by the observer upon receipt of sensory data. It denies/ignores the independent existence of the source object from which the sensory data was produced by emission or reflection. (It also ignores motion blur.) This paradox is an illusion.
Evidence for independent existence of objects (without observation) can be found within magical illusion, as the illusionist "manipulates" existing objects unobserved, to control perception. The audience observes a significantly different reality from the reality known to the illusionist, formed from data received.
Grandfather Paradox: =assumption of a time dimension in foundational reality rather than it being a transmission delay incorporated in the output observed reality. This paradox is due to misinterpretation of evidence.
Andromeda paradox: = assumption that unobserved foundational reality is relativistic rather than just the output reality from observation being relativistic. This paradox is due to misuse of theory (applying it to a situation in which it is not relevant/appropriate).
Twins paradox.
This paradox mistakes the fabrication of reality from received data for the foundational external reality. Time can't pass at different rates for the different twins as it is due to the sequential change of the whole Object universe and everything with existence exists in the uni-temporal space of the Object universe. It also ignores the biological ageing effect of space-travel. This paradox is due to misuse of theory.

So which of our basic physical assumptions are wrong?

There is confusion between material actualisations, potential sensory data in the environment and manifestations leading to the following wrong assumptions.
1. Space time exists externally ×
2. Space-time is foundational ×
3. Time is a dimension of external reality ×
4. Gravity is caused by curvature of space-time ×
5. The visible Image universe (as seen) has material existence ×
6. Space and time began at the Big Bang ×
7. The universe is the space-time continuum past, present, and future fully formed by inflation from a singularity ×

From what is known and what is required for a fully functional explanatory framework, without contradictions or paradoxes, these postulates can be given-
1. Space-time is an output from processing data that has undergone transmission delay of varying amounts.
2. Space-time is emergent.
3. Time is not a dimension of independently existing Object reality but is a dimension of observer fabricated Image reality.
4. Apparent curvature of space-time is an emergent effect from alteration of light paths in the vicinity of a mass, affecting when the EM data is received. It is an image reality, resulting from EM data processing, and is therefore not the cause of gravity. Gravity is instead due to the continual universal motion of all bodies with mass. This affects the surrounding environment, affecting the pattern of distribution of things such as dust and gas molecules. Thus affecting photon data transmission and giving the effect of curved space-time.
5. The visible Image Universe is produced by data processing and is distinct from the material,

uni-temporal Object universe.
6. Evidence for a Big Bang comes from observation of the Image universe and not the Object universe source of the data. Any alteration to the data during transmission and any alteration in viewpoint of the observer will result in a different Image reality being produced. (The red shift evidence for expansion may possibly be due to the continual universal motion of the Earth.)

There is no reason to assume that the Object universe does not have an eternal history. It is always only the newest iteration of itself but containing data generated within earlier iterations.

Blue hat- New ideas, Thinking ahead

Image reality

Einstein's theories of general and special relativity are mathematical descriptions of what will be observed rather than the underlying actualisations. The mathematics is useful but some interpretations are incorrect such as curved space-time being the cause of gravity.

Experiments, using computer simulations, might show that space-time representations can be fabricated by self organising learning systems given a changing environment, in which they must successfully navigate in order to survive. The algorithms that develop could be studied and possibly be used to create a reconstruction of the environment from the virtual organism's representation of it.

Data Pool

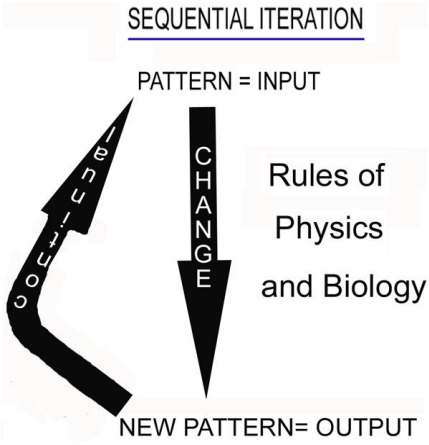
The data pool might be considered a Multi-verse of possible present (now)s. There is nowhere for these possibilities to be other than within the uni-temporal Object universe. Also observers in many different parts of the Object universe may fabricate different image realities of it, a Multi-verse of different visible Universes. How these Multi-verses within the Object universe can be described by mathematics and how they relate to numbers and sets is an interesting subject to consider. Also interesting is the possibility of a complete description of the framework using mathematics, that could be relevant to all facets of it, such as category theory. Max Tegmark argues, "If we assume that reality exists independently of humans, then for a description to be complete, it must also be well-defined according to non-human entities……..such a description must be expressible in a form that is devoid of any human baggage like 'particle', 'observation' or other English words."[1]

Object reality

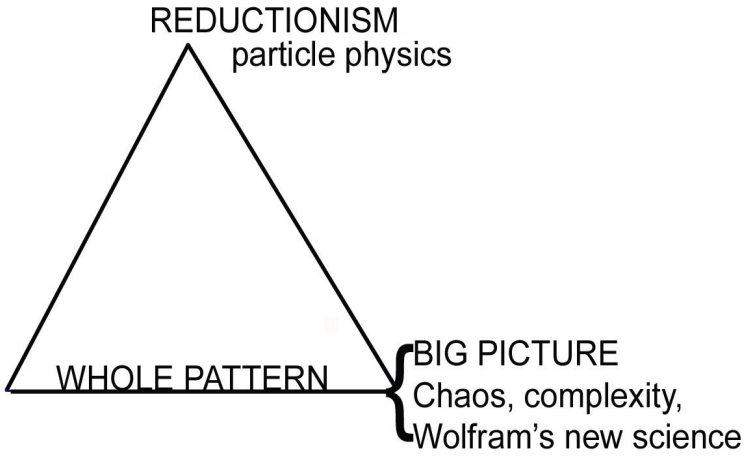
Stephen Wolfram's cellular automata show that complexity can arise from certain inputs and certain sets of rules, reiterated upon the output[8], as occurs in Object reality. Patterns and objects in different iterations cannot interact.
Also, a small change to the input to a cellular automaton can give a large change in output. This is also seen in fractal generation and in nature. For example - small molecular change to the FGFR3 gene causes detrimental alteration of a growth factor receptor, leading to dwarfism of the affected human individual. A small change at the atomic scale leads to a large change in phenotype at the macroscopic scale.[9]
The Pauli exclusion principle acts across all scales. Some rules governing change only operate at larger scales, but affect what exists at smaller scales. Phenotypes from genetic and epigenetic variance (expressed structure and function) result from 1) DNA molecule sequence, 2) DNA molecule folding. This is pattern control at a molecular rather than atomic or sub atomic scale. Natural selection is pattern control at the whole organism scale. Though all processes might be reduced to events at the smallest scales, for large scale selection of pattern that kind of reductionism has lesser not greater explanatory power.

Rather than being surprised at the existence of patterns, we could regard them as the equilibrium between maximum simplicity and maximum complexity, which approaches simplicity.

Diag.2a



Diag.2b



The relationships of everything allow the Object universe to function and become, rather than just exist. The relationships are integral to the arrangement of the constituents, being the variables and parameters that produce force for change or the potential for change. Mathematical rules and pattern generation control lead to organisation. Abstract representation or verbal description of the rules and controls are not required for their expression in Nature.

The Object universe is the actively participating omnipotent, omnipresent creator, preserver and destroyer of all structures and patterns. This framework brings physics closer to a number of theological ideas and overcomes the "red hat" philosophical / theological problems. It is more akin to Heraclitus' river than Plato's perfect realm. It is the patterns and all of the processes that are occurring, including the continual generation of potential sensory data.

Richard Feynman explained, "Its difficult to describe because it is an emotion. Its analogous to the feelings one has in religion that has to do with a god that controls everything in the whole universe: there's a generality aspect that you feel when you think about how things that appear so different and behave so differently are all run 'behind the scenes' by some organisation, the same physical laws. It's an appreciation of the mathematical beauty of nature, or how she works inside, a realisation that the phenomena we see result from the complexity of the inner workings between atoms: a feeling of how dramatic and wonderful it is."[10]

References

1. Max Tegmark, Shut up and calculate, arXiv:0709.4024v1 [physics.pop-ph] 25 Sep. 2007

2. Edward de Bono, Teach your child *how* to think, The Penguin Group 1992, Part 1 Page 2

3. Edward de Bono, Teach your child *how* to think**,** Part 2 Logic and perception, Page 111

4. Richard Feynman, Douglas Robb Memorial lectures 1979, recorded at The University of Auckland (New Zealand),© University of Auckland (NZ), Streaming video www.vega.org.uk, 2007, lecture 1 end questions.*

5. Daniel Kahneman, Thinking Fast and Slow, Farrar, Straus and Giroux, New York, 2011

6. Roger Penrose, Twistors and quantum non locality, Perimeter Institute recorded seminar archive, Dec. 14 2011.*

7. Joy Christian, Disproof of Bell's theorem, Brown Walker press 2012.

8. Stephen Wolfram, A new kind of science, © Wolfram LLC, Champaign IL. Wolfram media 2002

9. F. Rousseau, J. Bonadventure, L. Legeai-Mallet**,** Mutations in gene encoding fibroblast growth factor receptor 3 in achondroplasia, Letters to nature 371 252-254 15, Sept 1994

10. Richard Feynman, Surely you're joking Mr. Feynman, WW Norton and Company, New York, London, April 1997

Useful resources

Max Tegmark, Shut up and calculate, arXiv:0709.4024v1 [physics.pop-ph] 25 Sep. 2007

Max Tegmark, The mathematical universe, arXiv: 0704.0646v2 [gr-qc] 8.Oct 2007

E= Einstein, His Life, His thoughts and His influence on our Culture, Sterling publishing Inc., New York, London 2006

Richard Feynman, Douglas Robb Memorial lectures 1979, recorded at The University of Auckland (New Zealand),© University of Auckland (NZ), Streaming video www.vega.org.uk 2007*

Many Worlds interpretation of quantum mechanics. Stanford Encyclopedia of Philosophy,. (Plato.Stanford.edu/entries/qm-many worlds), first published March 24 2002. *

Chaos, James Gleik, William Heinemann Ltd., Great Britain 1988

Complexity, M. Mitchell Waldrop, Penguin Book Group 1994

The Descent of Darwin, Brian Leith, Collins, London ,Glasgow, Sydney, Auckland, Toronto, Johannesburg 1982

A new kind of science, Stephen Wolfram, © Wolfram LLC, Champaign IL. Wolfram media 2002

Paul Dirac and the religion of mathematical beauty, Graham Farmello, Perimeter Institute recorded seminar archive Dec 14 2011,http://www.perimeterinstitute.ca/Outreach/Public_Lectures/View_Past_Public_Lectures *

David Eagleman on choice, at FQXi "Setting time aright" conference. Fqxi.org/conferences/talks/2011 and You tube 4 Oct 2011 (www.youtube.com/watch?v=MkANniH8XZE) ©David Eagleman.

Malcolm MacIver on choice, at FQXi "Setting time aright" conference.Fqxi.org/conferences/talks/2011 and You tube 20 Sep.2011 (www.youtube.com/watch?v=dRDfwsuBNb4) ©Malcolm MacIver

Israel Pérez, A physist's view of the universe: a philosophical approach, arXiv:1012.2423v1 [physics gen-ph] Dec 2010

Theories of the Universe, from Babylonian Myth to Modern Science, Editor Milton K. Munitz, The free Press, Glencoe IL. 1957

* Available Via http://www.fqxi.org/community/misc/physics-resources