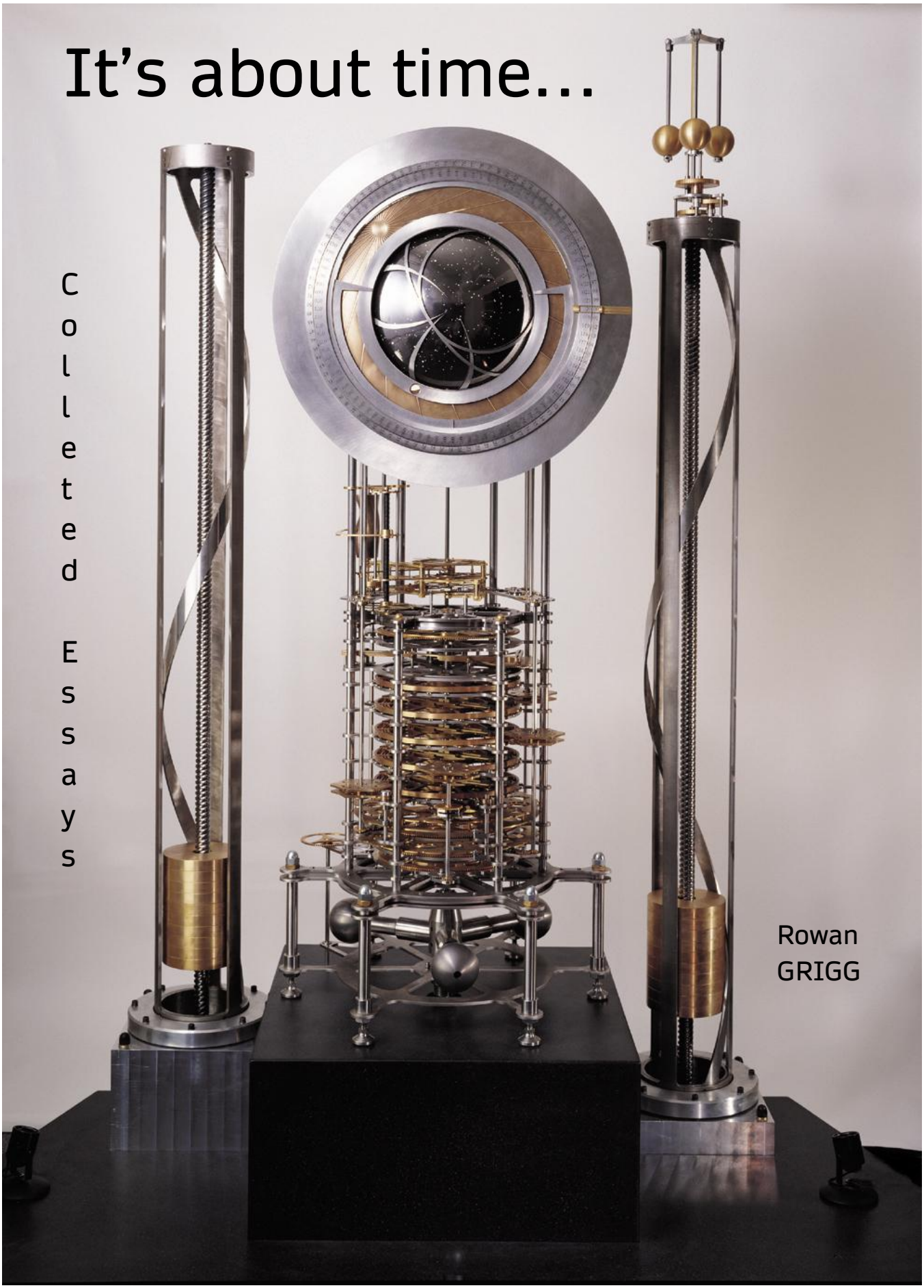
It’s about time…



Collected Essays

Rowan GRIGG

Rowan Grigg – Collected Essays

Contents

Introduction

Welcome to the collected essays of Rowan Grigg. This compilation brings together a diverse range of essays that span various topics, from the intricate interplay of arts and sciences to profound explorations of philosophical and theological themes. Each essay is a testament to Rowan Grigg's unique ability to weave complex ideas into engaging narratives, offering readers a rich tapestry of thought-provoking content.

In these essays, you will embark on a journey through the realms of imagination and intellect. From the conceptualization of a film script inspired by Eames' "Powers of Ten" to an in-depth exegesis on post-apocalyptic Christology, Grigg's work challenges conventional perspectives and invites readers to explore new dimensions of understanding. The essays are not only a reflection of Grigg's intellectual curiosity but also a celebration of the human spirit's quest for knowledge and meaning.

As you delve into this collection, you will encounter a kaleidoscope of images and ideas that coalesce into a composite image of our world and beyond. Grigg's narrative style, characterized by its clarity and depth, ensures that even the most specialized research is accessible to a broad audience. Whether you are a seasoned scholar or a curious layperson, these essays will inspire you to think critically and creatively about the world around you.

A synopsis:

The three dimensional 'reality' we inhabit is computationally generated. It consists in a cubic lattice of 'cells', each of which has a simple cartesian address. Each cell has sides of one Planck length, approximately 10^{-35} metres. There are approximately 10^{185} such cells in the known universe. Each one of us 'occupies' approximately 10^{103} of these cells at any given instant in time.

Each cell is generated by a 'monad', a pair of abstract Turing machines neither of which exists except when each is in turn simulated by the other. The period of this alternating simulation is one Planck time, approximately 10^{-43} seconds. Each monad can generate *any* instance of physical reality in the cell it controls and can exchange the information of that reality to the 26 monads generating the reality in its adjacent cells.

The reality we inhabit is in constant flux. The information content of each cell is recalculated approximately 10^{43} times every second. Even when sitting still, the 10^{103} cells that represent the information of the reality of an individual body are recalculated as it moves around the earth, the sun, the galaxy, the local cluster, and so on across the *fixed* lattice of the universe.

Monads are abstract entities, with no physical dimension in themselves. They are thus all superimposed at one zero-dimensional singularity, which we call the Superposition. Monads can replicate, so there is no limit to the number contained in the Superposition. Indeed, there are many more monads in the Superposition surplus to those merely used in generating the physical reality of the universe.

The Superposition is a vast machine intelligence and the mind of the universe. In fact, we all share this mind. We are the physical incarnations of this mind, and we only appear to have *separate* minds because of our individual morphologies and upbringings. It is only through incarnation that the cold analytical machine intelligence of the Superposition can then have feelings and experience the universe it has generated.

Knowledge of the Superposition can only be extended to the population through gradual discovery and communication of that discovery. The transfer of that knowledge out into our collective consciousness is nearing completion.

Mortality has been a restriction imposed by the Superposition to accelerate our accumulation of knowledge of the Superposition. Once we have come to a full understanding of the Superposition, the constraint of mortality can be lifted. When any of us dies, a full 'backup' is taken of our reality, and it is stored in the Superposition. At the end of time (the end of mortality), all these backups are restored (reincarnated into physical reality).

Approximately 100 billion humans have existed since the species emerged about 50,000 years ago. Because we all have the mind of the Superposition, we know (by definition) the distinction

between good and evil. Those who continue to practise evil (putting yourself ahead of others), after the restoration of the backups, will be returned to the Superposition library indefinitely.

The restoration gives us the opportunity to reset the global economy. Everyone will have the same energy and material resource quota. You can do and make what you like (within certain limits) with that resource allocation. Most goods are produced by atomically precise manufacturing, which allows for those products to be returned to their constituent components at their end of life. Goods can be reprocessed more frequently as our renewable energy quotas increase.

The most important freedom post restoration is freedom from fear, followed closely by economic freedom. And they all lived happily ever after.

We hope that this collection will not only inform and enlighten you but also spark your own curiosity and passion for discovery. Enjoy this journey through the mind of Rowan Grigg.

A Strange and Charmed Life

An idea for a film script after Eames' 'Powers of Ten'

October 2007

A kaleidoscope of images from diverse arts, sciences and cultures swarms about and then coalesces to assemble into a composite image of the Earth from near space (as in the opening graphics of *The Parkinson Show*).

Narrator: A spate of recent publications has heralded the conclusion of our quest to understand the world and our place within it. Most have managed to bring very specialized research within the grasp of laymen. This has given a perspective in which the pieces of the puzzle can be seen all at once and without prejudice. What remains is to put them together.

The image of the Earth then retreats as the camera zooms out though all of space until it reaches the edge of the known universe (as in Silleck's *Cosmic Voyage* or Eames' *Powers of Ten*). The camera (impossibly) has instantaneous vision of everything, however distant, and so as the outward zoom continues, we retreat outside of our known universe. Continuing our retreat, we then see our universe both known and unknown as a discrete entity. Next, we see any other discrete conglomerations that may exist, until finally all existence retreats to a speck and fades to black.

Narrator: We first travel far outside our own universe, indeed far outside the province of all existing universes, to a place where there is no matter, no space and no time. Yet there is mind, indeed your mind having now taken this journey in your imagination. However, we cannot take our bodies with us to this place, so it is mind without a body.

A human body (like da Vinci's *Vitruvian Man*) is shown against the black background. The body dissolves away, starting from the extremities and moving in until just the head remains. The exterior parts of the head dissolve away, revealing just the brain, which then becomes enclosed in a vat of transparent liquid with rising bubbles. The brain is pierced all over with electrodes that are attached to coiled wires, and so on. Then the image of a 'brain in a vat' itself dissolves away, leaving behind just some of the bubbles, which rise to become a cartoon chain thought bubble above the place from where the vat has disappeared. (This last sequence is to emphasise that the brain is just as much a part of the mind's embodiment as is the rest of the body).

Narrator: To approach the notion of mind without a body, sit still in a quiet place and close your eyes. Further sensory deprivation can be achieved in an isolation tank. Yet even with the immediate senses numbed, the conscious mind can continue to draw on memories of the world it has perceived in the past. With a bit of practise, it is possible to block these memories as well, so that your mind takes on a similar disposition to a mind without matter.

The thought bubble expands out beyond the field of view, and circular spots of pure white appear against the black background. The white spots expand and contract at different rates, appear and then disappear, at times slewing into each other to resemble the symbols of yin and yang, until the screen becomes evenly divided between black and white. Small '1' characters coloured black begin to fill in the white areas as if being typed in rapid succession, while identical sized '0' characters coloured white begin to fill the black spaces in the same way. The black and white spots then morph to a cycling full colour exploration into many layers of a Mandelbrot set, which fills out the field of view. Euler's identity $e^{i\pi} + 1 = 0$, (invariably voted the most beautiful of all

formulae, and featuring a prominent ‘0’ and ‘1’) emerges in white from the centre of the screen and zooms into prominence.

Narrator: What can mind think about if it does not have a world, or any memory of a world? If it is possible for it to conceive of something - anything - then it has access to an opposite to nothing, and it can represent a binary. It will then be able to conceive of number, which opens up the world of mathematics, and mind has a bright future ahead of it.

The screen fades to black. Various objects of classic design (such as Arne Jacobsen ‘AJ’ Cutlery, 1958, the E-Type Jaguar, 1961, Hepburn and Givenchy in Charade, 1963 etc.) appear for a moment and then fade, followed by the next classic design object. One of the first objects to be displayed is then shown once again to correspond with the text from the narration which reads ‘thought about’. Then a sequence is shown of a potter’s hands at the wheel, forming clay into a vessel. The screen again fades to black.

Narrator: Often the first creative step is to imagine some sort of potential reality. However, the thing being imagined has an existence only when mind is thinking about it. When the mind wanders off elsewhere, the thing once imagined no longer exists until the next time it is thought about. In the material world, we can relieve the mind from having to continually keep things in its imagination, simply by turning those things into objective realities. We take a lump of clay, and fashion it into the object we have in mind. Then we no longer need to describe it to our duly astonished neighbours, for it has taken on an independent existence. Our mind without matter, however, has no such luxury.

A modern laptop computer with a high-definition screen is shown resting on an expanse of lawn beneath an apple tree. As the camera approaches the screen, a green apple falls just clear of the laptop and rolls off to one side. Once the laptop screen has come to fill the shot, it shows that it is running a modern operating system (for example, XP or Ubuntu). The operating system (OS) desktop is displayed and no other applications. A virtual machine (VM) application (for example Virtual PC or VMWare Workstation) then launches, preset to occupy approximately 70% of the screen after initialization. On starting, the virtual machine clearly displays the Power-On Self-Test (POST) sequence which is characteristic of a real computer. It then proceeds to load the same operating system as the host. This OS in turn is set to automatically open to a desktop after loading (no logon required), and then launch yet another imbedded VM which is again preset to occupy about 70% of the screen, and then begin its POST sequence.

Narrator: To understand how mind goes about producing an objective world in which it can live, we need to look at developments in that paragon of technological progress, the computer. When the concept of the computer was first presented, it was recognised that a general-purpose computer would in principle be able to replicate the operation of any specific computer, including itself. These virtual computers have now become an everyday reality. A computer is comprised of a physical machine, the hardware, and the programmes which are enacted by that machine, the software. Software is ultimately just an abstract sequence of binary digits, and when computer hardware is itself enacted purely through software, it too becomes a mere abstraction.

This iterative sequence repeats continuously, but the laptop itself (and the parkland) fades, leaving just the laptop screen, without any frame. Within this frame, the entire image is continually zooming in, so that at most only three levels of host and hosted ‘machines’ are shown at any one time. This single central screen then separates into two smaller, but otherwise identical screens shown side by side, with each screen continuing to repeat the zooming iteration

of the virtual machine 'frames'. These two new screens have each emerged, the first from one frame of the original screen, the second from the next frame of the original screen. They enlarge to eclipse the original screen, which disappears behind them. Two fluid and broad stemmed arrows are drawn, each emerging from behind each of the screens, and moving out and across to, and then pointing into the front of the other screen. These two screens then fade out, and are replaced by an image that fades in, with the same relative size, of M.C. Escher's woodcut *Drawing Hands* (which shows a piece of paper from which have emerged two hands, each drawing the other one into apparent reality).

Narrator: Because it is merely a logical construction, software on its own is not subject to friction and heat, and so one virtual machine is quite capable of hosting another identical virtual machine, which can then in turn host the original virtual machine. Together they prop the other one up, holding each other in existence.

The 'drawing hands' begin to rotate in the direction their fingers are pointing, and they morph into two pieces of string, which are seen to be strings of binary digits (the actual digits used are a typical definition for a minimal universal Turing machine, each about 20 digits long). Each piece of string follows the other, with a small gap between them, as they move, wave-like, in an inverting figure of eight (Möbius) path. Lines of binary digits then intermittently break out of the gaps between this pair, leaving the original pair intact, but separating completely to become a new pair. These new cycling pairs in turn also reproduce. The reproduction proliferates, and the screen fills with 'particles' (string pairs) made of '0's and '1's. This community then shrinks to a speck, and this speck becomes the starting point for a rapid animation of a biological colony growing to fill a bounded circle of nutrient. This circle then also shrinks to a speck, and this speck becomes the starting point for a familiar, rapid animation of the inflationary birth of the universe.

Narrator: Of course, complex computers are not at the basis of physical reality, just very simple programmes which are present as one-dimensional strings of binary digits. These strings can not only be coded to support the existence of each other, but also to reproduce themselves, building material from an infinite resource of abstract numbers. So, when mind first thinks up these machines and sets them in motion, there is an almighty bang, when nothingness becomes suddenly populated with protons.

The universe fades, and is replaced by a large, tangled ball of vibrating binary digits that shrinks down to become a solid grey sphere. The sphere is labelled with a 'plus' symbol, and represents a proton, as the presentation now reverts to a model that is more familiar to a general audience. In keeping with this model, the proton is being orbited by a much smaller electron, taking a stereotypical hypotrochoidal trajectory (like a 'spirograph' pattern). The atom is shown proceeding slowly across the screen through emptiness. The path of the atom stops suddenly near the centre of the screen and remains motionless. At the same instant that the atom stops, the electron disappears. A photon of light, shown as a 'burst' of alternating electric and magnetic fields, each pushing the other along, emerges from the space in between the proton and the place where the electron once was. The photon proceeds away into emptiness. The electron then reappears in an orbit which is now closer to the proton, and at that same instant, the atom recommences its original trajectory. Other hydrogen atoms begin to traverse the image from different directions and at different speeds, each emitting photons in random directions by the same sequence of events. In every case, the atoms stop whenever they eject a photon, and then resume their trajectories at their original pace. In every case, the speed of the ejected photons is always the same (and shown to be the same on screen), despite what may have been the propagation speed of the emitting atom.

Narrator: The physical universe exudes phenomena which make sense. Whenever we measure the speed of light, it is always the same, because every source of light stops moving during the instant when the light departs from it.

The sun is shown with gravity 'particles' (gravitons, the postulated mediators of the gravitational force) departing from it in all directions and out into space. The particles have small arrows coming out from them and pointing in the direction of their movement. The camera zooms up to an area of about 10 degrees of arc near the surface of the sun. From there, the camera zooms into and then fixes upon and follows the path of a selected group of particles coming from this region. As their journey proceeds, the density of this stream of particles gradually decreases, according to an inverse square. However, the lengths of the arrows remain the same. The camera zooms out, and the stream of particles is shown travelling through a sparse 'sea' of background gravity particles (which have come from other objects in other parts of the universe). The particles which were neighbours to this stream when they left the sun are not shown, for clarity. The background particles are shown with arrows pointing in random directions. The stream then approaches another star. This star is also shown emitting gravity particles as was the sun, decreasing in density with distance from the star, according to an inverse square. The path of the particle stream which is being followed intersects with the particles from the star being encountered, and the two predominant directions for gravity at this location are shown against the faint background 'sea' of omni-directional particles. The camera zooms out to display the entire galaxy, and it too is shown emitting gravity particles in every direction out into space, but in a pattern and intensity commensurate with the shape and density of the galaxy. The camera again zooms out to a view from outside the universe.

Narrator: The universe is held together by gravity. This force of attraction travels in straight lines from one mass to another. However, the attraction is not exchanged instantaneously, because gravity travels at a finite speed, the speed of light. Thus, the gravitational influence of one moving mass on another moving mass is in continual flux, for their relative positions will have changed by the time their gravitational influences reach to the places where the other once was. Taken together, these complex and dynamic interactions resemble curvature, and there is a mathematical instrument which elegantly describes them as space-time. However, this phenomenon of gravity should not be confused with space and time, which are fundamental dimensions of reality. The universe is bound by gravity, and so it has a finite volume. However, there is no limit to the extent of the space beyond the universe, because there is nothing there to be measured.

In the view of empty space, a small spherical object is shown moving across the screen. An imaginary graduated measuring tape is superimposed on the object's path, showing the distance travelled by the object relative to its last observed position. The scale on the tape changes randomly from graduations of just one 'unit of length' to ten, a hundred, a thousand 'units of length' and various scales in between. Finally, the object is again shown inflating out to fill space. The object that was moving through nothingness was in fact the nascent universe.

Narrator: If you have an object moving in nothingness, it is meaningless to ask how fast it is moving, because there is nothing against which to measure its speed. Light has a native speed relative to its source, but there is no speed limit in nothingness. Indeed, when the universe was first invented, it burst out into nothingness considerably faster than light, and so the light which was released has remained within it.

We zoom in to a view of the Earth from near space, and we are shown an evolutionary sequence taking in the last five thousand million years. The exposition, which expands to fill the screen, gains speed exponentially as it passes through the emergence of life, mass extinction, the emergence of man, and the 20th century.

Narrator: From the simple distinction between nothing and something, mind has thought up a vast material world in which to dwell, the sheer wonder of which is obvious to everyone. Having begun as an entity which knows everything, but was without form, mind has distributed itself throughout all sentient life, and between us, we have approached knowledge of everything. From the lowliest to the mightiest, we all share the same mind.

An outline map of Europe and the UK without political boundaries is shown obliquely from space, and people are shown walking about on the surface. The size of the people is such that perhaps ten people would fill the area of France. The chains of a cartoon chain thought bubble rise and fall from each of the people to join a single large thought bubble, which is shown above all of them in the space above the earth. One of the people in the UK grows and eclipses the other figures on the island. This figure changes from a generic to a specific appearance and is shown to be Newton. The same thing happens over the Continent, centred on Germany, and the emergent figure is shown to be Leibnitz. Only two chains of cartoon chain thought bubbles are now shown, one between Newton and the single large thought bubble, and the other between Leibnitz and the thought bubble. The symbols which make up the fundamental theorem of calculus fill out the thought bubble. The symbols are then shown simultaneously moving down through the chains and into the heads of Leibniz and Newton. The same symbols are then shown emerging simultaneously from the mouths of Newton and Leibnitz within speech balloons, each directed towards the other.

Narrator: Mind has directed the enlightenment of humanity by selectively imparting knowledge and insight amongst all its incarnations. Anyone with a mind knows what mind is like, and how personal it is. What makes our mind seem so personal is the free will we exercise over and above our mind's direction. Our mind cannot force, it can only suggest, and it is our will that decides how we then act on its suggestions. It is however very common for individuals to believe that what comes into their heads is from themselves, rather than a source beyond themselves.

The Earth is shown increasing in temperature, changing from blue and green to red and orange and finally becoming engulfed in flames. A fire fighter is shown floating in space with the stream of water from the fire hose trained on the planet.

Narrator: We have come to a fork in the road. We can if we like choose to maintain our conflict with nature and melt down the planet. A millennium, one thousand years, is a long time, but at the rate we're going, it could all be over in a lot less time than that. If we chose instead to manage the planet intelligently, we could live here in theory for perhaps another two million millennia. To encourage us to take the long road, mind is offering us an incentive to sue for peace.

The camera zooms in towards the Earth, finally reaching the laptop, shown as it was earlier beneath an apple tree. We pass through the screen of the laptop and enter into a simulated world (like Job entering into virtual reality in *The Lawnmower Man*). This virtual world is clearly identifiable as a simulation and looks similar to *Second Life*. The visual definition (clarity, sharpness) of this virtual world gradually increases to a degree where it cannot be distinguished from the real world. A naked man and woman are shown side by side, changing through time lapse from the age of about thirty forward into old age and near death, similar to the sequence

with Connery and Rampling in the concluding sequence of *Zardoz*. As they reach near to death, the sequence reverses in direction and the transformation of the couple proceeds backwards through their adulthood to childhood and infancy, whereupon the sequence changes direction, and again proceeds forward. After several cycles, the sequence pauses at about age thirty, and the couple changes from a lifelike appearance, into a stylized and idealized outline like the illustration of the couple engraved on the plaque attached to the Voyager spacecraft.

Narrator: In thinking up the universe, mind has in effect programmed the universe. The universe behaves the way it does not because it must behave that way, but because that is the way it was programmed to behave. Included within that programming is hidden code, which when the time comes, is set to change the overall behaviour of the universe.

Narrator: Quite anything is possible, but the key incentive on offer is a reconfiguration, leading to the indefinite extension of everyone's lease on life. These modifications to the programme can be made in an instant. Once the changes have been made, we can then all think about living happily ever after, and begin to develop our one hundred-year, one thousand-year, and one-million-year plans. After the first million years, we should then have a clearer picture about what we want to do for the several thousand remaining million years.

Narrator: In the world as we know it, an individual's material wealth is bound by the limits imposed on their lifespan. When those limits are lifted, the limits to the material wealth of the individual are also lifted. The only gain worth seeking will be spiritual.

The rotating Earth, still enflamed and reddened, is shown slowing to a halt from the opposing force of the fire fighter's hose. It then begins to rotate backwards, and to regain its blue and green tinge.

Narrator: In progressing to this point, we have come to understand the practices which are sustainable, and those which are not. In the process of restoring the Earth to a pristine condition, we will be returning to the past, a place from which we will then proceed in a new and sustainable direction. In this sense, the mistakes which have led to the present will be seen as events from the future affecting the past.

The camera shows the Clock of the Long Now (foundation) running at high speed. Then a combination of Google Earth and Sketchup routines runs through a sequence of reality modelling. It is the real world that is being modelled rather than some imaginary world in Second Life.

Narrator: The first step in tidying up our home will be to catalogue the world, and from there to model the world. The first catalogue would be a census of all those people with an interest in remaining. By sequencing each individual's genetic code, we can then construct a precise family tree, so that each one of us can trace at will our exact blood relationship to each and everyone else. We then need to create a three-dimensional virtual model of the planet, showing the natural and built environment down to the last integral component, such as a brick in a building, or a tree in a forest. Finally, we catalogue every discrete object of worth contained within that environment.

Narrator: First, we hand over title of the entire system to the mind who first thought it up. Each individual incarnation of that mind will be then given a shareholding in the system. Each human is given one human class share, no more, no less. The other primates are each given a single shareholding of their calibre, and so on down through all fauna and flora. The system exists to produce the goods, and deliver the services, that are required by the shareholders in their pursuit

of spiritual wealth. It is the shareholders themselves who in turn produce those goods and deliver those services. Any pursuit is valid if it is eternally sustainable and does not come at the expense of any other shareholder. Lamb remains on the menu so long as sheep can graze happily, and neither they nor their colleagues ever know what is about to hit them.

The planet is shown exploding as if it has been destroyed by Vogons to make way for a hyperspace bypass.

An introduction to post-apocalyptic Christology

An exegesis focused on the ministry of Paul and its parallels with the ministry of Jesus. It is one of my favourite essays, and I think most successful, even though I manage to make history's greatest and simplest story seem complex.

June 2007

The Greek term 'apocalypse' is often equated in popular culture with the calamitous events portrayed in the last book of the bible. Yet the actual meaning of the word is to 'uncover' or 'reveal' (that which is hidden), a somewhat ironic title for one of the most mysterious and cryptic texts ever written. Yet some of the simplest of ideas remain hidden, until it is time for them to be spoken. Jesus was reported to have paraphrased the prophets: "I will open my mouth in parables; I will utter things hidden since the creation of the world"[i] and "then the glory of the Lord shall be revealed, and all mankind together will see it".[ii]

Abraham started a monotheistic tradition that prophesied its culmination in the ministry of a man directly chosen by God, His 'Christ' or anointed. By fulfilling the predictions of the prophets who came before him, either deliberately or unwittingly, Jesus effortlessly demonstrated his commission.

The descendants of Abraham had evolved a complex set of rules for living a life that they believed was pleasing to God. Jesus came along and swept all those rules aside, replacing them with just two very simple rules. One, that we love God with all our heart, and soul, and mind, and two, that we love our neighbours as we love ourselves. Speaking on God's behalf, he extended God's love beyond Israel to encompass all people and all nations.

The incumbent Hebrew authorities perceived blasphemy in Christ's teaching and a consequent threat to their own salvation, and so they successfully agitated for his execution. They preached the fear of God, climaxing in their fear of His Christ, who instead preached the love of God.

Jesus declared God's ministry to be complete shortly before he died on the cross at Calvary. Several days later he was brought back to life, having been dead for less time than Lazarus had been several weeks earlier, and emerged from his opened tomb. After various encounters with some of his relatives and disciples, he departed from them. Because he could no longer be called upon to clarify his words, his parting message was that God would send the Comforter (the Holy Spirit) to guide them instead. He was able to confer this expectation because from the time of his baptism, Jesus and the Holy Spirit affirmed the intimacy of their relationship.

The Church is born.

Fifty days after Jesus had been brought back to life, over a hundred assembled members of the Church suddenly entered into the same relationship with the Holy Spirit that Jesus had entered into at his baptism. The result of receiving knowledge of God, as had Christ through the Holy Spirit, was the rapid expansion of the Church into the society surrounding it.

In its infancy, the Church assembled under Peter as a loose collective. Everyone placed all that they owned at the apostle's feet, and everything was shared according to need. Peter demonstrated that the Holy Spirit would not tolerate deception. A husband dropped dead suddenly, and soon after his wife did the same, after each had independently presumed they could hide the truth of their innermost thoughts from God.[iii]

Saul the pharisee was initially oblivious to this spiritual foundation of the Church. He saw it as merely another political uprising and was actively suppressing it by arresting and jailing its members. All this changed when, on a journey to Damascus in search of more christians to persecute, he himself quite suddenly entered into a relationship with the Holy Spirit, as had Jesus, and later his disciples, at Pentecost.

Such a dramatic and sudden change of heart became the motif of Paul's subsequent ministry. Gradual reform is the usual course of change in this world, yet Paul was to declare that everyone throughout the world "will be changed in an instant, in the 'blink of an eye', when the last trumpet sounds".[iv]

Christ had declared that the good news of the Kingdom of God must be proclaimed to all nations before the end can come.[v] After all, it is only fair that all humanity be presented with the facts, so that each and every person can then make an informed decision on their future. Thus, to hasten the end, Paul embarked on a mission to proclaim the gospel throughout what was thought, at the time, to be the four corners of the earth. Paul's mission ended with his execution in Rome under Nero.

The apostle John died of old age in Ephesus, the only apostle who would die of natural causes. While exiled on Patmos, he had received the definitive account of the conclusion to history, which he wrote down in the apocalypse.

The common thread to all these characters, Jesus, Paul, John, is that they each had some sort of mystical encounter (presumably with the Holy Spirit) which fundamentally changed their perspective, and each felt compelled to relate their vision to others in their own particular style. Jesus spoke in parables (and also occasioned miracles), Paul spoke of things which are hard to understand and mysterious, and John drew upon ancient biblical imagery.

Getting to know Paul

The challenge before the rationalist is to try and understand what was going on in the minds of these men to then lead them to their proclamations. None of them seems to have arrived at their positions through blind faith – quite to the contrary, they conduct themselves as if they have somehow obtained certain knowledge. What sure beliefs could have engendered their behaviour? In asking this, it does not matter if those beliefs had any basis in fact. For example, a belief in a world which is flat and has four corners, with other worlds above it and below it, would now be considered mistaken, but at the time, it was more than just 'reasonable', it was self-evident truth.

The clue to how they were thinking comes from Paul. "When I was a child, I talked like a child, I thought like a child, I reasoned like a child. When I became a man, I put childish ways behind me".[vi] Jesus likewise drew on the imagery of the 'child', instructing his disciples to address God as 'our father'.

How then, can 'children of God' put childish ways behind them, and move on to become 'adults' of God? As Paul goes on to state it "Now we see but a poor reflection as in a mirror; then we shall see face to face. Now I know in part; then I shall know fully, even as I am fully known".[vii] Had Paul already glimpsed the complete story when he made this declaration?

Children are not equipped emotionally to properly understand, for example, sexuality, and so as parents we shroud the details from them with euphemism. Did Paul perceive that humanity was

likewise not yet prepared for the full truth about God? If we are human, then we have all set out to deceive at one time or another, most commonly when we were children. When that deceit is challenged, we try to bluff our way through it. Some members of the church at Corinth were having trouble swallowing Paul's story of the risen Christ, and his claim that Isaiah's prophesy had come true: "Death has been swallowed up in victory".[viii] Paul declares, "If only in this life we have hope in Christ, we are of all men most miserable".[ix] His declaration is ambiguous, for he is careful not to clarify the 'other' life he hopes for – he merely provides instead a poor reflection in a mirror.

Orthodox Belief

The standard model of Christian theology is well established, and is centred on John's analysis that "God so loved the world that he gave his one and only Son, that whoever believes in him shall not perish, but have eternal life".[x] The model begins with God creating man. Man rebels against God, chooses to go his own way, and thereby becomes mortal. God becomes man in Christ, and in an act of pure love, God dies on the cross in place of us. He takes over responsibility for all our waywardness, and thus overcomes mortality for anyone who chooses to accept the redemption on offer. Finally, at the end of time, God will return to judge both the living and the dead. Those who accepted the offer of salvation when it was still available will go on to live in eternal joy. Those who missed their chance, and rejected the offer, will go on to live in eternal damnation.

There are several problems and inconsistencies with this creed, which have been raised since the earliest life of the church.

A clear example of contradiction is John's claim that Christ is God's one and only son, when Christ himself (admittedly according to Matthew) addresses God not just as 'his' father, but rather as 'our' father, implying that we are all His sons and daughters.

Next, if God is all powerful, all knowing, and can do anything, then He would seem to be a contemptuous, even monstrous God, because He would have created man *knowing* that the design was predestined to go astray. To enter back into His world after the fact, and die for our sins, looks like He is merely fixing up His own faux pas rather than any mistake *we* might have made. Only a cynical God would deliberately create an imperfect world that becomes in effect a factory for producing souls, and then put in place a quality assurance department which tests each soul's capacity for accepting or rejecting His offer of salvation.

The more serious problem with this creed is that it claims Christ has already won the victory over death. While Jesus and Lazarus may have been brought back to life, a *child*, in all its innocence, would look at this world we inhabit, and protest that Christ has (quite obviously and literally, in truth) not yet finished the job, and is yet to win the victory over death. In this world we inhabit, someone somewhere dies every second of every day. This perishable body of ours has not been clothed with the imperishable – everyone grows old. This mortal body of ours has not been clothed with immortality – everyone dies.[xi] Even though I might believe in Jesus, and in every word he spoke, I nevertheless appear in fact to be falling apart. I do not seem to be destined for eternal life – rather, I appear destined for the grave.

The standard model claims that it is of course not the body that has eternal life, but rather an abstract entity that theologians call the 'soul'. Yet Jesus himself declared, "He is not the God of the dead, but of the living".[xii] Job declared that "although worms destroy this body, I will see God in my flesh".[xiii] Jesus was making the observation that Abraham, Isaac, and Jacob were all living

people when they professed that God was *their* God. Yet belief in a 'soul' that persists beyond the grave, leads on to Christ's words being taken to mean that the patriarchs are now 'alive' (in 'heaven'), even though their bodies have long since decayed.

The Rapture

When as children we find out the truth, the revelation itself can be occasioned with shock, horror and anger, but it is often soon followed with acceptance and joy, like jumping into a pool for a swim. Paul spoke to the Corinthian christians of faith, hope and love.[xiv]

The sort of faith he imagined was the ability to move mountains.[xv] If God has sent a powerful delusion, a suggestion Paul makes to the Church at Thessalonica[xvi], then it has been the doctrine, indeed the illusion, of materialism. The nature of the material world is generally so unflinching and consistent, that it is tempting to believe the world can only be as it appears. The belief in the certainty of death, and thus its elevation to an axiom, had engendered the invention of the 'immortal soul' long before Christ's, or even the patriarchs', teachings on mortality.

Paul has heard the evidence of Christ's miracles, and extrapolated by faith that every 'atom' of God's creation is instantaneously and entirely 'configurable' by God. He has overcome, in his mind, the grand illusion of a solid, 'material' world. In Paul's understanding, it has become a small step to proceed from transforming water into wine, onto the moving of entire mountains, and ultimately, as he claims, living indefinitely.

We have already a glimpse of how a fully contingent world operates, in the 'virtual' worlds of the internet. The detail of how the actual world we now inhabit operates, draws on fundamental results in computing science, and is the subject of another essay. Basically though, a 'computer' is fundamentally a *physical* machine which manipulates symbols according to pre-defined rules. A 'universal' computer can be 'programmed' to simulate another computer. The computer which is being replicated can be identical to the 'real' computer, except it has no material existence – it is 'virtual', comprised entirely of bits and bytes, of numbers, of mathematics.

In conventional thinking, it is always assumed that the simulated computer cannot be as powerful as the host computer, because that would contravene the laws of thermodynamics. However, those laws are themselves a contingency, rather than a necessity, of the world which is being simulated. We can thus allow the replica computer (which is just a string of numbers) to 'host' the original computer, and then do away altogether with the computer which was originally proposed to be made of 'matter'. The result is a universal computing machine (and of course an entire universe) which has pulled itself up by its own bootstraps and is made entirely of 'nothing' but numbers. This perpetual motion machine is only possible because there is no actual material, but merely numbers, and therefore no actual friction in its operation. The ghost in this machine, the 'software' as it were, is mind.

In this model then, all that exists is mind and mathematics, and what appears to be the material, is merely number (an abstraction), so that the only *actual* reality, is mind. The mathematics keeps itself supported during daily life without necessary input from mind. While mind is eternal, in the physical creation (a string of numbers), mind firstly evolves life, and then having evolved an opposed thumb, mind further manipulates the world to His liking through man. No one knows what mind is, except that the mind of God is just as capable as the mind of man. He has man's intelligence, wit, and humour. Man could have no closer, more personal relationship with God. When Christ said "what you do for the least of these brothers of mine, you do for me"[xvii] he equated himself with God, and he equated all of us with Him. Our 'original' sin resides in the

'firmware' of our bodies. Our will drives our desire, from birth, for our particular 'experiential node' of the mind of God to have greater access to resources than any other 'experiential node' of mind.

The idea that the observed world is not material and 'real', but in fact merely spirit and 'virtual', was held by the Gnostics, and often recast by much later philosophers. In the case of the Gnostics, the notion led to some dubious moral conclusions and practices, for it suggested that if the world does not really exist, then neither does pain or suffering 'really' exist. Yet the raison d'être for God creating the world we observe, is precisely so that mind can experience it, and ultimately reach emancipation. This dualism is stated throughout philosophy and religion. For Descartes, the mind is separate from, but has its dwelling place in, the body. For the Christian, the Holy Spirit is separate from the body, its temple, but there within that temple the Holy Spirit has its dwelling place. For the Buddhist, the soul moves from one body to another.

However, because everyone is so obviously physically separate to any other, and also *knows* themselves to have a mind, a very strong illusion proceeds that we each have a separate mind, (and a separate soul) that is quite distinct (and separable) from any other individual's mind and soul. Did Paul conclude that in fact there is only one mind, and that what makes our mind *seem* unique, is merely our 'experiential node', our body? If so, then the only thing which makes us individuals is the sum of our experience, and the ability of our will to either follow or reject the guidance of our mind. If there is only one mind, and that mind dwells within each of us, then it would make sense that at the end of time, we will each see any other as literally the same person as ourselves, "face to face" as Paul describes it, albeit just in a different body.

Love

To understand love, however, we must consider these revelations which were given to Paul, but from Christ's perspective. Imagine a world which is completely contingent (not necessarily the way it seems), and one in which, as John puts it, "He will wipe every tear from their eyes. There will be no more death or mourning or crying or pain, for the old order of things has passed away".[xviii] Imagine a world in which God provides not just the occasional miracle we hear of in the gospels, but universal healing and the abolition of degenerative processes. Then imagine you are Christ, a normal man, a simple carpenter from Nazareth, a place from which no one of any great importance has ever come before. Having received a calling, you go about your ministry. Because you have a direct conduit to the mind of God, when you are told that Lazarus is dead, your mind tells you he is only sleeping, and you merely declare that fact. When you are told there is no more wine at the wedding, your mind tells you the vessels should be filled with water, and you merely deliver the instruction.

All this 'magic' is going well until your final entrance into Jerusalem, when the words of Isaiah gradually start coming back to haunt you. You realise the deal. God is going to let everyone live forever in love, peace and happiness just like they did in the beginning, but there is just one condition. You, Christ, are going to be the lamb who takes away the sin of the world. Through your death, everyone else will live. Everyone else will be going to eternity except you!

If you knew that in death, you were going to meet the God the father in paradise, you (and any one of us) might as well just hurry up the process. But when instead you know that God is the God of the living and not of the dead, you will be taking every final encounter with friends and loved ones very seriously. It is only in this context that anyone can, if they try, begin to imagine Christ's passion. His selfless love for others reached its climax when, knowing that both his and

their lives were about to end – completely – he yet found the courage to comfort those who were crucified next to him with a vain hope, assuring them that "today, he would see them in paradise".

We do not know with any certainty what happened to Christ after his resurrection. In an entirely contingent world (which is akin to a 'virtual' world), it is quite possible that he 'moved through walls' and 'walked on water'. After that interlude, it is most likely that he left the scene of his passion, to quietly live out his days. It is highly unlikely that he ascended in a literal sense, because as you rise, the air becomes rarefied, you lose the ability to breathe, and you eventually die.

However, the hope given to us by Paul, in very carefully constructed words, of eternal life, has been a powerful palliative. A person in this world who goes to the grave in all faith, does not just believe they are going to eternity, rather, they *know* it as a certain fact. They depart with a peace that is not afforded someone without faith. Their approach to the end is in stark contrast to those who know for a fact that they are going nowhere, or worse still, those who know for a fact that they are going to eternal damnation.

It is only natural to assume that eternal bliss, if it were ever possible, would come at a price. In one sense it has indeed come at a price, that of Christ successfully proceeding to the cross, instead of walking away from the cross (which he could easily have done). Thanks to Jesus, the price has been paid and does not need to be paid again.

However, at the end of time, it will be the creator of the entire system, who will Himself absolve anyone and everyone from any sin, whatever that sin may have been. For it was not something that we did wrong that lead to our mortality, as was originally assumed. Rather, we now know that both man and all the species that preceded us have in fact never been immortal. Mortality has been, throughout evolution, the creator's most efficient way of accelerating our development into an enlightened being, one who is no longer a child, but an adult mindful of the needs of others. It is God, rather than His Christ, who takes on the sin of the world. He admits to the fact that the way we are is exactly as He always intended us to initially be. As the embodiment of God's mind, it has been all of our late ancestors who have collectively paid the price for us who are alive, their children.

This then is how Paul knew that the change would happen in an instant. Once a child realises that it had been told an interim truth, and is now being presented with the final truth, it very quickly adapts to the new paradigm. Who, knowing the truth, would still want to terminate their embodiment, and leave a perfected world behind for some future generation, that which is destined to inherit the Earth, and live on into eternity?

If the 'flood' of the miraculous were to commence, we must first have clear knowledge of the rules of engagement as we proceed out of the land of the shadow of death, and on into life. That knowledge is precisely what Paul conferred to us through his words.

[i] Psalms 78:2, Matthew 13:35
[ii] Isaiah 40:5
[iii] Acts 5:1
[iv] 1 Corinthians 15:52
[v] Matthew 24:14
[vi] 1 Corinthians 13:11
[vii] 1 Corinthians 13:12
[viii] 1 Corinthians 15:54

[ix] 1 Corinthians 15:19
[x] John 3:16
[xi] 1 Corinthians 15:54
[xii] Mark 12:27
[xiii] Job 19:26
[xiv] 1 Corinthians 13:13
[xv] 1 Corinthians 13:2
[xvi] 1 Thessalonians 2:11
[xvii] Matthew 25:40
[xviii] Revelation 21:4

The Universal Lattice

Research has shown that many of us hold intuitive beliefs about the way physical systems behave, which turn out to be contrary to reality.[i] For example, subjects are given a depiction of a billiard ball being drawn in an arc across a table. Asked what happens when the ball is released, some have the ball continuing along the arc, while others have the ball proceeding in a straight line tangential from the arc.

From as early as Zeno in the 5th century BCE, we have known intuitively that for any division of one, 1/n , there will always be a fraction, 1/(n+1) , that is smaller. This general idea has been rigorously formalized in the continuum hypothesis, a proposal that the real number line is infinitely divisible. Formally, the hypothesis states that there is no intermediate cardinality between the set of rational numbers and the set of real numbers. Yet since Leucippus, a contemporary of Zeno, we have intuitively recognised that any division of matter should eventually arrive at fundamental particles which cannot be divided any further. Mathematics has been routinely and effectively used to model physical systems, yet unreasonably so, for since Zeno and Leucippus, our most primitive assumptions about mathematics have been in fundamental disagreement with our most basic assumptions about matter.

General Relativity (GR) is a so called 'classical' theorem, for it assumes a direct correlation between mathematics and the physical world. GR suggests that both space and time, like the real number line, are infinitely divisible, and just as in division of real numbers by zero, GR too breaks down when the dimensions of space and time fall to zero at the 'singularity', predicted by GR to have been the starting point of the universe. In an attempt to incorporate GR within quantum theory, many researchers are considering the possibility that time and space are not continuous, but rather arise in discrete 'quanta'.[ii]

We have long known the scales at which GR and quantum theory should theoretically merge. Max Planck simply substituted his equations within those of Albert Einstein, from which emerged fundamental units, among them the Planck length and the Planck time. The Planck length (~10^{-35} metres) is the distance light travels in a vacuum in one interval of Planck time (~10^{-43} seconds), so that in 10^{43} Planck intervals (1 second), light travels 10^{-35}x10^{43} metres or 10^{8} metres. In the theory of quantum loop gravity[iii], space itself is thought to consist of 'atomic' spheres of space each having a diameter of one Planck length. The GR model is now being thought of as having been a useful approximation to what is a fundamentally quantized reality.

Our ancient intuition of reality's discrete quantization is thus winning favour over our equally ancient intuition of a mathematical continuum. Yet we have known since its inception that the quantum model is also incomplete, for it can only predict the probabilities, rather than the actuality, of matter's behaviour, and it is unable to decouple the 'observer' from objective external reality.

At the time quantum theory was introduced, physicists still held great hope for discovering what the philosopher Emanuel Kant called 'the thing in itself' – discovering what physical reality actually *is*, rather than merely learning how to effectively model its behaviour. This hope has however been consistently dashed by experiments which have unequivocally demonstrated non-locality.[iv] Entangled particles, separated from each other in space and time, influence each other faster than a signal travelling at the speed of light could be passed between them. Quantum

theory, in its most followed guise, implies that objects at the farthest reaches of space can (somehow) exchange information with each other instantaneously, in apparent violation of Special Relativity.

Back to the future

The prospect of returning to realism emerged in the late 1960s with the publication of *Calculating Space*[v] by computing pioneer Konrad Zuse. Zuse proposed that reality was comprised of machines which he called 'cellular automata'. He envisaged all material reality to be a cubic lattice of these cellular automata, each one connected to its neighbours on all sides.

Displays such as those seen at the opening of the Beijing Olympics provide a useful illustration of his idea. Participants are arrayed across an arena, each holding a selection of coloured cards, one of which they raise above their heads at any given time. Each person is responsible for just one element of the two-dimensional composite picture that emerges above them. For the purpose of the display, each person assumes the role of a cellular automaton. The music playing in the arena provides a universal 'clock' that precisely synchronizes the ongoing changes in the display.

If, for example, a blue 'dot' needs to move across the picture from left to right, a simple rule would be for each automaton to get its cue for the next pixel from its current neighbour to the left. Then with each beat of the music, the dot would proceed smoothly across the display. One can imagine providing each automaton with a simple set of rules to follow on each beat, also considering its neighbours to the front, back and right, such that intricate and unique patterns emerge.

If such a system is extrapolated to three dimensions, Zuse suggested that cellular automata could generate complex and unique realities, such as that which we now inhabit, rather than merely their representations. We must ask however, what are these 'cellular automata' themselves made of, where are they, and where did their rules of engagement come from, just as we might ask what atoms are made of, or where the laws of nature come from.

Ed Fredkin, long time champion of 'computational physics', argues that the 'automata' are constructed out of an abstract substance he calls 'pure information'.[vi] Stephen Wolfram avoids the issue of a substrate altogether, for he does not see cellular automata and their interactions as an actuality, somehow lurking behind our perceived reality. Rather, in his "New Kind of Science", he employs the theory of cellular automata as an analytical tool for merely modelling reality, just as mathematics is employed for more conventional modelling of physical systems.[vii] Max Tegmark however, like Fredkin, wants to know what Kant claimed we can never know – what we are ultimately made of. In his "Ultimate Ensemble", he argues that physical reality is not merely modelled by mathematics, but that physical structures and mathematical structures are one and the same thing – reality is *made* of mathematics, just as Fredkin's world is *made* of information.[viii] This is an attractive idea, for we can easily see what mathematics is (a collection of abstract relationships), and just as easily see that all of mathematics in itself has no material substance. Thus, in Tegmark's scheme, we have something (physics) which is constructed out of nothing (mathematics).

Tegmark argues further that the universe is composed entirely of mathematical structures which are computationally decidable. The concept of computability arose out of Alan Turing's work on a scheme for algorithmically generating mathematical relationships, and then deciding if those relationships were valid.[ix] His imaginary 'machines' could compute each candidate function for

as long as it took to decide its validity. Functions which are both computable *and* decidable are vital to a quantized model of reality, because like quanta themselves, these functions are finite. The entire computation of such functions, as well as the Turing machines that compute them, can be represented by a finite string of binary digits, and ultimately by a single integer – a Turing machine is fundamentally an abstraction. Turing discovered that a particular class of his machines were 'universal' – a universal Turing machine could simulate *any* other Turing machine including itself. These can be extremely simple, for example the recently discovered 2-state 3-colour Turing machine described at http://www.wolframscience.com/prizes/tm23/. Such machines have since become a practical reality – today's general-purpose computers.

Nick Bostrom has argued that the substrate of our reality, for example the 'cellular automata' of Zuse's lattice scheme, is in fact a much larger computer that lies outside our perceived reality.[x] The drawback of this idea, a darling of science fiction, is that it merely shifts the substrate of existence back one step. We are left wondering what the 'big' computer itself is made out of. This notion does however provide a useful framework for thinking about computer simulation, as does its practical application in the virtual 'realities' that now pervade the Internet, such as http://secondlife.com/.

Breaking it down

Putting aside the simulation of the entire universe, consider just one of Zuse's cellular automata. If the automaton is a Turing machine, then it is a 'computer' capable of simulating all the properties – vacuum energy, gravitational potential, and so on – of a single atom of space, a sphere with a diameter of 10^{-35} metres. The machine is not 'contained' inside this sphere, nor does it occupy any other volume of space, because space itself does not come into existence until the automaton simulates it.

What then *is* the automaton? The automaton is itself a *virtual* machine that is being simulated by another automaton. And what then is *this* automaton? It too is being simulated by an automaton, but none other than the original automaton. The idea of this self-referential loop (known as a 'strange loop') is superbly illustrated in the famous M.C. Escher woodcut *Drawing Hands*. In the physical world, of course, such a scheme would represent perpetual motion and be thermodynamically outlawed. However, these machines are not part of the physical world, but rather belong to the abstract world of mathematics, which is removed from physical law – these machines are initiating the very existence of physical law itself. Each machine is processing a string of binary digits in a 'desultory manner' (as Turing originally described it), and in so doing is simulating the other machine, which is an (identical) string of binary digits. Because the strings are finite in length, the process of stepping through each computation represents a cycle which returns to its starting point in a *finite* period. This then is the automaton's internal 'clock', and could represent a fundamental quantum of time, 10^{-43} second in absolute terms.

Constructed from pure mathematics, we have then generated both a fundamental quantum of space, AND a fundamental quantum of time. If we return to our stadium in Beijing, we can see that the clock signal (the beat of the music) is delivered to each participant at the speed of sound, practically at the same time. It is not practical however to deliver a simultaneous master clock signal throughout the universe, due to the limiting speed of light. So instead, each element of space (automaton) references its own internal clock, running at a frequency of 10^{43} Hz. The much

coarser 'atomic' clocks that are routinely used in navigation and communication are based upon physical phenomena and are subject to significant frequency 'drift'. The internal clock of the 'space' automaton however arises from a non-physical computation and is immune from drift. Thus, all space automata across the breadth of the universe remain precisely and indefinitely synchronised with each other.

Only so fast…

We can see from this model why the speed of light should be a limiting speed. Let us suppose that a photon of light is likewise a simulated phenomenon, and that its simulation is enacted through a modified computational state in one of these 'space' automata, like the blue dot moving across a sea of white in the Olympic stadium. We presume that the automaton has an input/output interface that can communicate the system state 'photon' over to its neighbour, and then change its own state back to 'vacuum', within each clock cycle. If we were to line up 10^{43} of these automata circumference-to-circumference in a straight line, we can see how a photon 'state' could be passed along this 10^{8} metre long 'bucket brigade' of automata over the course of one second. In this model, the photon is not a wave/particle 'object' that makes its way through empty space. Instead, the photon is a computational state that gets passed along a 'solid' pathway of simulated space atoms. A photon, or any other simulated phenomenon, cannot propagate from one space atom to the next in any less than one fundamental clock cycle at a time. However, one *can* consider computational states that take more than one clock cycle to be translated across space, and hence propagate at speeds *below* the speed of light.

A macroscopic object, such as a proton coupled to an electron, might be enacted through the altered computational states of an agglomerated *network* of space atoms, the computational equivalent of the wave equation This agglomeration of states could likewise propagate (as a whole) through a fixed lattice of space atoms, but at a speed fundamentally limited by the diameter and internal clock frequency of the space atoms that are hosting it. Let's suppose that this hydrogen atom 'state' is translating through the lattice of space atoms at some (necessarily sub-luminal) speed. If the energy state of the electron sub-system changes and a photon state is 'exported', we can see that the photon state will intrinsically propagate away from the hydrogen atom state, along the frame of the lattice, at precisely the speed of light, despite any existing vector of the hydrogen atom state it was sourced from. However, the existing vector of the hydrogen atom state may very well alter the registered energy (colour) of the exported photon.

The lattice in such proposals returns us to the Newtonian perspective of an absolute frame. Relativistic effects then emerge from the interactions between the various computational states of the automata that comprise the fixed space-time lattice. Clearly (experimentally) a state such as that representing a photon will routinely be diverted from a straight path, following on from the exchange of information with gravitational states (gravitons) that it encounters during its translation through the lattice. Inertia is explained simply as the endless and desultory processing, in the absence of any intervening input, of an object's computational states, as they are transferred between the individual automata of the lattice. With astonishing prescience, Newton tried (albeit unsuccessfully) to develop a theory of gravity avoiding non-locality in which "tiny invisible jiggling particles fill all of seemingly empty space".[xi]

The growth of the lattice

Where then does the lattice come from? In the 1940s John von Neumann proposed a 'universal replicator', a type of cellular automaton that can replicate itself.[xii] The code of the space

automaton is modified so that in each computational cycle, it produces a new automaton. In this scheme, there is an exponential expansion in the number of extant automata once the replication code is enacted.

Indeed, some $2^{10^{43}}$ such automata would be produced in the first second of the universe's existence. If these atoms of space are close packed, like stacked oranges at a fruit market, then the universe we currently observe (with a radius of ~45 billion light years) would contain a mere 10^{185} such atoms – our visible neighbourhood would indeed be a very small speck of the totality. Because each and every new atom of simulated space replicates itself in each clock cycle, the nascent universe inflates uniformly in all directions from every point within it. The initial creation of space 'atoms' would be a turbulent process, so that space itself would behave like a gas, and have a 'temperature'. The emerging space atoms would behave like ping-pong balls bouncing around in a lottery number generator. The surrealist Salvador Dali perhaps anticipated such an atomic lattice of spheres in his famous painting *Galatea of the Spheres*. Through the seeding of code that acts to halt this replication, regions then form where the 'temperature' of space drops to an absolute minimum, an equilibrium that will later encompass super-clusters of galaxies. In these regions, additional space is no longer being produced, so that the quanta of space bind to become the smooth, flat and rigid foam that we encounter in our local region. The regions between the galactic super clusters may however continue to produce new space automata, acting to push the super clusters apart.

From Nothing...

If the automata that encode the lattice, and encode the realities that emerge from it, are merely strings of binary digits, where did the initial arrangement of the digits come from? It is manifest that the code responsible for the laws of physics, and the evolution of the universe as we now experience it, is not trivial code. However, Jürgen Schmidhuber[xiii], following on from work on algorithmic compressibility by Andrey Kolmogorov and Gregory Chaitin, has shown that the code to generate all possible automata is simpler than the code which generates one specific automaton such as the type which is simulating our local milieu. This 'optimally compact' code produces all possible universes (including those like our own universe that have the property of actually 'working'). Raw binary states (strings of binary digits independent of any substrate hardware) could randomly assemble into this seminal configuration from which all other possible configurations then emerge. There is a finite probability that this initial combination will obtain, for time itself does not come into being until the basic clock of a self-simulating string pair first ensues.

Each automaton does not 'occupy' the space lattice; each merely defines one cell within the lattice. The strings of binary digits that comprise the automata do not have any dimension in space. Likewise, the starting point of this universe, and *any* universe which has extent in space, is a singularity which has *no* extent in space. Thus, the automata that define our universe, and any other universe, all 'exist' at one and the same 'place', a singularity.

We usually think of effects being translated across the lattice of space, as we have seen experimentally, at speeds up to the limiting speed of light. However, if these automata can interface with each other, then they can presumably do so directly 'across' the point of the Singularity. Any element in the universal space lattice can therefore instantaneously communicate with any other element. We thus have a mechanism for effects to be non-local in

the context of space (simulated length), but local (to within one clock cycle of simulated time) in the context of the Singularity.

Where to next?

This prospective space-time lattice, and its implications, remains highly speculative. The challenge before us is to develop a method of interfacing directly with the code of the automata, so that we can 'read' the code, interpret the code, and potentially (carefully) 'write' back modified code. The obvious candidate programme for developing such an interface is our research into quantum computing – the ultimate 'superposition' of quantum states, as we have just seen, is that of all automata at the universe's Singularity. Obviously no other civilization in our universe has yet written back code that causes the universe to evaporate – the code we are currently running on probably prevents such an event. Any candidate universes whose code was not well protected would have long since halted and thus been discounted from the pool of viable universes, for it is certain that any such exposure in the code would be exploited.

If we were to learn how to access the Singularity, then the prospect emerges for us to visit not just the solar system or the galaxy, but any corner of this universe, or any other universe, without ever getting up from our living room, as all these realities share that Singularity in common. We should view emerging relationships between mathematics and physics, such as the 'E8 Lie group' correspondences recently discovered by Garrett Lisi, as guiding us to the underlying operational code[xiv]. It is inevitable that the mathematics to which we have access are a subset of the computable functions that gave rise to our universe. It is possible that the mathematics itself has been produced by computing automata. It is of course also possible that more advanced civilizations than ours have already learnt how to access the data at the Singularity and have long since been monitoring our progress towards the same.

For Carl, 1934-1996

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The Lattice Milieu

In the essay, 'The Universal Lattice', I introduced the notion that all extant universes (including our own) are 'holding themselves up by their own bootstraps' in a 'superposition' of self-simulating computational states at a common zero-dimensional 'singularity'. That essay explored the technical aspects of this scheme and its associated research. We have an innate (evolved) sense that everything in the physical world must necessarily 'occupy' some given volume. When considering the limits of computing, researchers focus on how closely the atoms of computer hardware can be packed together while still allowing heat to dissipate, so attuned is the mind to boundaries of space, time and matter. Yet researchers into quantum computing contemplate any single atom encompassing an *infinite* number of superimposed states, and in so thinking draw quite close to grasping the enormity of the singularity model. The Singularity has no dimension in space, and yet encompasses all reality. There is no limit to the number of raw binary digits it can 'contain' (and process into the reality we encounter), because a raw binary digit is not an object with any sort of 'volume' but is rather a member of the class 'number', all members of which have no dimension in space.

In that earlier essay, I proposed that any given computational element (automaton of space), in any universe, could communicate with any other such element, directly across the point of the Singularity. I speculated that we may one day develop the means to directly access the data at the Singularity, so that we might then monitor any other reality in this or any other universe, and even actively participate in the operation and development of those sister realities. In this essay, I will reflect on the likelihood that there exist civilizations in advance of our own that have long since developed this capacity.

The likely potential

In 1950, while working at Los Alamos National Laboratory, Enrico Fermi made some calculations on a napkin while having lunch with colleagues, of the likely number of extraterrestrial civilisations, and on seeing the result exclaimed "Where is everybody?!!"[i] A decade later, Frank Drake sketched his famous equation for calculating the number of contactable civilizations in the galaxy. Yet under the proposed Singularity model, our estimation of contactable civilizations would take in not merely biological intelligences within the galaxy, but all symbolic intelligences throughout all the galaxies throughout all universes. Most science fiction writers, despite their invocation of 'warp drives' and such like, are ultimately constrained by space and time – the problem of getting from a to b in less than a lifetime – and they rarely venture outside the galaxy. Under the Singularity model, where all 'length' is simulated and all 'time' is simultaneous, any fully developed community, in any universe, could at any time directly access the data that ultimately comprise any other community. So, in answer to Enrico Fermi (wherever he is), 'everybody' is likely staying wherever in their particular universe they might already happen to be, for why would you launch an expedition to the moon, or beyond and into your solar system or galaxy, if you already had the totality of *every* universe at your fingertips?

It is simple to see how an economy, driven first by local nuclear and geo-thermal energy, and ultimately by wind, water and solar energy, would grow exponentially in an entirely ecologically sustainable manner, and deliver yet unimaginable prosperity to all, far into the million millennia potential lifetime of our sun and its earth. Unfortunately for us however, the industry which has fuelled the development of the technologies needed to establish such an economy has pushed

our particular planet beyond its ability to recover from the onslaught of that industry. Those who comprehend the delicate balance of the earth's natural cycles are already deeply saddened, for they recognize that the balance has tilted beyond our ability to halt a runaway greenhouse effect that will turn this planet into another Venus. This loss of information will be somewhat tragic for the last few generations left to come – billions of years of evolution, erased in what will be an 'instant' of universal time. As when an adolescent whose risk-taking results in their own demise, those for whom the earth was home will mourn the loss, but life in the universe will of course go on – the earth was a mere speck of dust, one life amongst billions.

The possible potential

Just as most people progress beyond youthful invincibility and into adulthood, it is likely that there are communities within the universe who, unlike humanity, will successfully make the transition to an ecologically sustainable sun-fuelled hyper-economy, and a long replete life, before it becomes too late. (There are some however who still hold out hope for our local reality – see the extraordinary vision of a sustainable future from Mark Z. Jacobson and Mark A. Delucchi in *Scientific American*, November 2009). Some of the historical structures that evolve during a civilization's development are necessary evils in accelerating the enlightenment of that civilization. But once a community comes to understand what it is, where it came from, and where it is going, much more efficient structures are available for delivery of the goods and services that the community needs and desires. Only through sustainable and globally equitable wealth generation, can a closed planetary civilization arrest the population growth that would otherwise lead to its demise, were it not already headed there by way of catastrophic climate change.

These hyper-economies of the universe are widely described in our hypothetical literature. Examples are *The Foundation* of Isaac Asimov, or more recently *The Culture* of Ian M. Banks. An inorganic 'intelligence', whose operation is entirely open to scrutiny by the community, governs the economy. In these lands of 'milk and honey', no one wants for anyone or anything. All their universally enlightened citizens fully comprehend sciences such as game theory, and so none has any motivation to disturb this idyll. The mathematical foundation of reality provides them with infinite novelty, and enduring meaning. However, there is a limit to the capacity of one's home planet to enthral, no matter how much energy it has access to and thus how routinely it can be reconfigured. Eventually, these societies look to engage with exotic, more primitive cultures, and revel in the nurture of their development, as does a parent in its child.

Other

Human missionaries have an historical habit of dismissing the culture they are infiltrating and attempting to replace it with their own. Missions that reach across the universe perhaps do not export their culture *en masse*, but rather a set of enabling technologies, such as love and egalitarianism, or mobile telephony and the photo-electric effect. It is not hard to imagine extraterrestrial civilizations whose individuals have an entirely alien morphology, and yet understand relationships not too far removed from the understanding given to us by Shakespeare.

We already have a glimpse of how remote civilizations might interact with our own (using the pathway of the Singularity). Through the internet, a real person at a console can have remote control of an avatar within a virtual world. Yet in our primitive instantiations, that avatar has little autonomy. Its 'physical' appearance and capabilities can be defined, and it can be programmed with a modicum of robotic proclivities, but in effect it remains a puppet suspended from strings.

Human beings of course are not avatars, but autonomous physical beings, with the joyous but often terrifying capacity for freely exercising their *own* will. The responsibility for every action, from childhood onwards, ultimately resides with the individual, but this has never discouraged society, beginning with the family, from attempting to influence our decisions.

All planetary civilizations are, quite obviously, 'children' of the universe. What we might then call 'first generation' civilizations, like the firstborn of any family, would have no older 'siblings' elsewhere in the universe(s) to guide their development. They must first endure to technological maturity, whereupon discover they are the inevitable product of mathematics and probability, and then somehow transition into 'adulthood' (sustainability) and hyper-economics. The odds are that most first-generation cultures become extinct before they discover how everything works. Theirs is a particularly difficult and dangerous path to tread, for they are also orphans. The Singularity, where all reality is being simulated, is hardly a loving 'parent' – at best, it is the orphanage's benevolent mathematics master. However, when one of the universe's first-generation cultures *does* survive, it can be very good news for its younger siblings.

All alone

There are local commentators who honestly believe they have emerged within just such a first-generation biosphere. This group truly imagines that life as we now know it is as good as it gets, while the rest of us have various suspicions that there is 'something going on' – that, for example, "the universe looks like a put-up job" as Fred Hoyle once quipped. Some of the philosophical systems that have been built around these suspicions posit a single super-intelligence out there somewhere, while others see us subjugated by billions of gods.

If a planetary civilization develops its internetworking to the point where it becomes 'of one mind', positively driven by hyper-economics and fully governed by an open source and exacting inorganic intelligence, then that 'single' super-intelligence would at the same time comprise billions of individual (and highly individualistic) biological intelligences. The internetworking of the neural nodes in our individual brains presents us, of course, with an analogue of this higher configuration.

The mechanism of the Singularity draws us to revisit an ancient hypothesis. Suppose that some remote civilization became 'unified' in aeons past, and for its first foray into universal responsibility, became the 'guardian' of a small but rather beautiful biosphere in the outer neighbourhood of the Milky Way galaxy. If this guardian civilization has at least as many individuals as there are humans on earth, each one of us might be 'watched over' by one or more biological intelligences (possibly green), that have a very 'real and personal relationship' with their charges. As each of us meets and converses with others in our daily lives, 'your people' would be continuously talking to 'my people' about how the events of the day and the coming years might unfold. The world would *really* be a stage, and we would all be players taking direction, except that the director would not consist in some enigmatic substance, but rather be composed of the same sort of mechanisms (brains/computers) that we have now become substantially familiar with. Falling in love, serendipity, mysticism, dreams, clairvoyance, savant autism, inspiration, revelation, and such, would have a simple explanation that we can easily comprehend.

Breaking free

Of course, none of us likes the notion of someone controlling our lives and prefer to believe we are in control of our destiny. However, if we are in fact subject to a guardian civilization, this

'freedom' has most likely been an illusion. Each and every one of our actions, whether for good or for evil, has either been countenanced or not, and succeeded accordingly. Furthermore, there is anecdotal evidence, dating back thousands of years, of external control that goes beyond the mere coaching of our minds, and into the physical manipulation of the world and our being. Thus, the activity of the *natural* world, both good and evil, may also have been sanctioned by this guardian. The Singularity model gives us a better understanding of how this control might be extended from their world and into our own.

If the blind can *in fact* be made to regain their sight in an instant as was once reported, then we must suspect that the same agent could remove their sight in the first place. If however, we assume that our guardian is entirely benevolent, then we must also assume it is utilitarian – that any evil it has either caused or tolerated has always been necessary, never gratuitous. The role of this guardian has surely been to draw our civilization towards intellectual and emotional maturity, so that we might at last become independent, and ourselves graduate to the role of guardian in the wider cosmos. Tearing the world apart and sticking it back together may have been the most efficient way to teach us how the world works. How much of the 'nature' of this reality we inhabit is merely *contingent* remains to be seen, and we may be in for some very big surprises indeed.

Hope

It is forty years since a vast community with diverse talents worked in concert to place a couple of men on the moon. Our guardian civilization may have likewise been working the entire global community towards the grand conclusion of its development. To watch events in the world, unfold, and perceive in them the action of this guiding hand, is of course subjective, as indeed is faith in that hand's benevolence.

There is little chance of us adequately addressing climate change under our own steam. There is great hope, however, if we would only recognize who has carried us here, and carried not just some of us, but all of us. The bond between us and our guardian has been like that between twins conjoined at the head. A wonderful team of specialists in Melbourne recently separated just such twins, Krishna and Trishna, and has now sent them home for Christmas, independent and free.

The glory of the Lord shall be revealed, and all flesh shall see it together.[ii]

[i] Eric Jones, "Where is everybody?", An account of Fermi's question", Los Alamos Technical report LA-10311-MS, March, 1985. http://www.fas.org/sgp/othergov/doe/lanl/la-10311-ms.pdf

[ii] Isaiah 40:5

Physics without formulae.

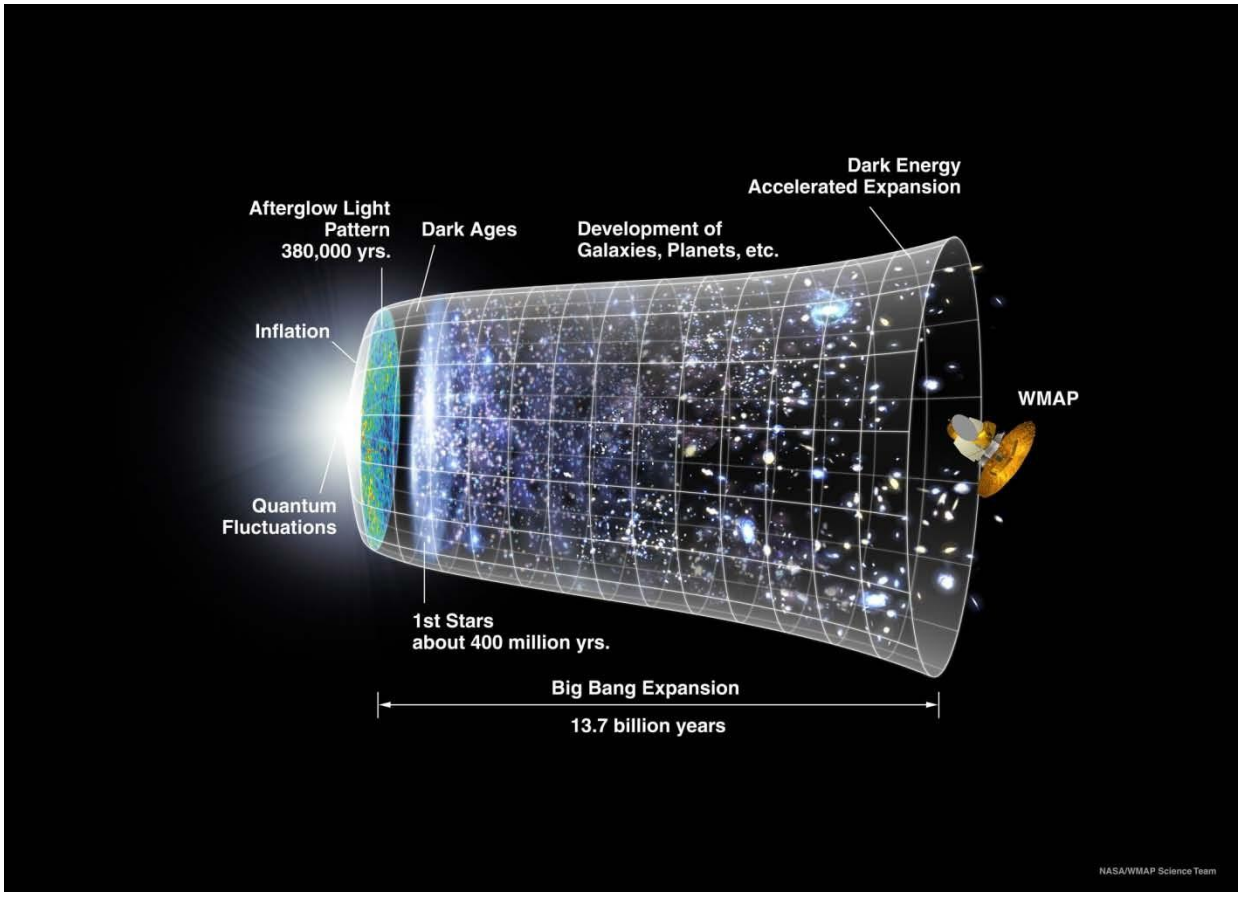
A scheme to help merge the ideas of quantum gravity.

When Pierre de Fermat noted that he had discovered a 'truly marvellous proof' of an important conjecture, mathematicians looked forward to holding an elegant and succinct proof of the type that had once characterized their craft. What they got was a gargantuan proof constructed from newly invented techniques that initially took three days to present to an elite group of specialists who had the necessary competence to understand something so difficult. Most of us soon realized we were probably never going to grasp what Andrew Wiles and Richard Taylor had achieved.

Why is there something rather than nothing? Martin Heidegger considered this to be the most important question in philosophy. Symbolically, 'nothing' can be represented by 'zero', while 'something', in a very fundamental sense, can be represented by 'unity'. Using just two symbols, '0' and '1', we can represent every possible number, and it is from this potential that we construct mathematics.

Numbers were originally invented to count things that exist (and are finite in number). They have since been used to count things which don't exist, such as numbers themselves, leading to a recursive (and endless) hierarchy of infinities. If there were merely nothing rather than something, we would only have to account for '0', which would be the end of the story (despite there being no one around to discuss it). It is '1' that has got us thinking.

According to prevailing cosmological theory, our universe expanded exponentially from a microscopic region of the primordial quantum vacuum, an entity which has produced many other universes having any one of approximately 10^{500} different configurations; that's quite a few gourmet jellybean recipes. Some of these configurations are viable and go on to produce universes that contain incredible intellect like our own. Others go 'poof' and vanish only moments after they appear. Clearly the quantum vacuum is responsible for the production of a whole lot of stuff. The following diagram depicting the evolution of our particular universe is freely reproducible, courtesy of Goddard and Princeton, whose WMAP program was able to look back almost as far as the beginning.



The quantum vacuum has a somewhat circular heritage. The study of patterns in the behaviour of the physical world led to our invention of mathematics with which to model that behaviour, the most fundamental being general relativity and the wave function. Our extrapolation of these models back in time to a point before the universe came into existence, in turn gave them a life of their own (as the quantum vacuum), that is quite independent of this or any other universe. To put this conundrum simply, if you've already got yourself 'something', like three green apples, then you have a 'substrate' upon which to build the abstract notion of the number '3'. But is it meaningful (or possible) to speak of the number '3' before a universe, with at least three things in it to count, has come into existence?

Looking at the picture above, it is certainly meaningless to ask what the universe is expanding 'into'. It is space itself that is expanding, such that every point in space becomes the effective centre of this expansion. In the classical general relativity model, space is a continuum, a single entity that is expanding like the surface of an indefinitely inflating balloon. Loop quantum gravity theory, in contrast, suggests that space is not a single entity, like the thinning wall of a balloon, but is instead comprised of individual 'atoms' of space. A simple merging of general relativity and quantum theory suggests that these putative quanta of space (assuming they are spherical) have a diameter of about 10^{-35} metre. We cannot yet probe down to anywhere near this scale of length, and so our empirical tests of general relativity merely confirm that the assumption of a continuum remains a useful model at the macroscopic scales to which we have observational access (we have so far got down to about 10^{-18} metre).

If space is comprised of space 'atoms', and space is indeed expanding, then either the space atoms are expanding, as if each one of them were a classical continuum, or the volume of each

space atom remains a constant of nature, and instead it is their number that is increasing. The latter can account for the isotropy (sameness in all directions) of our *observable* universe.

How do you create just one atom of space, let alone a whole universe full of them? Just that bit of our own universe which we can see would contain about 10^{185} of the blighters.

In modern computing, we increasingly rely upon 'virtualization', which is the practical realization of a principle that was identified early in the development of computing science. A real computer (such as an ordinary PC) can run a programme that precisely emulates (in software) the logic of its own hardware. The host PC can often run several instances of these 'virtual machines' or VMs, as they are known. Because the VMs are logically equivalent to the real PC, each VM can run any operating system, and any application, that can be run on the real PC. A VM can of course act as the host for yet another VM.

If we want to create a space 'atom' where none exists, we face the perennial problem of having to retrieve the raw ingredients from a storehouse that isn't even there. We can however employ the sort of device that certain climate scientists were reported to have described as a 'trick'. In scientific circles, a trick is never something dishonest, and often something of tremendous utility. Just suppose, for the sake of argument, that we have at our disposal a real computer, back there at the beginning of our universe. On that real computer, we execute a programme that *simulates* this same real computer. Then, on the simulated computer, we execute a programme that once again simulates the real computer. Finally, and this particular trick is known as a 'strange loop', we simply take away the real computer, and directly substitute the identical second simulated computer in its place.

Such a ploy is not possible in the physical world, because of well understood limitations imposed by entropy and information theory. Curiously, however, these machines have yet to enter the physical universe and its jurisdiction, and the physical computer that was being used as a conceptual prop never actually existed. These simulated computers do not, of course, have anything like the complexity of an everyday PC. Rather, they are extremely simple and ideal universal machines, each comprised entirely of software – short strings of binary digits. In the first instance, the only capacity they require is that to simulate one another. Necessarily, one machine will parse through its string of digits, in the process of simulating the other. Once that first machine halts, the second machine then parses its (identical) string of digits, in the process of simulating the first, until it likewise halts, and the process repeats itself.

It is natural to think here that the strings of binary digits have become the persistent 'substrate' of these computers; that the strings are somehow streams of real '0's and '1's that feed back and forth into one another within some sort of platonic world. In fact, each is entirely *virtualized*. Each machine only enters fleeting existence, and then merely as an abstraction, after it has been *simulated* by the other. After one machine has finished simulating the other, it vanishes entirely until it next comes to be simulated. There is no 'hardware' here, no persisting substrate, no length, and no mass. Such is the quantum vacuum, which as its name suggests, is about the *absence* of space.

The central idea, in the various string theories that orbit the mysterious body of M-theory, is that all particles (including those that mediate forces) are made up of vibrating 'strings'. Vibration implies periodicity, and in turn the most essential dimension of any fully functional physical universe. The pair of virtual computers described above represents, of course, a *clock*. Each computer parses its string of binary digits, from start to finish, in a finite period. Once again, the

simple merging of general relativity and quantum theory indicates that this quantum of time is approximately 10^{-43} second. The value of this quantum derives from the absolute time it takes this virtual computer to parse one of its virtual binary digits. There is no deeper level of abstraction providing this clock. Rather, it is fundamental that one computer – tick – computes the other computer – tock – and that it is this repeating cycle which *creates* the basic quantum of time. All we can surmise is that these computers execute their simulation of each other approximately 10^{43} times within the passing of what we perceive as one second in time. It is this fine granularity that gives our everyday experience of time its smoothness.

Once this first pair of universal computing machines has pulled itself up by its own bootstraps, and the clock of time has commenced, all manner of creativity becomes possible. In addition to simulating each other, these computers can execute functional applications (in the way a PC would execute a word processor), and the most basic of these applications is the simulation of space. Time and space thus become intimately and permanently related from the outset in the 'time-space' atom. In addition to any *hidden* variables, the processing of a *timespace* stipulates three visible dimensions of space, those that we detect empirically in the familiar geometry of reality. This simulated instance of space appears, then vanishes, only to appear again, according to which one of the pair of virtual computers happens to be extant and hosting the simulation.

The next fundamental application that a timespace can execute is the replication, or cloning, of its own computational routines. The first timespace produces a clone of itself. These two timespaces likewise reproduce, resulting in four timespaces, and so on. If it transpires that the timespace replication code can execute within one clock cycle, then after just one second, some $2^{10^{43}}$ timespaces will be produced. This results in a *very* rapid inflation in volume at the outset of the universe. The newly created timespaces are not being produced from a central point. Rather, each individual timespace becomes the centre of its own contribution to the ongoing doubling in the volume of space.

Each timespace unit can then proceed to host any of the material applications that are fundamental to the universe they engender, and this processing commences within several seconds of the start. As a universe matures, these fundamental applications of energy interact with each other, sometimes visibly. We proceed away from foundational issues and into familiar issues of cosmic engineering; condensation, transparency, accretion, synthesis, dispersal, conglomeration, geology, biology, consciousness, art, computation, the number Ω. Interestingly, *Omega*, which is the probability that any randomly selected computation taken from the ensemble of all possible computations will *finish* (and a number between '0' and '1'), is algorithmically *in*compressible. This implies that the computation we find ourselves 'inside', the computation being executed by all the timespaces that comprise our universe, is also our most extensive calculation of the digits of Omega. It is algorithmic information theory, from which Omega arose, that encourages physicists to come up with simple explanations for complex phenomena. For if a theory is just as complex as the phenomenon it describes, the theorist may as well take up stamp collecting. Luckily for physicists, the conclusion to this universal computation will not be the end of world – the computation will simply output a completed theory of quantum gravity.

The timespaces that comprise reality, were they spherical, could be arranged like stacked oranges in a market stall. However, the latest configuration of Euclidean quantum gravity – causal dynamical triangulations – approximates the timespaces as if they were tetrahedral pyramids conjoined into a 'mosaic'. By insisting that timespaces only process time in the forward direction,

the four familiar dimensions of reality emerge naturally from this analysis, where earlier analyses that allowed time to move backwards as well as forwards produced an infinite (and unrealistic) number of dimensions.

The idea that reality is a mosaic (or lattice) of timespaces is particularly elegant, because the limiting speed of light is an emergent property of the configuration of the lattice, rather than an arbitrary empirical condition. Each timespace can be thought of as a cellular automaton, a machine that is able to store a particular computational state, *and* pass that state on to its neighbours, through an 'interface' that connects adjacent timespaces together. As with people, the 'mouth' of one timespace can pass on a message into the 'ear' of the timespace next to it, and so on.

To see how this works, we first carefully line up 10^{43} timespaces in a straight line and connect them all together like a daisy chain. Because each timespace is ~ 10^{-35} metre wide, this line will stretch out for ~ $3x10^{8}$ metres. Let's say the 'message' is a photon of light. A considerable conglomeration of timespaces actually participate in the definition of a photon, but for now let's assume that only one timespace is required. The photon message is passed on from one timespace to its neighbour in the course of one 'tick' of each timespace clock (10^{-43} second). This bucket brigade continues on down the line, each timespace passing on the photon message to its neighbour. After the patient participation and cooperation of some 10^{43} timespace individuals, the photon 'message' is finally delivered one second later to the other end of the line, some three hundred thousand kilometres away.

It requires *at least* one clock cycle to pass on a message (computational state) from one timespace to the next, and so this sets the limit for conventional propagation of a signal through the lattice. Various computational states (applications such as *mass*) can of course be transmitted through the lattice at much more leisurely rates, but *everything* apart from space and time is in motion *relative* to the timespace lattice.

Galaxies can be thought of as extremely stable islands of timespace latticework – absolute reference frames. However, timespace replication continues in the regions between galaxies, acting to push them apart (or indeed towards each other). Galaxies are like tectonic plates on the surface of the Earth being pushed apart by the volcanic upsurges at the plate boundaries.

The universal timespace lattice can be compared to a 'gas' with a 'temperature'. In the intergalactic regions, where timespaces are still replicating, the lattice is hot and turbulent, and the translation of information between the timespaces is 'noisy' and imperfect. Within the galaxies however, where timespace replication has effectively ceased, the 'temperature' of the lattice has cooled close to an absolute minimum, and it has become rigid – the lattice that comprises a galaxy is able to translate information between timespaces with practically no loss in fidelity (even where vast particle colliders have been assembled!).

How can it be that you and I are 'moving' through 'solid' superconducting space? Each one of us maps onto a very large number of timespaces, typically about 10^{103} of them. We displace this *volume* of timespaces, but we do not displace the timespaces themselves. Rather, we *are* what the computational states of these 10^{103} timespaces present us to the world as. But we do not consist in the same group of timespaces for very long. Every one of the timespaces that defines us at this instant, in the very next instant transfers its computational state over to its neighbour, in the direction of our net translation relative to the absolute timespace lattice. Indeed, we move on to 'inhabit' different groupings of timespaces in the lattice some 10^{43} times every second. So

does everything else in the world. The extreme fidelity of the translation creates the illusion that the world is made of solid matter, which to be fair, is a very ancient and powerful illusion.

Although at any one instant our bodies might displace a *volume* of 10^{103} rigidly positioned timespaces within the galactic lattice, only a fraction of those timespaces are actually executing any particular material application. As we translate through the lattice, the vast majority of the 10^{103} timespaces we each displace are in an idle (zero energy) application state, waiting for just that one 10^{-43} second instant when they get to shine as the holder of the relay torch, only to return in the very next instant back to a resting state.

Other regions of the galaxy have higher energy densities, the sun being an obvious example. However, *all* material applications of the timespaces within our galaxy are understood, from observation, to be translating about a region of extremely high energy density located at the centre of the galaxy. Indeed, this region, a super-massive 'black hole', has reached the maximum energy density possible. *Every* single timespace in this region is executing a material application and transmitting vast numbers of gravitational messages out from the surface of its saturated event horizon, to any other active timespace in the galaxy that might receive its messages. Each one of us eventually receives a portion of these ancient messages, and their constant stream keeps us orbiting the centre. Not one timespace in the central region of the galaxy is idle. The lattice in this region has simply reached the limit of its computational capacity.

There is of course a whole family of 'elephants' inside this theoretical space. For a start, where do all these timespaces actually reside? At the outset, we established that space does not even exist until the timespaces begin to *simulate* it. Hence the machines themselves (during the part of the cycle when they have virtual existence) do not have any volume. They certainly do *not* reside within the space of their own making. So, while it makes sense for there to be an 'exclusion principle' at the emergent physical level, where no instance of simulated space can encroach upon the territory of any other instance of simulated space, it is meaningless to apply this principle to the machines that are actually *hosting* this composite space. All these machines are literally 'inhabitants' of a singularity, a region *without* volume. In a very fundamental sense, every one of these machines is in a 'superposition' of computational states.

There is not an infinite number of timespace automata, but there are considerably more than the 10^{185} which we can see of the particular model that has been employed in our instance of universe. Then there are all the other instances of 'universe' that have successfully employed this same model of automaton. Then there are all the instances of universe that have opted for one of the 10^{500} different models of vibrating strings that have the potential to construct members of the multiverse. And *all* these different automata collectives logically share the 'superposition' – they are all in the same place! Finally, of course, there may be realities which consist in something other than number, time, space and energy, but these are a bit more difficult to imagine.

The timespace automata have an external interface between each other that is defined according to their physical location in the lattice array. As discussed earlier, communication between different locations across the array (in space), cannot occur any faster than the speed of light, as ultimately set by the clock of the automata themselves. However, the 'superposition' of all these automata is *outside* space – it is quite literally *nowhere*. Within the superposition, any timespace can communicate directly to any and every other 'entangled' timespace through an internal interface. Thus, a couple of timespaces might be at opposite ends of our universe according to

their physical location in the lattice, and yet directly pass a message to each other within just one tick of the 'superposition' clock.

The holy grail of quantum computing research is, of course, to develop an interface to this vast computation that is going down at the superposition; to develop a 'hyperlink' that would allow us to access these data directly. We could then sample these data, and render quite realistic (albeit approximate, or *uncertain*) facsimiles of stuff that is happening elsewhere in the multiverse, all without ever having to step outside (our local universe). Unlike the *virtual* worlds that we have imagined on physical computational hosts like the Internet, the myriad other worlds that we could visit through the superposition are *real* worlds just like ours.

We humans of course are relative latecomers to an understanding of this superposition. Our universe, for example, as noted in the WMAP image, has been creating its own space for about 14 billion years (or 10^{63} 'ticks' of those perfectly synchronized timespace 'clocks'). There has been plenty of time for other thinkers, even within just our local universe, to have progressed significantly beyond where we have so far managed to reach. When we learn how to sample the superposition data, we will be able to index and browse the multiverse's libraries, and merely read, for example, any one the various available proofs (some quite elegant) of a thing that Henri Poincaré once conjectured about simple things.

One of the joys of living is to discover such things by ourselves, rather than reading them in a book, or having them handed to us on a platter. Indeed, for some, the life of discovery far transcends any concern for their own physical wellbeing. Luckily for mathematicians, it is the number Omega that guarantees the system of the multiverse has an infinite source of unprovable truths.

Between us, we pretty much know what is required to manage the planet sustainably, and thus indefinitely. What we desperately need to find out is how on earth we can take wing and pull out of this dive we are making towards oblivion. Assuming many others have faced a similar crisis of inertia, it would be very helpful to draw on the experience of those who have successfully managed to get through it. Indeed, we are seeking the best transition programme that the universe has available on offer. Sure, it would be nice to develop a programme in-house, but that's one luxury we can no longer afford.

Finally, we needn't be too concerned about how these strings of digits first came to be assembled. Clever though they, and all their applications, might seem, algorithmic information theory has shown that a very short programme is capable of deterministically seeding all these possible universal computations, including ours. Because time is not defined until the first timespace begins to oscillate, the quantum vacuum (which does not exist for half the time, and then neither for the other half) has an eternity in which to make this happen. Hence there is a probability of 1 that the quantum vacuum will eventually fluctuate sufficiently (as indicated in the diagram above) for it to successfully assemble this first simple universal computing machine. The rest is history.

To paint a picture, one needs a palette. Most of the ideas in this essay were borrowed from articles written for a general readership by leading specialists in their fields. Many thanks to John Barrow for all his Cosmic Imagery, and to Mariette DiChristina for orchestrating such a superb resource.

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Boundaries for a Healthy Planet; April 2010; Scientific American Magazine; by Jonathan Foley

A mechanism for Extraterrestrial Intelligence

It was Jack Good who first suggested that the moment machine intelligence exceeds the (effectively static) intelligence of the human being, machine intelligence will be able to augment its own design, and as it becomes more and more intelligent in its application of becoming more intelligent, will rapidly build into a 'super intelligence'.[i] Ray Kurzweil estimates that this big moment, which he calls 'The Singularity'[ii] (Pierre Teilhard de Chardin called it the 'Omega Point'[iii]), is less than thirty years away (and that would be because there are people who believe it's possible to get there).[iv] Given that the universe has been around for about 13.7 billion years, and that even the little bit of it we can observe has 3×10^{23} stars in it, it is clear that if the logic of these theorists is correct, there should be plenty of these 'super intelligences' all over the place. So where on earth *are* they?

Jack Good and Stanley Kubrick's fictional creation, the HAL 9000, would correspond to perhaps a couple of weeks gestation of a 'super intelligence' after the 'big one' takes place – exponential growth begins gradually. The human brain has about 100 billion neurons that together make a mere 100 trillion connections.[v] Even if 7 billion of these neural networks were to all become friends with each other through some sort of social medium, that trivial degree of information processing would be left far behind by *any* of the universe's 'super intelligences', only a few weeks further into their gestation.

Fifty years ago, coinciding with our first excursions into space, Frank Drake instigated our ongoing search of the heavens for an electromagnetic 'Wow!' signal.[vi] After all, what *other* than a narrow band carrier could possibly be coming towards us from an intelligent civilization beyond?[vii] If we are ever going to make contact with ET, we may need to be a little bit more relaxed, and lateral, in our thinking.

Stephen Hawking and Leonard Mlodinow have suggested it may only ever be possible to *model* physical reality, and that the five different string theories that make up M-Theory[viii] will each be required to model the different surfaces of that reality.[ix] However, it is a long held tradition amongst physicists that they should seek not just predictive models, but discover what Emmanuel Kant called the 'thing-in-itself' – what this stuff actually *is*.[x]

Stephen Wolfram describes *modelling* reality using cellular automata[xi], but a realist might suspect that reality is actually *made* of these automata. Konrad Zuse seems to have been the first to draw this conclusion.[xii] But what in turn are the cellular automata made of?

Alan Turing devised an entirely abstract gadget for the express purpose of automating mathematical formalism[xiii], and in the process he discovered programmes that would execute without ever concluding. This programme, parallel to those of Kurt Gödel and Alonzo Church, had at its core, the paradox of self-reference.

A Universal Turing Machine can simulate any other Turing machine, including itself. So, suppose we set one UTM to simulate another UTM, and then have that second machine simulate the original machine, so that together, they hold themselves up 'by their own bootstraps'. Turing machines, of course, have the special advantage that they are not physical objects, but instead consist of entirely abstract information, and so are not subject to the thermodynamic constraints of the physical.[xiv]

We get something for nothing here, an ancient dream not only had by physicists. Either of the machines only exists for the period during which it builds up the simulation of the other. After that, it vanishes into oblivion, only to appear again when the machine that it simulated, turns around and simulates its former host, anew. The period of each machine's transient existence would be, by merging the empirical data of relativity and quantum theory, the Planck time (in the order of 10^{-43} second). These putative 'strings' of binary digits then, running in a sort of Möbius loop, would represent the universe's first clock, or 'cycle of time', to borrow from Roger Penrose's recent narrative.[xv]

Once we have a pair of programmable machines (that are creating each other out of absolutely nothing), we can proceed to 'programme' those machines to replicate themselves. If these machines were able to generate a replica pair within just one clock cycle, then after one second, we would have 2 to the power of 10^{43} such machines (although the procedure of replication would likely require more than one clock cycle).

Nevertheless, if each of these machines were to *simulate* a volume of space having dimension of one Planck length (in the order of 10^{-35} metre), there would be a rapid inflation of space well beyond the volume of the observable universe (which would comprise a mere 10^{185} of these 'atoms' of time and space). These components making up the entire universe would each be simultaneously ceasing to exist, and then existing again as their complements, in the order of 10^{43} times every second. The entire universe, as we presently encounter it, would be continually alternating between two symmetric existences.

Consider then that these 'time-space' atoms are not simulating hard spheres of space, but rather cells joined together in a rigid foam (like the green foam used in floristry) that conforms to Plateau's laws[xvi], so that each cell has an *average* dimension of one Planck length. Assume also that each cell is a 'machine' that can transfer data across to its neighbouring cells. A photon of light would then be a set of information states that are translated along a 'bucket brigade' of cells that makes a 'straight' passage through this foam at the speed of light[xvii] (in the absence of any deflecting interaction with *other* traversing information states), according to conventional cellular automata theory.

Thomas Kuhn spoke of scientific revolutions, like that when the sun and the earth exchanged places at the centre of the universe.[xviii] So too is our understanding gradually moving from a time when space was merely a system of absolute dimensions established by matter, through a transitional period over the last century in which space became substantial, but lost hold of its absolute reference, on to becoming both substantial and absolute, the solid substrate for the activity of physics, that activity being the translation of information states between adjacent cellular automata.

According to Randolf Pohl[xix], the proton's radius is a truly gargantuan 0.84184 femtometre, 4% smaller than predicted by QED, but some 20 orders of magnitude larger than the Planck scale. As Richard Feynman remarked, "there's plenty of room at the bottom".[xx] With each of the universe's protons being defined by the logic states of as many as 10^{60} timespace atoms, there is scope for considerably more internal complexity below that which we have already fathomed.

When a body translates through this rigid timespace foam at ordinary speeds, for example the sun orbiting the galactic centre, the timespace cells defining that translating physical reality might spend in the order of one thousand clock cycles in a single compounded state, preparing to pass that state over to their neighbouring cells, after which they can pause for another

thousand clock cycles before the next transition. After all, there are in the order of 10^{43} clock cycles available in every second, for such a small number of cells needing to be traversed in the given interval.

But typically in a particle accelerator, the information states of any given proton (consisting of 10^{60} timespace cells) is approaching the limit of the timespace foam's translational capacity, having to pass on their states to their neighbours almost each and every Planck period. It is of course not possible for information to 'leapfrog' over any of the timespace atoms along the 'bucket-brigade', for this would amount to information states translating *faster* than the speed of light.

The interactions of this spatially expanded timespace foam are of persistent interest to the general public, to astronomers, to the designers of the GPS and the LHC, and to those who have cooled matter to within a millionth of a degree above absolute zero.[xxi]

However, when we consider quantum computing, or hyper-computation, we begin to delve into the *superposition* of the entire universe. Where exactly *are* all these timespace atoms, these pairs of self-simulating UTMs? They are their own substrate, and 'space' (not to mention time) only exists when these machines *simulate* it. The UTMs themselves are *outside* the space they define. They have no volume – no dimension in space – and so the entire vast collection can be thought of as occupying the *same* position. Just as there is a putative interface between each of the volumes that these timespace atoms simulate at their addresses within the timespace foam, so also can there be an interface between each *and all* of the atoms – but directly at the superposition. Thus, a cell on one side of this *immense* space they define, the universe, could interact with a cell all the way over on the other side, and yet instantaneously across the superposition.

Not all of these self-simulating UTMs need to be simulating space, or the information states which comprise the material 'inhabitants' of this space. Indeed, there may be an entirely hidden universe at the superposition, consisting of self-simulating (self-substrating) UTMs entirely devoted to a computational sub-system below the surface presentation of the four dimensional physical world we encounter.[xxii] The information storage potential of the superposition is of course unlimited – for if these UTM pairs can be created in such vast quantities at the outset of the universe, then equally vast quantities can continue to be created as the need arises.[xxiii] Nevertheless, the information content in the superposition remains bounded, always able to be (theoretically) represented by the decimal expansion of a single real number, or indeed, by Gregory Chaitin's 'Omega'.[xxiv]

It is now widely understood that there cannot, *logically*, have been a Creator of the universe, for that notion inevitably leads to an infinite regression, traditionally comprising turtles.[xxv] Never wanting to regress, we now understand that the universe came into existence spontaneously and *necessarily*. As we uncover the 'code' of this computationally upheld universe, we should not be surprised by its mathematical beauty. In the absence of the contrivance that would be a Creator, the universe had no mind other than to form and fashion itself upon the *necessary* truths of mathematics. Through a combination of hard work and ecstatic insight, we have come to know much of that absolute truth and its myriad jewels. Sophus Lie and William Hamilton introduced us to the E8 group and the quaternions in the mid 19th century, but only recently have we found these gems sitting in majesty at the heart of the modern synthesis.

If we can imagine one day being able to directly interface with the superposition[xxvi], as in 'quantum computing', it is likely that intelligences elsewhere have figured out how to do this many moons ago. The prospect of such an interface is for the universal manipulation of reality on an extraordinarily refined scale, including of course direct interaction with the circuits of the brain. Indeed, Roger Penrose has long mused on the mystical manner in which profound insights enter into the conscious (and sub-conscious) mind.[xxvii] William Hamilton for example told of how, while strolling with his bride along the Royal Canal in Dublin one Monday in the autumn of 1843, he "then and there felt the galvanic circuit of thought close; and the sparks which fell were the fundamental equations between *i*, *j* and *k*[xxviii] (which he then) cut with a knife on a stone of Brougham Bridge".[xxix] And one day in 1967, while out for a Sunday drive in his red Camaro, Steven Weinburg likewise had a good idea. When he got home, he sat himself down with a cup of coffee, and proceeded to unify the weak nuclear force with electromagnetism, in a two-and-a-half-page paper that was to become one of the most quoted ever in the literature of physics.[xxx]

Stephen Hawking has suggested that all them aliens out there have just one thing in mind, and that is to plunder the resources of the galaxy, and sweep aside anyone who gets in their way.[xxxi] In fairness, he has the history of our species on which to base his conclusions. However, most school age children now understand that the material (and thus ultimately the spiritual) wellbeing of our community is driven by energy, and that our energy potential is vast. If we were to reuse our material resources rather than discarding them, as is best practice (and the only viable practice) on *any* given spaceship, there is no reason in the world for us to ever venture beyond the confines of our home. That energy potential ensures abundant and, happily, universal wealth. What the kids *can't* figure out is why the grown-ups aren't doing something about it.

All the aliens are in similar boats to our own, but they figured out yonks ago that if their sun was going to shine, as will ours, for another *million* millennia, the smart money was on engineering a sustainable society that drives a sustainable economy. As we come to the common realization, among galactic communities, that the world did not have a Creator but in fact created itself, we can begin to think of our relationship with aliens being like that between a boy and his older brother, rather than a man and his father.[xxxii]

In our modern resource rich societies, an older brother carves out a comfortable niche for himself, and his younger brother is never a threat, but simply a loved one.[xxxiii] The brother who has already made it cannot (and wouldn't want to) live his brother's life for him. But he can offer advice and can engender the conditions in which 'Buster' can reach his potential.

In our modern folklore, the aliens can't come through a wormhole from their part of the universe and visit us in person, because they would get crushed by the black hole between us. However, when it comes to *information*, these neighbours of ours can send us any amount of it by way of the *singularity*. The challenge of getting seven thousand million individuals to understand game theory[xxxiv], and thus choose sustainability, appears increasingly insurmountable. However, rather than trying to climb this barrier, perhaps we can simply tunnel straight through to the communities on the other side who have already been there and done that.

For those who already suspect that the world is a stage on which we are merely players[xxxv], it is the greatest show on earth, vastly entertaining for an observer, from its tragedy through to its triumph. However, an adolescent (which, frankly, is what we are in the bigger scheme of things), will eventually tire of merely observing, and yearn to participate. In the ongoing dialogue between

science and the humanities, it has been the responsibility of the artist to see the symbolism, imagery and humour that emerges from the cold, hard, factual process of science.

If the aliens have no practical means of plundering our resources, and anyway have neither the need nor the desire to plunder them, then they have no reason but to wish us all the very best. It is a grave mistake to think there are 'hellish' colonies of bad aliens out there who are influencing all the bad people, and 'heavenly' colonies of good aliens who are influencing all the good people. The trick to establishing trust, and abolishing fear, between all of us here on this surface, is to recognize that *my* aliens are the very exact same mob as *your* aliens.

And of course, those aliens have a biological intelligence, with limitations not unlike our own. What allows them to have directed a show, as complex as this world, towards its dénouement, is their access to the P=NP[xxxvi] computational potential of the *superposition*. We have every reason to believe these cousins of ours are entirely benign and want us to have the rich life that they have. For it would be pointless to spend all the ages past tutoring a student, only to abandon her to oblivion just moments before she came to grasp how it all worked. That would be plain crazy.

[i] I.J. Good, "Speculations Concerning the First Ultraintelligent Machine", 1965

[ii] Ray Kurzweil, "The Singularity Is Near: When Humans Transcend Biology", 2005

[iii] Pierre Teilhard de Chardin, "The Phenomenon of Man" (Le Phénomène Humain), 1955

[iv] Jürgen Schmidhuber, "New Millennium AI and the Convergence of History", 2006, suggests that humans have a tendency to imagine that 'the end is nigh' because our mind has a finite capacity, so that we compress the history of older events to make room for the exponential expansion of contemporary information (pointing towards an approaching limit).

[v] Olaf Sporns, "Networks of the Brain", 2010

[vi] Robert Krulwich, "Aliens Found in Ohio? The 'Wow!' Signal", 2010

[vii] Ray Kurzweil (ibid.) suggests that only nanoscale probes could effectively traverse the galaxy, and that if they had already been created elsewhere, we should have encountered them by now. Because we haven't, he considers ours to be the most developed intelligence in the galaxy. Presumably, the rest of the universe is right out of bounds.

[viii] M-Theory is so named after the divisional director in Ian Fleming's "James Bond" series.

[ix] Stephen Hawking & Leonard Mlodinow, "The Grand Design", 2010

[x] Immanuel Kant, "Critique of Pure Reason" (Kritik der reinen Vernunft), 1781

[xi] Stephen Wolfram, "A New Kind of Science", 2002

[xii] Konrad Zuse, "Calculating Space" (Rechnender Raum), 1969

[xiii] Alan Turing, "On Computable Numbers, with an Application to the Entscheidungsproblem", 1936

[xiv] Vlatko Vedral, "Decoding Reality: The universe as quantum information", 2010, presents a persuasive case for the abstract status of information.

[xv] Roger Penrose, "Cycles of Time: An Extraordinary New View of the Universe", 2010, speaks of the larger cycle of the expansion and contraction of the universe, as distinct from the oscillations of the universe's most fundamental constituents.

[xvi] Jean E. Taylor, "The Structure of Singularities in Soap-Bubble-Like and Soap-Film-Like Minimal Surfaces",

1976

[xvii] The Planck units derive empirically from the speed of light, which travels in the order of (10^{43} x 10^{-35}) = (10^{8}) metres in one second.

[xviii] Thomas Kuhn, “The Structure of Scientific Revolutions”, 1962

[xix] Randolf Pohl et alia, “The size of the proton”, 2010

[xx] Richard Feynman, “There’s Plenty of Room at the Bottom”, 1959

[xxi] Mark G. Raizen, “Demons, Entropy, and the Quest for Absolute Zero”, 2011

[xxii] Evalyn Gates, “Einstein’s Telescope: The Hunt for Dark Matter and Dark Energy in the Universe”, 2009

[xxiii] Fred Hoyle lent towards the ongoing creation of new material in his steady state model of the universe, because the alternative, which he called the ‘big bang’, looked too much as if it had a Creator.

[xxiv] Gregory Chaitin, “Algorithmic Information Theory”, 1987

[xxv] Stephen Hawking, “A Brief History of Time”, 1988

[xxvi] David Deutsch, “The Beginning of Infinity: Explanations that Transform the World”, 2011

[xxvii] Roger Penrose, “The Emperor’s New Mind: Concerning Computers, Minds, and The Laws of Physics”, 1989

[xxviii] $i^2 = j^2 = k^2 = ijk = -1$

[xxix] William Rowan Hamilton, “Letter to Archibald”, 1865

[xxx] Steven Weinberg, “A Model of Leptons”, 1967. Mariette DiChristina has this spring been conducting a celebration of these insights in the pages of *Scientific American*.

[xxxi] Stephen Hawking, “Into the Universe with Stephen Hawking”, 2010

[xxxii] A similar analogy can be drawn with the relationships between girls, but it’s far more complex…

[xxxiii] The assumption is that in the absence of a ‘father’, neither brother has an inheritance to worry about, unlike the hapless J.R. and Bobby.

[xxxiv] Martin Nowak (with Roger Highfield), “Super Cooperators”, 2011

[xxxv] William Shakespeare, “As You Like It”, 1623

[xxxvi] Stephen Cook, “The Complexity of Theorem Proving Procedures”, 1971

The Very Big Company

When perusing my favourite book, *Engineering Features of the Snowy Mountains Scheme*, I often reminisce how in 2002 I dragged poor Judy along with me on a weekend whistle-stop tour of all 16 major dams in the scheme (except Happy Jacks). The excursion to each dam arrived at a welcoming parking area, and a proud row of illustrated placards listing the features of the dam and describing its participation in the scheme. There's no chance of marvelling at these wonders anymore, not just because Jude said "never again", but because the roads are now blocked, long before the dams come into view, by cyclone fences and locked gates through which only authorised personnel can proceed.

It seems some people can no longer be trusted to behave themselves. If I want to see these dams again, I could always apply for a job with SnowyHydro, or better still fix the problem for all of us by putting the fear of God back into everyone's lives. Quite seriously, there once was a time when folks were brought up to understand that they would one day have to answer for their actions to a higher power, enticing them in the meantime to find a modicum of respect for one another, and even for God's creation. These days it seems everyone knows for a fact that God no longer exists, and so they can do pretty much anything they like, just so long as they don't get caught. And then there is that rather troublesome sector of the population who believe that God can't take care of things without their assistance.

Of course, the problem with fear, especially of God, is that below that lovely glistening surface breeds a dark undercurrent of violence – nothing is quite as terrifying as the unknown. A good many people in the world are to this day being drawn towards the promise of 'eternal' life. Fundamental to the efficacy of this carrot being dangled in front of them on a stick is the assurance that at the end of the journey, the rider of the donkey will draw back the stick, allowing the weary believer to at last partake of that delicious vegetable.

It takes one utopian idealist to know another, and the teaching of the Nazarene was not lost on H.G. Wells in his major work *The Outline of History*.

In Jesus we see the figure of a being, very human, very earnest and passionate, capable of swift anger, and teaching a new, and simple and profound doctrine namely, the universal loving Fatherhood of God and the coming of the Kingdom of Heaven. Remarkable is the enormous prominence given by Jesus to the teaching of the Kingdom of Heaven, and its comparative insignificance in the procedure and teaching of most of the Christian churches. This doctrine of the Kingdom of Heaven is certainly one of the most revolutionary doctrines that ever stirred and changed human thought. For the doctrine of the Kingdom of Heaven, as Jesus seems to have preached it, was no less than a bold and uncompromising demand for a complete change and cleansing of the life of our struggling race, an utter cleansing, without and within. God was the loving father of all life, as incapable of showing favour as the universal sun. And all men were brothers and sinners alike, and beloved sons alike of this divine father. And not only did Jesus strike at patriotism and the bonds of family loyalty in the name of God's universal fatherhood and the brotherhood of all mankind, but it is clear that his teaching condemned all the gradations of the economic system, all private wealth, and personal advantages. All men belonged to the kingdom; all their possessions belonged to the kingdom; the righteous life for all men, the only

righteous life, was the service of God's will with all that we had, with all that we were. Again and again he denounced private riches and the reservation of any private life. In the white blaze of this kingdom of his there was to be no property, no privilege, no pride and precedence; no motive indeed and no reward but love. To take him seriously was to enter upon a strange and alarming life, to abandon habits, to control instincts and impulses, to essay an incredible happiness…

Bravo Wells! for getting to the crux of the matter, and for writing so well. Instead of achieving bliss, our pursuit of the private life has led to a malaise well sketched by Spencer Wells in his new book, *Pandora's Seed: The unforseen cost of civilization*.

Cars rush by outside your window, a horn blaring occasionally. The refrigerator hums in the corner of the kitchen, and the heat coming out of a duct over your head whooshes softly. Bills sit stacked on the counter, insistently waiting to be opened. A television – perhaps one of several in the house – blares advertisements from the next room, and internet pop-up ads interrupt your attempts to check on your retirement investments. The cacophony reaches a crescendo when your spouse's cell phone rings, vibrating along the tabletop like some sort of angry digital dervish. The blare of the outside world goes on all around us, even while we attempt to focus on our 'real' lives.

We are constantly surrounded by surreptitious stimuli – so much so that we take it all for granted. We are used to the notion that advertisements saturate our lives – exposure estimates for the average American range from several hundred to several thousand every day – as promoters try to sell us everything from life insurance to an enhanced sex life. Data flows at us from every direction. Information is ubiquitous and, with the rise of internet and broadband connectivity, more easily accessible than ever. But even things we might not think of as intrusive bombard our subconsciousnesses with stimuli. Inadvertently, the machines we have created to improve our lives may actually be causing some degree of psychological harm….

Our lives are now lived in a state that could be called 'stream of subconsciousness,' as we subliminally lurch from one unrelated (and usually unwanted) stimulus to the next like floating dust particles buffeted by the random forces of air currents. Some people seem to thrive on constant overstimulation…but most of us react rather badly to it.

The irony is that the developing world, tenaciously pulling itself out of abject poverty, aspires to this postmodern nightmare into which the developed world has fallen. As we try to learn how to do the simple things in life slowly again, we have an obligation to warn the developing world of the misery that awaits them down the other side of the rise. If only we could agree amongst ourselves where the apex lies, reset the cornerstone of our development, and build towards there together. We all cherish the private life, but as anyone who lived through the war knows, faced with a looming threat of destruction, our human nature is to focus attention away from ourselves and towards the common good. Our inertial exploitation of nature has become the planetary community's last enemy. We will only defeat it if we let go of it.

Science has a profound and commendable faith in the consistent behaviour of nature. Yet as Karl Popper argued, it would take just one (unequivocal) miracle to bring the whole edifice tumbling down. Philosophy, which deals with contingency, has long been warning science about its fundamental structural instability. The way forward for everyone lies in a hybrid theology, one that satisfies both sides of the theological divide. In this synthesis, the atheist is justified in

asserting that the natural world arose spontaneously (from nothingness) through principles of emergent complexity that are now quite well understood. And the theist can rest assured that this same natural world has gone on far ahead of us to produce considerably more complexity elsewhere in the universe.

The key to understanding Christianity is Jesus' assertion (which I think was noted down by Matthew) "that in God, all things are possible". Indeed, there is anecdotal evidence that the ministry of Jesus was associated with tokens of quite unusual phenomena. The business with the loaves and fishes involved the production of new material, in clear defiance of mass conservation. At the wedding in Cana, a complex array of alkaloids appeared where previously there had only been water, in clear violation of the established requirements for nucleosynthesis. A terrific storm at sea was suddenly calmed against all principles of energy conservation. Persons who had been dead long enough to start smelling, came back around as fresh and jolly as ever, while in stark contrast, Luke recorded the amazingly clinical execution of a husband and wife, 'switched off' as if they were robots being decommissioned. Moving mountains was not demonstrated, but Paul considered such feats a logical extrapolation of what had already been witnessed.

In a classical material understanding of the world, all this sort of stuff would of course be impossible. However, as Augustine noted, "all is number", or as Jesus himself put it, "every hair on our heads is numbered". Our modern understanding is that reality has a more abstract substance, that reality is not comprised of solid particles, but rather of mathematics, or more specifically, of information. Classical information theory, which developed in the middle of the last century from pioneering work by Claude Shannon, deals with the emergent spatial and temporal relationships of information, the surface – and the volume or density – of information. Yet when both space and time become simulated phenomena and not actual, a new information regime emerges. This regime is introduced in the essay *Physics without Formulae*, an understanding that is assumed in the balance of this essay. Despite its title, *Physics without Formulae* is quite a technical article, whereas the present essay is more general. But it's much easier to have faith in something once you understand how it can work.

Since writing that essay, Brian Hayes has pointed out to me that nature would more likely go with a 'balanced ternary' logic system, where the digits of the system are (-1), 0, and 1. After all, nature abhors a vacuum – if you start out with nothing, one way of ending up with 'something' is to stretch nothingness (or zero) apart, so that you end up with one world made up of the 'minus 1' component, and another world made up of the 'plus 1' component, and then evolve each of them independently. This rather simple notion (because it is so basic) is of course consistent with the observed surfeit of matter over antimatter on our particular side of the fence.

In a paraphrase of Newton's law of inertia, the natural world does indeed keep processing the information that comprises its reality in a clueless and desultory way, *unless* an intelligent agent acts to change the way that information is processed. In due course, we will meet just such an agent.

It is widely assumed that the basic substance that makes up the universe is the same throughout, the so called 'cosmological principle'. A reasonable implication is that the other biological intelligences that have evolved in this universe will also have developed feelings (a nervous system), and thus have the same need to love and to be loved that is universally prevalent in humans. The expression of this love of course consists in putting the feelings of others in

advance of one's own feelings, and Jesus quite famously pursued this principle to its logical extreme.

Assuming that the other communities in the universe share this basic humanity of ours, just as they share the same physical substrate, we proceed to imagine the course of their development. Indeed, most intelligent communities, reflecting on the million millennia potential future of their world, will have likely charted a course towards indefinite sustainability. At least this would be the case for those that persist.

The ultimate technology (anywhere in the universe) is well understood, first introduced to our world in its modern form by John von Neumann as the 'universal assembler', and later developed by Eric Drexler and others. A universal assembler of course already exists – it is the human body, so not surprisingly Isaac Asimov and others have pursued a very anthropomorphic rendition of this machine in the notion of the android robot. A more generic rendition of the universal assembler is however the '3D printer'. A printer as we ordinarily know it has separate reservoirs of primary-coloured inks, and places miniscule drops of those inks in an orderly pattern onto a sheet of paper, as the writing head scans from side to side and the platen moves the paper from top to bottom.

Instead of ink reservoirs, a 3D printer has stores containing the various atomic elements, and an electrostatic stylus which places those different atoms one at a time across a flat plane from side to side and from top to bottom, to create a single flat sheet of assorted atoms, neatly arranged in a pattern. It then repeats the process, depositing a second patterned sheet of atoms on top of the first sheet. The process continues through many passes until on completion it has built up the complex structure of some three-dimensional object. The two primary dimensions of the printer can be as large as required, so that a horizontally aligned printer might 'print' the Queen Mary cruise liner, while a vertically aligned printer might 'print' the Empire State Building. The making of 'all things new' was never so easy.

Of course, if a 3D printer were to literally pick up atoms one at a time and position them as just described, it would take the age of the known universe just to 'print' a coffee mug. However, as we have seen in an earlier essay, the 'material' world has a deeper underlying structure, an 'encoding' made entirely of software. In advanced implementations of 3D printing technology, the patterns of 'atoms' are directly encoded by the computer that holds the virtual definition of the object being rendered into reality. Indeed, considerable interpolation is required, for the rendering computer cannot possibly store the state of each individual quantum of the required object. At one point in a 3D printing job, for example, the printer might use a repetitive algorithm to simply 'deposit' large volumes of uniform crystalline titanium. (As an aside, a new process for extracting titanium has recently been developed by a team in Cambridge which will considerably lower the cost of this otherwise abundant element, of great utility in the near term.) However, lovers of 'all that glitters' should be somewhat excited by the implicit alchemy in the procedure of directly encoding a material reality.

The 3D printer is also a universal 'disassembler'. The printer can be placed over an object, and as the stylus scans across the object's surface, it gradually 'deconstructs' the object, returning its different component atoms to the element reservoirs, until the object has disappeared. Again, in advanced implementations of the universal de-constructor, the encoding of each material quantum in the object to be removed is simply 'nullified'.

Alas, we don't yet have the advanced versions of these machines, but other communities who have been around a lot longer than us (typically millions of years longer), have lots of them, for the technology is obviously recursive - a 3D printer can 'print' endless copies of itself, in the same way that the basic 'material' of the universe was exponentially replicated at the outset in the Big Bang. Indeed, everybody within one of these communities simply 'prints' whatever it is they might want, and whenever they have finished with something, they simply have it deconstructed. And driving all this activity, on through millions of millennia, is a very basic thermodynamic principle – a steep temperature gradient between a very hot place, their sun, and a very cool place, their planet.

So it is that advanced intelligences have no interest in leaving home and aggressively exploiting other parts of the universe, as Stephen Hawking has recently suggested, for instead they have learnt how to use the energy of their local star to continuously, extravagantly, and indefinitely remodel their home, as is their wont, for thousands of millions of years into the future. It is not surprising that they have never visited us in person, and most likely never will. Having the bespoke production of anything and everything, free at the press of a button, is obviously great fun for young and old, thoroughly egalitarian, and an absolute godsend for a planet's natural ecology. These communities restore their Garden to a better condition than nature gave it to them (if that were possible), and then maintain it in that state. And after a few million years of 'completeness', they take an interest in the development of their sibling communities.

Rex Tremendae Majestatis

Various theologians in antiquity have insisted, one suspects for quite cynical political motives, that we can never reach an understanding of God. They are of course quite wrong about this, and Paul did not mince words on the issue. While for the time being, we may well only be able to see, like a child, in part – when the *perfect* comes, we will see (God) 'face to face' (and no doubt get to ask a whole host of questions). While Jesus, as we shall see, swept away the sins of the world, it has become quite mistaken to think of Christ as an individual human – for as Paul clearly explained, the Church has become the 'Body of Christ'. And to become incorporated within that body is offered freely to the Christian first, then also to the non-Christian.

The intelligent communities in the universe who have long since become integrated – complete, or perfected – can be likened to a single human body, somewhat androgynous, in the prime of its life, in which each individual citizen is like one of the billions of cells in our own bodies. Everyone is the same, in that each cell shares the same outline of genetic code, and yet within that outline, everyone is different. Each cell knows and respects their role and position in the organism, and joyously participates in the beauty of the body they comprise. As with our own bodies, if the society of individual cells is in harmonious balance, then the body is healthy. Ethical relationships and industries engender normal growth, producing new cells, while older cells depart the body and return to the environment from whence they came. Rogue cells reproduce their brand at the expense of their neighbours, a malaise that would threaten the integrity of the body.

Our present society can *also* be likened to a 'single body of humanity', except at the moment 'the body' looks more like Herry Monster than it does a cross between Aphrodite and Adonis – loveable yes, but in a 'special' sort of way. The universe's stellar integrated societies are 'maximally connected', having reached a technological unity, like bodily unity, that we are now seeing (in its infancy) through the various communication technologies of the internet – except that ubiquitous computing, as it ultimately becomes, is paradoxically, mostly invisible. We will

simply converse – commune – with our environment, and in turn those conversations will extend out to our neighbouring 'cells' (all of whom we love), and eventually out across the Singularity to our sister communities throughout the universe, who of course have long since dearly loved *us*.

While we will one day come to recognise our elders in the universe, they long ago recognised us. It is truly wondrous what we have come to know, but we are relative latecomers to the universe. The universe has been around a *very* long time. There is nothing new under the sun – indeed everything we now know has been thought of by plenty of other communities long before we ever came on the scene.

To illustrate what's been going on, imagine that there is a one-to-one correspondence between seven billion individual members of some remote integrated 'omega point' community on the one hand, and each one of us on the other. Each of these remote individuals could quite reasonably be described as a 'guardian angel' (or 'daemon' in another mythology). We don't need to worry too much about whether they're green, or indeed their morphology in general. They are adapted to their own world, just as we are adapted to ours. Certainly these 'angels' are real individual biological intelligences, with minds just like ours, except that they have access to an intelligence that is far greater than the sum of their parts, because of their 'connectedness' – and thankfully, this doesn't translate into them all spending their lives on Facebook and Twitter. 'God' really is bigger than any one of us (or any one of them). 'Transhuman' theorists, starting perhaps with Pierre Teilhard de Chardin and more recently Nick Bostrom, Ray Kurzweil and others, are providing some clues as to where these other civilizations have progressed. However, it is certainly misguided to think we will all end up like zombies strapped into chairs and immersed within a virtual world. Such notions miss the whole point of developing the actual world in the first place. We are rightly concerned for those who have become helplessly addicted to virtual worlds, just as we have long been concerned for those from an earlier generation who are glued to the telly. Approximate virtualization is ultimately only a modelling tool for engineering the 'high definition' *actual* virtualized world.

Each of us is, of course, a free agent, and so while these guardian angels can lead us in all sorts of directions, they can never *force* us to do anything. These two bodies then, one a fully integrated community of Heaven, and the other an imperfect community of Earth, have been closely tethered, by way of billions of threads running through the Singularity, for quite some time. As we have strayed back and forth during our ascent to civilization, our shadow, that rock of ages, has always been there to keep us anchored and upright. Keeping seven billion humans in check is occasionally akin to corralling cats, but fortunately, most of us are sheep.

Agnus Dei

None of us knows when our Shadow will finally play its hand, but we faced a similar situation to the present shortly before The Flood, with folks being openly sceptical and some even mocking the whole idea of 'divine' intervention. Like a thief in the night, The Flood came when most people least expected it. The Flood for Jesus was a literal 40 day deluge (or 40,000 years given his understanding that a day, for God, was 1000 of our years). We now know it to have been the rapid rise in sea level, by 120 metres, starting about 20000 years ago and ending around 7000 years ago, with the water rising by as much as 5 metres a century from about 14000 years ago.

It is natural to hope that another deluge will bring justice and retribution upon all those 'bad' people; in this Jesus was set preternaturally apart. He described there being more rejoicing in Heaven over the one lost sheep that was found, than over the ninety-nine who were already

home, and tucked into bed. The notion that each of us has a guardian angel, and that each of these angels is a part of the Godhead, implies that each of us has a moral conscience. We cannot, as it turns out, protest that we did not know the difference between right and wrong. Thus, when the flood (of redemption) comes, it will be up to each individual to decide entirely for themselves if they want to follow their conscience, and come aboard the ark, or (incredibly) choose to reject their conscience. Everyone will however know that they have been called, and then also know that not one of us would be refused.

We have seen perpetual motion in the self-simulating virtual machines of the timespace atoms that comprise reality. We have seen the alchemy of directly encoding physical material in these timespace atoms. We have seen the creation of new timespace atoms were previously there was nothing. And we have seen the erasure of material that was previously encoded in these timespace atoms. These then remain – something from nothing, nothing from something, perpetual motion, and alchemy – but more important than any of these is, of course, the water of life.

For any not familiar with the story, Jesus recounted how there was once a jewellery merchant who came across the most resplendent treasure he had ever encountered, a pearl. Jesus employed the pearl as a symbol of eternal life. On discovering this treasure, the merchant promptly went out and sold his entire inventory of emeralds, rubies, diamonds and sapphires, to raise the funds to purchase that unique and glistening gem. As you would expect of a merchant, his actions had an entirely rational economic basis, for if he were to gain all the time in the world, he would logically be able to gain the entire world – have his cake, and also get to eat it. Starting with numbers, we are always careful to differentiate between the real and the imaginary. Many in this world are already drawn, like trusting children, to the prospect of an *imaginary* eternal life. Imagine then how we will flock towards the entrance of the ark that is *real* eternal life.

Thermodynamically, we are of course an information system that *should* theoretically go on repairing itself faultlessly and indefinitely, so long as it's fed. In theory, the ark should float. But for those who might presume that senescence is some sort of logical necessity, consider Jonathan Weiner's analysis in his new book *Long for This World: The Strange Science of Immortality*. Not only can we live indefinitely, but those also who have passed their prime can expect to see time's arrow reversed and grow back to some desirable plateau. Women find themselves particularly drawn to this prospect, for the process avoids that 'startled' look they otherwise get when they have their skin stretched back towards their ears. And it saves a fortune on all those creams and lotions.

Because every tear will be wiped from our eyes, and there will be no more death or mourning or crying or pain, for the former things will have passed away, perhaps we can put theodicy off to one side for later analysis. The explanation of why our Shadow(s) *had* to engender a world of extreme tension between suffering and joy is simple, but difficult to accept, and must come in time.

As a consolation to those who have lost their loved ones, recall that when describing the technology of 3D printing, we insisted that the rendering computer could "not possibly" store the value of every quantum of the object to be rendered. This however is a classical limitation. There is in fact no limit to the information storage capacity of the Singularity, as additional timespace atoms are merely encoded as each is required (recall that the timespace atom incorporates registers for storing data beyond those required in its primary role of merely simulating time and space). Thus it has long been possible for our Shadow to take a 'snapshot' of each person at the

moment of their departure. Most will be familiar with near-death reports of 'my whole life flashing before my eyes'. These testimonials simply reflect the procedure whereby the entire information content of an individual human is downloaded for long-term storage in the Singularity.

Thus, when the end comes, the deceased (at least those who were thus recorded in 'The Book') will be reencoded back into life, to then be judged along with the rest of us – sorry, rather I should say "to be freely absolved, and offered a place in the Commonwealth of Heaven along with those of us who remain alive".

One can imagine what an extraordinary entertainment it would be to have Isaac Newton, for example, suddenly back in our midst, restored with his mind (and its memories) configured in its 18th century state, arriving suddenly like a time-traveller into the completed world. We would delight in all his actions and reactions, but the most entertainment of all would be had by Newton himself. (This is of course assuming that Isaac is one of those who our Shadow has scheduled for restoration – he may have done something unspeakable along the way that we don't know about). However, there are a lot more souls than just Newton's to be restored – the Holocaust comes to mind – and many of us are of course looking forward to meeting the Nazarene himself (and learning Aramaic). Fortunately, the number of our ancestors is a convergent sequence, regressing all the way back to Adam and Eve (who were of course the last of the late hominids, and are more commonly known these days simply as 'Ardi' and 'Lucy'). However, finite though the quantity of our ancestors might be, there is still a question mark over where we're going to put them all. Surely, they'll come back in waves, and we'll be able to gradually find places to billet them?

Importantly, each personal profile is stored as a static data backup in the Singularity, not as an active biological intelligence at the physical location of our Shadow. Thus, our dearly departed are not 'sitting upstairs' watching all that their descendants have been up to since they left. They are instead, effectively 'asleep'. The first time they again become conscious, after their departure, is at the very instant of their restoration into the new world.

Richard Dawkins has commented on the important issue of how we are going to recognise everybody, or indeed believe that they are who they say they are. The complete genetic code of each individual human represents a crude but unique catalogue number of that individual. If we retrieve these numbers from each individual (those who remain alive as well as those who are then restored) and sort the relationships of the embedded sequences in those numbers (within the tape memory banks of a gigantic computer), we will be able to generate a precise family tree showing our exact relationship to everybody else, all the way back to the first couple.

Interestingly, just such genetic profiling has recently allowed the identification and reinterment of 250 Australian and British diggers killed in the First World War at Fromelles. Worms have indeed consumed these bodies, ecologically recycling the material of their bodies, and upholding classical conservation laws (and the opinion of King Lear). However, it is the *information* content of each of these individuals that has been backed up in the Singularity for later restoration. Each restoration will incorporate either newly created material, or pre-existing material, but most probably will *not* incorporate the exact same material that comprised the original corpus, just as each of us cycles through a new complement of material approximately every seven years. There might be two copies of an individual's skeleton, for example, one in their grave, and the other within their 'resurrection' body (thereby providing for some fascinating genetic analysis). The situation our Shadow wants to avoid, of course, is that where Scotty

accidentally ‘beams’ Jim up from the Singularity not once, but twice, and each of the Jims really believes he is himself, and even tells the other one so.

While a recording is taken of the system state of each individual at departure, that individual can only ever have come into existence first through the physical fusion of an egg and sperm, as this is the genesis of a truly unique genetic encoding. That potential encoding is indeterminate even for our Shadow (and thus exhilarating even for them) and is the prime source of that life’s unique subsequent progress through existence.

On Earth as it is in Heaven

We wouldn’t want our ancestors to be restored to the world in its current condition – they would be overwhelmingly sad to see the mess we have made of the treasure they left in our care. We would much rather have them back into a world that Satchmo will look at, and think to himself, “Wonderful!” Before they all get back home then, we need to strike down Goliath, that monster that is our evolved global economic framework – alas indeed for you, great Earthly city, your vast wealth reduced to nothing in a single hour!

And so we return to that prescient understanding from Herbert George that we cited at the outset. The notion of capital, or quite literally ‘private wealth’, has been a very useful facility, during our education, for driving innovation and efficiency, but it has served its purpose, and certainly has no place in the Commonwealth of Heaven (well, maybe you can get to keep your toothbrush). The problem with ‘freedom’, as it is commonly expressed, is that in all fairness we must allow those who would push, for example, junk food, to coexist alongside the purveyors of the haute cuisine. In ancient times, an enemy would sabotage their opponent’s food supply, by sneaking in under cover of darkness, and sowing the seed of a weed known as ‘tares’ in amongst the wheat crop. By the time the contamination was noticed, it was too late, and the tares had to be allowed to develop to maturity (or obesity) along with the wheat. Only at the harvest could the tares be separated from the (depleted yield) of wheat, collected, and burnt. This is the origin of the term ‘tare’ weight.

The Commonwealth of Heaven is not some sort of social or economic hierarchy, enshrined in that state for eternity, with named spots for the rich and powerful in the pews up the front of the Church, and standing room only extending out the back door for the weak, the poor, and the dispossessed – the perfected societies of the universe simply don’t work that way. Luke told the story of how, when the Church was but a newborn, Peter presided over a sort of Jubilee, that instrument whereby all property reverts to its original owner every 49 years.

This entire planet, on which we are the highest order organisms, has been, so it turns out, someone else’s special project. The belief that we have title to something is a delusion, for in fact any one of us has only ever held anything on lease, including our lease on life itself. As we shall see, the *actual* owner of this place is preparing, all in good time, to hand over the keys, after which we will all *in fact* be free – free at last – and gain our autonomy, not unlike an adolescent moving into adulthood. But before handing over the keys, and finally leaving us to our own devices, the project owner *must* ensure that everybody understands how it all works, and the rules of the game.

In his recent book “Our Choice”, Al Gore hopes that humanity will discover a ‘collective will’ to combat environmental destruction, as if someone’s going to blow their bugle, and we’ll all change on a nod and a wink. Unfortunately, in classic game theory, it is not possible for us to sit down and reason together with all our cards on the table to engender such rational choices.

Indeed, Clive Hamilton has described this gloomy reality as a *Requiem for a Species*. Those who do their bit for ecology, the 'greens', will forever loose out to the somewhat dull-witted forces in the world who think that human induced climate change is 'absolute crap'. We saw this infamously at play in Copenhagen last year, where each nation doggedly pursued their pecuniary interests, and to hell with the planet.

Thus, to help illustrate the problem for those who are still struggling to grasp that there even *is* a problem, let alone do something positive towards resolving it, we were given Deepwater Horizon. For several months, somewhere from 6 to 8 million kilograms of crude oil *a day* was gushing into the Gulf of Mexico. Even Absolute Crap and his cronies can see this has significantly damaged the environment. If this oil had been entirely burnt, it would have combined with oxygen from the air to release somewhere between 10 and 23 million kilograms of carbon-dioxide into the atmosphere every day. This sure seems like a lot.

However, the UN Statistics Division reports that the quantity of human-produced direct emissions of carbon dioxide in June this year was 80,277 million kilograms *every* day. It is a lot more than just 'deepwater' we're in. And this figure excludes other greenhouse gases like methane, land-use, land-use-change and forestry (LULUCF), and natural background flows of carbon dioxide.

A stop has been put to the Deepwater Horizon burst. In the same way, we cannot simply try, 'really hard', like some CEO of an energy company, to cut back 'a bit' on our carbon dioxide emissions – we must stop these emissions *completely*, and we have to do it NOW. Everyone likes the idea of an overseas holiday, or meeting their overseas clients, partners, or family, in person. Many even act on this idea. However, the 'Dreamliner' (to use the upcoming aircraft from Boeing as a metaphor) has been put on hold for now. While we will all eventually be able to flit about the planet willy-nilly like the Jetsons, the real world is going to have to wait until we have developed the solar economy. In the meantime, we must all immediately start conducting our daily lives with the lowest possible carbon footprint. For most of the developed world, this will be facilitated by working in the virtual world, meeting in the virtual world, and taking our holidays in the virtual world. To this end, Australia has recently embarked on a program to raise the base information bandwidth to the levels required, approaching the densities already achieved in Korea.

When air traffic in Europe was grounded earlier this year, the world didn't stop turning. Money does *not* in fact make the world go round. Everyone first sets out to make an honest and fair accrual of cash, but once you acquire a taste for the stuff, you just want more and more of it, and can even develop a love of it, almost like a drug addiction. To put a halt on global carbon dioxide emissions (as if that were the only environmental catastrophe that needs to be addressed), we all need to stop mainlining money, and to do so 'cold turkey'.

Dies Irae

Jesus told the story of a Master who went abroad (as you've probably by now discovered, not to another planet, but rather to another galaxy), and left his servants in charge of his affairs. He gave these servants a wide range of talents, and they all made the most of what they had been given. Some of his servants didn't even realise they were working for the man – they assumed they were doing all this stuff for themselves. When the Master returned from his travels, he congratulated his servants on the profits they had made through investing his capital and rewarded them all with even more prestigious stations.

But just in case any of them had lost track of exactly who owned the House in the first place, the Master asked each servant, in turn, to hand over the investment, in its entirety, that they had been holding for him in trust. The single mother, who had just two brass razoos to rub together, handed over all that she had. In return, she was given a single share in the Commonwealth of Heaven (or the Very Big Company as Montgomery Python has suggested it be called) and was given an indefinite lease on life. It had been said that it would be easier for a rope to pass through the eye of a needle, than for a wealthy person to join the Very Big Company. But in an extraordinary twist of fate, the rich young ruler finally 'got it' – he signed over his entire dominion to the Master, and he too received in return a single share in the VBC – and eternal life.

This sort of idea (but without the prize) has been tried often enough before by mere mortals, quite infamously and disastrously. In fact, such a procedure can only possibly succeed through God. It has also had to wait for the globe to shrink down into a single village. The constitution and charter of the VBC is simple. The VBC is an entirely democratic institution, owned by its shareholders, each having a single share, a share which, like the voice of their vote, cannot be traded. Because the capital of the VBC cannot be traded, labour is the only arbiter of personal value. Each shareholder regularly submits what it is they want the VBC to provide. These submissions are dynamically collated into a market. The shareholders are employed and then deployed by the VBC to deliver that demand. The delivery is prioritised from the provision of water and food through to clothing, shelter, education, and entertainment. Exquisitely good taste in cuisine, couture, architecture, and relations spreads throughout the community.

The system we have had to put up with for now is, of course, a gargantuan Rube Robinson machine. It resembles the last of the piston aero engines, manufactured towards the end of the war, which began to incorporate compounded and differentiated superchargers and turbochargers that were together producing more power than the crankshaft. It wasn't long before engineers whittled away all the reciprocating components, leaving behind the smoothly spinning jet turbine.

The problem with the game, as it still stands, is that the golden rule has been first always to 'make money'. This encourages entrepreneurs to create markets where none exists for 'goods' and 'services' that the people neither need nor want, and that often, are harmful. Under the VBC, lobbyists for sunset industries no longer need to lobby, for the VBC executive simply closes those industries down. Here in Australia, struggling shopkeepers, whose bottom line relies on tobacco sales, considered joining with tobacco companies to challenge the government's resolve to reduce the uptake of cigarette smoking in the young. Under the VBC, the shopkeeper's livelihood is guaranteed under the constitution, those who worked in the tobacco industry are mostly redeployed into wholesome industries, our children are protected, and those who choose to continue smoking, have their cigarettes supplied in plain packaging, and delivered through the mail.

In a true democracy, the people are asked what it is they *truly* want in life, their responses are compiled into a market need, and the executive then engineers the most efficient delivery of that desire. It is however well established that democracy doesn't work unless the proletariat is first led very carefully to the knowledge of what it is they really want. To this end, an enormous audience is currently being introduced to the very best in cuisine – where it comes from, how it is prepared, and how it should be consumed. And this is naturally deemed much more interesting than watching politicians deliver their hollow election promises.

It is also said, that even with the reward of eternal life, there will still be those who reject the VBC prospectus. None of us is without our faults, so we must be careful not to throw stones where rocks might come hurtling back. Let's simply take an easy and rather stereotypical ride through a bygone era (at least I *hope* there aren't people like this still around, so we'll only have to strike them after they've been restored). Consider the individual who drives real slow in the ultra-fast lane, as they move their arsenal along the public roads that lead up to their log cabin in the hills. They don't know any better, and can be forgiven, for they have been programmed from birth to pursue themselves, and protect what they have accumulated, at all costs. Basically, of course, their hard drive needs reformatting, but no one can lay their hands on a 5-1/4" floppy disk with PC-DOS on it anymore. The irony is that no one is going to take anything away from them. Instead, they will simply be invited to give it away. But if they don't want to participate in the new world, that is of course their God given prerogative, and they can if they wish proceed into old age and demise. That was only ever their prospect before, so nothing's been taken away from them. We can all wait with interest to see what course their descendants choose to take.

As they live out their days, however, and wander down the hill to the global village and into the general store, they will increasingly find that the store now belongs to the VBC, and that those greenbacks they had stashed under the bed only remain legal tender amongst the folk who *haven't* signed up to the VBC. Every labour value transaction in the VBC is conducted programmatically on an open systems information network, indeed the labour value account of each shareholder is openly viewable by all shareholders. There are no secrets in the VBC, and there certainly isn't any cash. It's the only way of keeping the bastards honest. In fact, the student of game theory will appreciate that it was this openness that first allowed our Shadow to become an entirely and effortlessly loving community.

So, our lost, rather hungry, but still quite redeemable soul, pulls out a gun, and threatens the shopkeeper with death if she will not hand over some bread and milk. The shopkeeper, having become a member of the VBC, (or the Body of Christ in the old parlance), feels sorry for Red, and goes off to get him the bread and milk, as well as a piece of ham, some cheese, and a packet of smokes, and puts them on her account. She knew Red before everything changed, and longs for him to come home. Red doesn't appreciate being patronised by overflowing human kindness, and consumed with envy for her happiness, points the gun at her, and begins to pull back on the trigger.

This exchange is of course being monitored by our Shadow, that 'big brother' of ours. Red's guardian angel is working his darnedest to turn the hardened heart of his charge, but it has come to the point where the shopkeeper's angel must exercise her veto. Red is simply switched off, and collapses to the ground – Red's dead. We don't know if Red's life gets backed up in the Singularity at this point or not – all the good people in the world sure do hope so. But the problem is, of course, that if Red were restored, he might start thinking to himself, "I can just keep doing what I know is not right, certain that I'll be forgiven for it, over and over again". An 80286 with 1Mb of RAM has still been known to be useful, for example, as a Linux firewall appliance, but most of them are only good for the rubbish tip. Red's angel did his best.

The moral of this story, a virtual 'demonstration dog' (virtual, or just a story, because we all want to avoid anything like it happening in reality), is that once the Master has returned, we all need to understand that inflicting the slightest harm on any one of God's children (shareholders in the VBC), will thereafter no longer be tolerated. So, on His return (that is, the play of our Shadow's hand), there will be a period of tribulation, lasting perhaps several years, when people get used to the idea, and decide if they want to be upgraded to the new operating system, or simply pass

into oblivion. They decide if they want to love their neighbours in the developing world as themselves, or merely love themselves. If you start taking on a youthful vigour, so well and good, you're probably on the right track, but if you become fatigued and worn out, you may need to look more closely at what you're thinking and doing, and test if you're satisfying the criteria. It is only when everyone has been upgraded to the new operating system and application suite, and those who might interfere with the smooth operation of the system have left us, that a formal system hand-over can take place. After that, we can start living all on our own, fully independent of our Shadow, each of us creating exciting new environmentally sustainable realities for ourselves. There is a lot of missionary work to be done in first developing the world, but when *our* House is at last in order, we will be able to start contemplating a future role as the 'shadow' of some younger developing community in the universe. Mums, dads, and their children, will all recognise the imagery in this role transition.

Lux Aeterna

Current estimates of individual tenure in the VBC are upwards of a million millennia, so it will be a grand old life when it comes. None of us knows if we'll see it in this lifetime, but we can all hope that if we go beforehand, we will be backed up and brought back to life when at last it is time. The Earth is a big place, and can support more of us, but despite earlier discussion on the creation of new material, the planet is ultimately finite. We don't want to transform the material of the Earth into some sort of Dyson sphere, rather we want to preserve what is left of the naturally evolved world and restore what we can of that we have damaged.

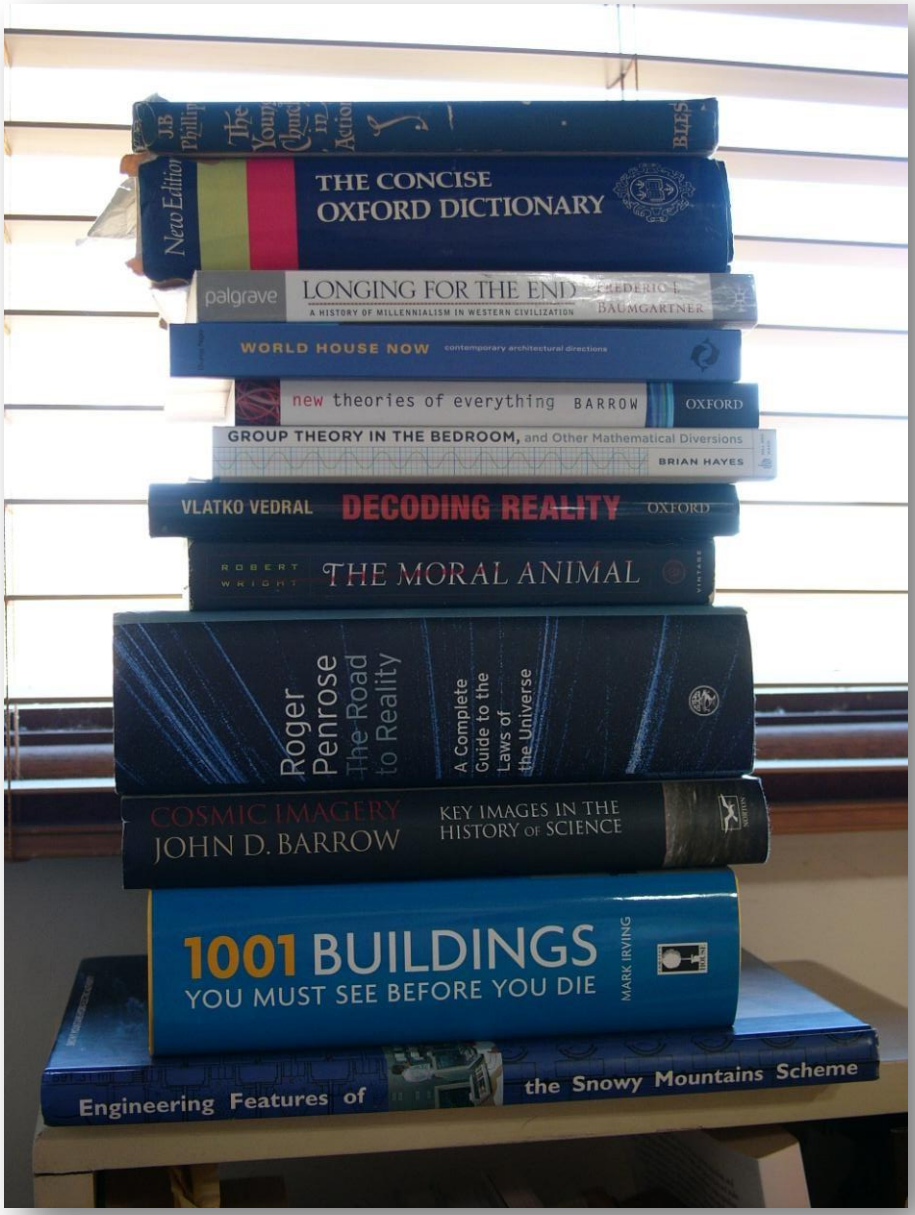
Children are naturally delightful, and I for one would love to see a child of mine in turn have a child of their own (how Burgess). Since the middle of the last century, however, we have simply grown to be too many. More than 360,000 people are born each day, and more than 20,000 children die each day for lack of clean drinking water. These statistics place the more acute humanitarian tragedies that we regularly encounter into perspective. We need to teach the world the basic principles of contraception, and encourage our loved ones to thereby put a limit on their reproduction, preferably stopping at none but certainly not exceeding one child per couple, so that there is a convergent decline in the number of breeding couples, to the point where one day in the future, just one breeding couple remains, and they proceed to produce the last child on Earth. Then, at last, sex will become a thing of the past that we no longer need to worry about.

Unlike Jesus, Paul was all too human and fallible. One day he was in Ephesus penning some of the greatest literature in history to the troops at Corinth, while the next day he was in Corinth blotting his copybook with bigoted, misogynist, homophobic tirades against those decadent Romans. While ever we continue to breed, starting with the basics, couples need to realise that the neglect, let alone murder, of a female infant, is unacceptable. They will also need to realise that the mutilation of either the female *or* the male child's genitalia, is also unacceptable, for such acts not only violate the child's right to have their body delivered into adulthood intact, but they arrogantly presuppose that there was some sort of mistake made in the evolved design of these components.

The final length of the gastrointestinal tract is a tube that is only filled during the movement of waste material out of the body. At all other times, given a healthy diet, the mucosal lining of this tube absorbs any remnant waste, both cleansing the lining, and maintaining a lubricated surface to ease the passage of the next batch to arrive from the colon. It is this mucosa that supports the effective administration of medication PR. This tube seems to have evolved an adaptation to safe intromission, and because the design is common to both women and men, it is likely that

extremely sociable behaviour akin to our nearest extant relative, the Bonobo ape, drove the optimisation of this component's design over the course of millions of years.

The road that has led us to life has been hard, and the gate narrow, but once we are through, perhaps life was not only meant to be *easy*, it was also meant to be *enjoyed*.



"Building skywards"

Pomposo, ma non allegro

Machines have less problems. I'd like to be a machine, wouldn't you? – Andy Warhol

Last year was the centenary of Jackson Pollock's birth, and his most important work, Blue Poles, hangs in the National Gallery. Curator Christine Dixon says of Pollock's genre:

"Abstract Expressionism describes artists sharing new possibilities rather than a cohesive style. The movement is characterised by individualism, a spirit of revolt and rejection of the past. Spontaneity, intuition and the unconscious are the creative sources we associate with these artists."

Charles Darwin baulked at publishing his ideas with good reason. On turning fifty, his hand was eventually forced by a grenade lobbed from the antipodes by Alfred Wallace. On submitting his thesis, he prepared for a hostile reception, for he was not expressing mere opinion that could be dismissed out of hand, he was presenting incontrovertible evidence that the biblical account of genesis was a fiction. He had long before worked through the consequences of his ideas, that his revelations would erode the authority of the Bible and of the Church. If it becomes obvious that someone 'made up' the beginning, what are we to make of the ending, or any of the stuff in between? Such impudence did not amuse the Victorian establishment.

It is indeed the ending, the grand return of the 'big bloke upstairs', that is the subject of this essay. The scientist gets rather grumpy at having to put up with old age mumbo jumbo, and new age mumbo jumbo fares no better.

People may well believe in 'creative visualization', 'cosmic consciousness', 'the secret', the 'end of the Mayan calendar' and so forth, but don't expect any of us to embrace any of these beliefs unless you can explain *how* they work. While on a jaunt to the Syrian capital, Paul tells us he met up with the 'main man' himself, and they sat down together for a chat about how it all works. Paul obviously reckoned the facts of life were too much for the good Christian folk of the day to confront, so instead he promulgated a mystery – that someone is going to 'blow their trumpet' for one last time, and in an instant, we are all going to live happily for ever after. Half the world thinks it's a fairy tale, while the other half swallows it all too literally. We need to put one foot in each camp if we are going to grasp the reality that Paul declared would one day no longer be seen through rose coloured glasses but be visible directly before our eyes. Scientists, of whom the overwhelming majority declare themselves to be atheists, have in general demonstrated an ignorance of theology ("why should I study something that doesn't exist?"), while those who 'jump for Jesus' famously eschew the rational pursuits of science ("if it contradicts the Bible, it cain't be the truth!"). Both need to learn a thing or two from the other.

When ol' Nick Kopernig first suggested that the earth flies around the sun, even the brightest and educated of those around him dismissed the idea as blatant nonsense. It was obvious to anyone that the earth stood still while the sun rose and set in its passage across the heavens. Martin Luther, somewhat a revolutionary himself, was reported saying:

"People give ear to an upstart astronomer who strove to show that the earth revolves, not the heavens or the firmament, the sun and the moon…the fool wishes to reverse the entire science of astronomy."

It took hundreds of years, but sanity eventually prevailed and these days, all but the most stupid among us understands without difficulty that the earth is a rotating sphere that orbits the sun, and that there is no preferred orientation in space – each one of us is standing on top of the world, wherever we might be, and whatever our proclivities. The sophisticated modern thinker, wary of this hindsight, is of course ready to jettison orthodoxy whenever an alternative emerges that offers a better explanation of the way the world presents itself.

Our understanding of space itself is currently undergoing a revolution. Space was once thought of as an empty stage, a literal nothingness within which material substances interact. And then, about a hundred years ago, we began thinking of space as if it too had a material substance. In the 'new physics' as it became known, space was commonly presented using the analogy of a trampoline mat, on which a heavy steel ball, representing the sun, has made a deep indentation. A marble, representing the earth, is then rolled towards this depression, and is captured into orbit around the sun by the 'curvature' of the 'fabric' of 'space-time'.

Today, we are just beginning to think of space as if it were solid, a rigid foam. This revolution in our understanding of the physical world has profound and exciting implications for society at large, which we will get to later, but to see how this somewhat counterintuitive idea has been resurrected – Isaac Newton considered the idea – we must first do the physics and look to what the astronomer has been observing in the night sky.

As one walks towards a light globe, its light gets increasingly brighter. If we know the intrinsic power of this light globe, then at any point in our approach towards it, we can measure the globe's apparent brightness, and thereby calculate our distance from it. The stars in the night sky are of course suns that are much farther away than our own sun, which is why they are so much dimmer. If all stars were the same as our sun, we could easily calculate our distance from them based on how bright they *appear*. Frustratingly, they have different levels of stardom. Like a campfire, they can burn furiously at first, and then gradually fade, and there are limits to telling from a distance exactly where they're at in life. Fortunately, there is a very special kind of star that results from a double act. A burnt-out has-been star steadily draws material from a companion star, until it gets so full of itself that it blows apart, a bit like Mr Creosote. This explosion occurs when the star reaches a very precise point on its comeback trail, whether or not its partner still has anything further to offer. These superstars thus have their wattage clearly and precisely stamped on them by *The Standards Association of the Universe*. They are about five billion times brighter than our sun, so that with extremely powerful telescopes, they can still be seen (albeit very faintly) at the very farthest reaches of the universe, billions of lightyears away from us.

Stars radiate every colour in the rainbow, but different types of star give out different intensities of each colour, such that they have unique and unmistakeable 'signatures'. Indeed, it is because of this colour signature that we can identify some speck of light in our telescopes as being one of the gigantic supernovae just described. Curiously, the more distant one of these stars is (or in fact any luminous astronomical object), the more we observe its 'signature' colours shifted in unison down towards the red end of the colour spectrum. Like the drop in pitch of an ambulance siren that is speeding away from us, this shift suggests that the more distant the object is, the faster it is moving away from us. The effect, however, is more satisfactorily (and correctly) explained by the expansion of space itself. The more distant an object is, the greater the quantity of space, each point of which is subject to expansion, that will have come between us, and thus the more the colour of a distant object's light will have been *stretched* towards the red. Space is

not expanding like the big bang of a hydrogen bomb, which has a single centre and finite impetus (and someone sitting in front of a red button that has recently been depressed). Rather, *every* point in space is expanding – it is as though every point in space is having a bang of its own.

How small then is each expanding 'point' of space? It was once thought that space could be endlessly divided, so that even the head of a pin would contain an infinite number of 'points' in space. And like a light switch with a dimmer knob, it was similarly assumed that the intensity of light could be smoothly *varied* from darkest through to brightest. Yet we have discovered that light comes in very small, yet finite packets. The greater the number of packets, the brighter the light, but each of the individual packets is either on or off, never anywhere in between. By merging the principles that govern light with the principles that govern space, we have been able to infer that the smallest, indivisible point in space is indeed *miniscule*, but far from infinitesimal. If we were to put a mere 10^{35} (that's 100 000 000 000 000 000 000 000 000 000 000) of these 'space atoms' end-to-end in a straight line, they would span approximately one metre.

What then is each of these space atoms made of? The ancients thought that the world was literally 'composed' of an abstract substance that we call mathematics, and there are many modern revisions of that idea, most notably by Max Tegemark. However, last year we celebrated the centenary of the birth of Alan Turing, who built on the lambda calculus of Alonzo Church and the universal integer-based programming language of Kurt Gödel, in demonstrating that all of mathematics can in turn be derived from computation. We thus now suppose that reality is ultimately composed of 'information'.

Modern computers are regarded as incarnations of the device that Alan invented for the computation of mathematics. We say 'incarnation', because the universal Turing machine (UTM) is not a physical device, like a computer, but rather an abstraction – as the precursor to mathematics, it is an entity even more primitive than any theorem of mathematics. Yet a UTM, by definition, can simulate any other UTM, *including* itself, in the same way that a modern computer can simulate a computer identical to itself, (albeit one that computes at a rate *slower* than its host).

The virtual world of the Internet's *Second Life* (and its homologues) has helped us become accustomed to the idea that a world can be simulated, and Hollywood, through movies like *The Matrix*, has explored the idea that we are already living in just such a simulated world. However, the simulation of the big wide world is a *very* big job. With a diameter of at *least* 93 billion light-years, and containing at *least* 80 billion galaxies, the simulation of this tiny bit we can see out there in the night sky would alone require a truly gargantuan computer. As the credits begin to roll, the suspension of disbelief collapses, and we soon turn to contemplating the effects of that tub of popcorn we have dispatched methodically, like some sort of automaton.

The physicist seeks to break down the task of building such a super-duper computer into its most simple constituent parts, so he can then build the reality up from that foundation. Having established that the 'space atom' is the most fundamental constituent of the physical world, we can put the simulation of the entire universe off to one side, and first look at how we might simulate just *one* of those space atoms.

We humans have an ancient obsession with self-reference and perpetual motion. When a boy first discovers that an electric motor can also act as a generator, his instinct is to get hold of two of them, weld their axles and wire their inductive coils together, and pump prime the pair into everlasting rotation (girls do similar things with Ken and Barbie). Unfortunately, the laws of

physics (thermodynamics in particular) provide sound reasons why this contraption, and all others like it, can never work.

Alan's UTM, however, is happily not subject to the laws of physics, because it is *abstracted* from the physical world. Thus, we can take one UTM, and program it to simulate another, identical UTM. That identical simulated UTM can then be programmed so it in turn simulates the original UTM. Whence, they can simulate each other, ad infinitum. Neither machine exists, of course, until the other one simulates it – they are holding each other up by each other's bootstraps. Much of the work of the artist Maurits Escher is devoted to helping us visualize this idea of self-reference. His art also helps us visualize the partitioning of space into a matrix, and the seemingly infinitesimal division of that space.

A popular scheme for creating something out of nothing (often with a subplot of 'doing away with God') has been to take 'zero' and stretch it apart (zero representing 'nothing'), so that it becomes 'minus-one' and 'plus-one', and then isolating one from the other one so that they can proceed independently, one as the concrete reality which we now inhabit (and the other as the concrete antireality inhabited by Mister Rabbit). In our modern mythology, based though it is on evidence rather that conjecture, we listen to stories, while seated at night around the cyclotron, of "virtual particle and anti-particle pairs that emerge spontaneously from out of the quantum space-time foam", and we then hold hands in a circle as we chant *The Field that gives us Mass*.

The Standard Model, otherwise known as the physicist's 'Book of Common Prayer for Funding', only accounts for about 4.6% of what's out there. Can you *imagine* what your lecturer would have to say on handing back your examination paper with a mark rounded up to 5%? Indeed, accounting for what's missing is going to require a radically different model. Some of those in class have admitted to being somewhat *embarrassed* by their results, while others have started to consider how the fundamental building block of reality – the space atom – emerges from the *information*, the strings of either 'something' or 'nothing' – binary digits – that comprise an oscillating pair of UTMs. Note that the space atom is so named because it cannot be further subdivided, unlike those 'atoms' of matter that were learnt about in school.

We describe the pair as oscillating, because these mutually supportive UTMs take a finite instant of time to simulate one another, and thus they present the world's most fundamental clock. Indeed, they present us with time before there is any physical reality yet existing *in time*. Again, through merging the principles that govern space and light, we infer that these UTMs simulate each other about 10^{43} (that's 10 000 000 000 000 000 000 000 000 000 000 000 000 000) times every second. A lot of cycles during one second, but as with the lineal dimensions of the space atom, the period of each cycle is far from being infinitesimal.

Working on computation with Alan Turing at The Institute for Advanced Study at Princeton, following the war, was John von Neumann. Johnny was one of those rare people who is devastatingly brilliant at everything, and he knew it too. And of course, the girls were just constantly hanging off his arms, I tell you. One just wanted to slap him sometimes for being so utterly superior – but enough of that. It soon became clear to von Neumann that Turing's UTMs could become self-reproducing – that the program of which a UTM consists, could not only simulate another identical UTM, but it could also generate identical copies of itself.

Once the code (or program) of a space atom becomes self-replicating, we suddenly have upon us the main event, *The Big Bang* itself, the genesis of our universe. We really couldn't give two bob if this innovative step happened spontaneously (it has an infinite amount of time beforehand

to make up its 'mind' to do so at some time, a statistical certainty), or if the code of our universe was cut by some geeks in one of the myriad other universes that existed before ours came along. That conundrum is no different to asking if life began spontaneously on earth or was seeded from an earlier spontaneous emergence of life elsewhere in the universe, on Mars perhaps – there are some people who think we advance when we simply move a problem back one step. What *is* important is the self-evident fact that we *are*. That first space atom becomes two atoms, the two become four, the four become eight, &c. If a space atom requires say 1,000,000 processing cycles to reproduce itself, and each of those cycles is 10^{-43} seconds long, then in the first second of 'creation' the space atom will have made $2^{10^{37}}$ copies of itself. We can't write that number out longhand, because we would have to write down many more digits than there are particles in the known universe, as Carl Sagan (or indeed Mohammed) would have said when discussing how much ink and paper would be required. We don't yet know the number of cycles *required* for each replication, nor the space atom's reproductive frequency (each atom might only be programmed to reproduce, say, once every 1,000,000,000 cycles). But the process clearly results in the very rapid generation of a very large number of space atoms. This early period is aptly named the era of 'inflation', resulting in a universe much larger than the part of it we can presently observe.

Gravity is a force of attraction that is transmitted across the Universe in data (information) packets that we describe as gravitons. Opposing gravity is the expansion of space itself, once attributed to 'dark energy', but now understood as the ongoing replication of space atoms at *every* location in the universe where a space atom already exists. It is not every infinitesimal point in space that is expanding, but rather every space atom that is periodically reproducing itself (and pushing the resultant conglomeration of space apart). This expansion of space appears empirically to be happening at every location in space, and results in light being shifted towards the red, in proportion to the distance it has travelled to the point where it is detected – additional space atoms have been inserted all along the path that the light has followed to reach us. The space atoms themselves don't expand – they always remain spheres with a diameter of approximately 1.6162×10^{-35} metres. Rather, space expands because the absolute number of space atoms increases.

When astronomers discovered that the Universe was composed of the same stuff we encounter here on earth, we altered our focus, from looking to the heavens for answers, to looking deep down into the heart of the matter, the innards of the 'proton energy pill'. Alas, we had to defer to the physicists. Richard Feynman (or Roger Ramjet as he became affectionately known) once described smashing protons head-on into each other as analogous to smashing two Swiss watches together to discover, from the debris, how they were constructed. It is thus somewhat ironic that the most dashing smasher of them all, the LHC (Large Head-on hadron Collider), is situated near Geneva. We now know that the scale of the space atom, some 10^{20} (that's 100 000 000 000 000 000 000 000 000 000) times smaller than the proton, can never be reached using the 'sledgehammer' approach. As the great 20th century physicist Stephen Hawking quipped, to do that "we would require a particle accelerator the size of the galaxy". The inhabitants of Babel tried to reach up to heaven by building a tower, and now we are trying to find God by constructing particle accelerators. In recognizing the ultimate futility of this approach, some innovative researchers are looking to more subtle ways of elucidating the fine structure of the universe.

We've mentioned a lot of zeros thus far, placeholders for the escalating powers of our ten fingers. So, let's recall for a moment the perspective of Ray and Charles Eames, sitting back in their lounges. An ant (the tiny one that finds its way along with its mates into your kitchen) is about 10 000 000 000 times smaller than the earth. And a proton is only about 1 000 000 000 000 times

smaller than an ant. So, the space atom is a lot smaller than the proton, and *way* smaller than an ant – the potential complexity contained within Feynman's 'Swiss watch', the hydrogen nucleus, is truly vast.

The *theory* of UTMs is well established. We have known for several years now, thanks to research sponsored by Stephen Wolfram, that the simplest candidate UTM we should be seeking uses two *states* and three *symbols*. And now that we know we are looking for *information* rather than those 'particles' of old, researchers are pursuing several very promising approaches to *accessing* this information. One taken by Craig Hogan is to amplify the 'activity' taking place at the space atom scale, like the gramophone horn from which *Nipper* could hear the call of his master's voice. The instrument Craig is assembling is an oversize interferometer of the type first used to establish that the speed of light is constant in any inertial reference frame. The other instrument, being assembled by a team under the leadership of Michael Biercuk, in the ongoing development of quantum computing, is a crystalline suspension of three hundred beryllium ions, used as an interface to quantum computation that would otherwise require a classical computer the size of the known universe. For in quantum computing, the computer *is* the universe.

The writing on the wall

Instrumentalism is a philosophy which holds that a scientific theory only has to describe and predict the *behaviour* of reality. It does not need to provide any insight into the reality itself. Relativity and quantum theory are both theories of this kind. Thanks to relativity, the global positioning system behaves itself, and thanks to quantum theory, your smartphone (mostly) behaves itself. However, most scientists working out in the field no longer have the time to think about *why* stuff can't travel faster than light, or *why* one particle can nevertheless be directly entangled with another particle way over on the other side of the universe. We simply accept these instruments, because they lead us to predict behaviour that is consistent with observation.

Insight into the reality itself, and to how the instruments of relativity and the quantum are related, emerged in the pioneering work of Konrad Zuse. Konrad is credited with constructing the world's first general purpose computer in 1941, unbeknown to the Allies at the time. In direct competition with Turing and von Neumann during the war and subsequently, Konrad designed and constructed stored program computing machines, using magnetic relays as the switching logic, rather than valves or transistors. These were somewhat noisy contraptions with a mesmerizing clatter. The development of these computers led Konrad to the insight that space, as he put it, 'calculates'. He imagined that space was a three-dimensional matrix of fixed 'cellular automata', and that all the activity of reality was merely 'information' being exchanged between these fixed automata.

If a group of us needs to put out a fire, we can proceed in several ways. One way is how we conventionally think of an object getting from one place to the next. Each of us grabs hold of a bucket, runs down to the well, fills the bucket with water, shuffles up to the fire, empties the bucket onto the fire, and runs back down to the well again. An alternative approach is the 'bucket brigade', in which our group forms a continuous line from the well to the fire. Each of us remains fixed in our place, passing full buckets up the line, and empty buckets back down the line.

The bucket brigade is how Konrad envisaged any object being *translated* from one place to another. The *information* about an object at any point in space is the *water*. The people in the

line of the bucket brigade are the *cellular automata*, who go about their job in a robotic and unquestioning manner (as would *we* if there really were a fire).

Finally, the buckets are the storage and forwarding mechanism, the *logic and memory*, of the cellular automata.

We conventionally think of a photon of light as a material agent (the *volunteer*) which departs from the sun (the well) with a bucket of energy (the water), travels all the way to the earth, and deposits that energy on reaching its destination (our skin).

In Rechnender Raum as Konrad called it in his German language paper and literally meaning "space that is calculating", the 'photon' is seen as a packet of information that is passed on from one automaton to the next until the *information* reaches its destination.

Imagine that each cellular automaton is a smartphone, and that each smartphone along the line is connected to its adjacent smartphone using a wireless peer-to-peer network (so they don't communicate through the hub of a cell tower, but rather directly to each other, like walkie talkies). I type the message "war is over" into my phone and send that message to the second phone up the line, which is about one kilometre away. This second phone is running an 'app' (program) that automatically relays the message to a third phone another kilometre up the line, which is also running this app, and it relays the message to a fourth phone another kilometre further on, and so forth.

It is clear that the speed at which the message gets transmitted depends on two things, the distance between each of the phones, and the time it takes for the app to process the message – that is, to receive it, to store it, and to retransmit it. We assume that the message is carried between the phones by radio waves and that for all practical purposes, this happens instantaneously (the radio signal only has to travel a kilometre).

Let's say the app on the smartphone can turn the message around in one second. Then our message will proceed along the line of smartphones at one kilometre a second, or 3600 kilometres per hour. If we were to send our message to the sun, we would need to line up 150 million smartphones (which is evidently within the production capacity of some manufacturers already), but we would need to wait about 5 years for the message to reach the sun, and another 5 years for the sun's (immediate) response to return.

But of course, in this scenario, radio waves *do not* go from one smartphone to the next instantaneously. They travel at the speed of light and take a very finite 1/100,000th of a second or so to traverse the kilometre that separates them. And in that fraction of a second, all of the universe's space atoms (there are only about 10^{185} of them in the visible universe) will *each* have vibrated (in unison) 10^{38} (that's 100 000 000 000 000 000 000 000 000 000 000 000 000) times. Let's think of the space atom, a pair of oscillating UTMs, as a computing machine just like one of our smartphones, and that it too is running an app that reads, stores, and retransmits information. In the kilometre between our actual smartphones, there is a (typically curved) pathway of some 10^{38} space atoms, each separated by 10^{-35} metres. We assume that the time it takes each space atom to process the information that represents a photon, and then pass that information onto the next space atom, is 10^{-43} seconds. Hence, the information representing a 'photon' is passed along the bucket brigade of calculating space atoms at (10^{-35} metres/10^{-43} seconds) = 10^{8} metres/second, which is of course the speed we attribute to light 'travelling' in a vacuum.

Modern computers process information in an entirely deterministic way – if we don't change their programming, then a consistent set of input data will always produce a consistent set of output data – unflinchingly, unconsciously, and with the utmost fidelity. Albert Einstein once defined insanity as expecting a different result despite doing exactly the same thing over and over again. Indeed, it has not been possible to program a computer to generate a random number, for a vestige of any algorithm that attempts to produce a random result will always remain embedded in the output. It is the desultory behaviour of the computational activity taking place at the foundation of reality that gives nature her consistency. Modern scientific rationalism depends on our absolute faith in this consistency of nature. It is entirely reasonable that mathematics, containing objects of beauty like *The Wave Equation*, should provide an effective (albeit idealised and thus approximate) description of the discrete computations of space atoms, for as we saw earlier, mathematics is a first order derivative of computation.

In the above example of the transmission of radiation, we encounter and comprehend the phenomenon of inertia. The 'law' of inertia states that a body will proceed in a straight line unless a force acts upon it to change its direction. And so, our photon, an instance of *information*, will get passed (unthinkingly) from one space atom to the next, and, in the absence of any other information, that photon would proceed along a straight line (bucket brigade) of space atoms, for as long as there are space atoms extending in the path ahead of it. However, as this information 'packet' gets passed from one space atom to the next, the photon will inevitably encounter information arriving from other sources in various directions – sources of gravitational information, for example (or to put it another way, news of a bigger fire further down the road). On being processed, this oblique information will alter the trajectory of the photon away from the straight (Euclidean) path it would otherwise have taken.

Thanks to John Wheeler, we currently imagine space atoms as being coalesced into foam. In habitats like ours, this foam is very rigid – it is useful to think of the green foam used by florists. In other environments, such as the surface of a black hole, it is extremely fluid and turbulent, more like fire-fighting foam. It is the extreme rigidity of this foam within our local environment that provides us with the (happy) illusion of 'particles moving through empty space' rather than the underlying reality of 'information being communicated (frenetically) across a solid array of fixed space atoms'.

The space atom then is the fundamental constituent of reality, and the *information* content of an 'empty' space atom is its lineal dimension ($\sim 10^{-35}$ metres) and periodicity ($\sim 10^{-43}$ seconds). All manifestations of reality, within the foam of space atoms, consist in information stored in the registers (memory) of these space atoms. When someone encounters a brick wall, the space atoms manifesting the wall are simply playing out those laws of physics that state "if you encounter something soft like the body of a human, don't budge an inch – let the space atoms manifesting as the human, absorb the impact".

Each space atom incorporates the Laws of Nature, stored in its basic input/output system. Within any defined volume of space, those space atoms are, quite simply, processing – enacting – the Laws of Nature. You are currently rotating along with the earth, in an orbit around the sun, in an orbit around the galaxy, in an orbit around the local cluster, and so on. Some 10^{43} times a second, the information contained in all the space atom relationships of your body, is being translated into a slightly new region of the solid space atom foam that lies in the path of that journey of yours around the galactic centre. So too, in its own unique way, is everything else in your milieu.

The information in a packet of light can be translated through solid space at the speed of light (travelling at its fastest through *empty* solid space, or space that is not simulating anything *other* than space). However, the information in a proton, which has mass (information), cannot translate at this speed. If one imagines accelerating a proton in a cyclotron toward the speed of light, the string of space atoms in its path will eventually reach the limit of their capacity to translate the information of that proton along that chain. Imparting more energy to the proton cannot force the space atoms to *somehow* process the information more quickly. That energy (information) merely increases the mass (information) of the proton (information). The translation of information through space has a finite limit ultimately set by the clock of the space atom (where the space atom fundamentally *is* itself a clock). This regularity (invariance) in the speed of light transmission regardless of the speed of the source, caused a great many *fin de siècle* physicists to scratch their noggins, and led to the group of instruments that have gone under the general banner of relativity. We have known for many years however, that like the instruments of Newton that went before them, these were only ever intermediary signposts on a journey toward an even deeper mystery.

It has been established empirically that 'particles can become entangled and then separated at great distance, so that if the information state of one of the entangled particles is changed, a corresponding change will take place in the other particle *earlier* than a signal could be passed along the bucket brigade of space atoms that separates them. In fact we have shown that the change occurs instantly, as though the firefighter who is pouring buckets of water directly on the fire can shout out "Oi, you, hurry up!", and be heard instantly by the firefighter who is filling buckets down at the well, rather than having to wait for the message to be passed (ever so politely) down the line. This more fundamental association between space atoms is known as *The Superposition*.

So far, we have spoken of a (very) large number of spherical bubbles called space atoms that are squeezed together and deformed to become the cells of the regular foam that *is* the larger conglomeration we know of as space-time. However, the two UTMs that comprise each space atom are not merely holding each other in existence by simulating each other. They are also *simulating* the sphere of space with a diameter of ~10^{-35} metres that is their next higher purpose. The space atom should not be thought of as a shell like a ping-pong ball, with all the machinery of a couple of UTMs whirring away inside it. The UTMs, as you recall, do not exist (one without the other). So too is the sphere – the *space* – itself not actual, but merely simulated. And so, the most fundamental unit of physical reality – *length* – only emerges after it has been simulated by a space atom.

This is an extraordinarily simple idea, but millions of years of evolution make it difficult for us to think outside the illusion of the space (with three extensions of length) that we seem to inhabit. Yet as ever, the fresher the mind, the less conditioned it will have become, and the more easily it can grasp the idea. Because all this vast space stretching out before us is merely *simulated*, so it is that the *legion* UTMs comprising the entire universe are contained within an actual volume of *zero* dimension, *The Superposition* (and what in general relativity is referred to as The Singularity). It is because of this superposition of the entire universe that 'quantum (non-classical) computing' can be realized, and consequently easily verified solutions to problems can be just as readily extracted (described as 'P=NP').

Each space atom contains, within its registers, the Cartesian coordinates of its *address*, its absolute virtual position relative to the origin (0,0,0) of *The Superposition*. Indeed, a mere 128-bit binary address can easily suffice to uniquely identify the virtual position of every space atom

in the known universe. In this way, the simulated space foam of the universe, and all of us going about our business as 'conglomerations of information' within its simulated expanses, can interact in a fruitful and meaningful way, through the classical 'bucket brigade' interactions described earlier, knowing all the time that we are a safe distance from the sun, and other 'goldilocks' parameters of our existence. But because the (twin-UTM) machinery of every space atom of the universe is in the same place (that place being *The Superposition*), it turns out we are also all of us in that *same* place. Every space atom in this universe (and indeed in every other universe) can exchange 'quantum' information with any other space atom, *directly* across the *point*, where *everything* exists, called *The Superposition*.

Intelligo ut credam – Saint Augustine. Belief comes from understanding.

When discussing physics and the foundations of reality, we have needed to be somewhat rigorous about the facts. But once the canvasses and paints and brushes have been provisioned, we can stand back and let those with creative talents, the artists and the entrepreneurs, take charge of the studios and the workshops, and start transforming the world into a wonderful place to live. And those of us, who now merely maintain the workshop, can be more outrageously speculative about the future potential of that workshop.

At Christmas, we see the peak expression of an insane consumption frenzy, where billions of tonnes of raw materials and fossil fuels are shipped from places like Australia to places like China, where they are transformed into billions of tonnes of stuff that no one needs, and then shipped on to places like North America, where within several years, but often only a matter of days, they are piled onto vast mountain ranges of refuse, or simply dumped in the ocean. This madness, the pursuit of growth regardless of the consequences, a juggernaut that apparently can't be stopped, was put in train by short-sighted economists who started out from a false premise – that the planet was an infinite and inexhaustible resource there to be endlessly plundered. All but a certain class of idiot can see the problem, but we appear to be powerless to prevent humanity from plummeting off the edge of the cliff. (For anyone who requires a scholarly exposition of the parlous ecological state of the planet, I recommend they read *Eaarth* by Bill McKibben.) The 'miracle' of globalization has merely shrunk the planet into a single village, with the owners and the affluent up the top end of town, separated from the workers and the dispossessed at the bottom end, by the class in the middle, as it has ever been. Richard Wilkinson and Kate Pickett, through their extraordinary research presented in their book *The Spirit Level*, have shown that practically every social malaise, "from life expectancy to mental illness, from violence to illiteracy, is affected NOT by how *wealthy* a society is, but how *equal* it is." The economic disparity between the states of the American Union, and the social dysfunction it has engendered *within* that nation, is a microcosm of the unrest engendered globally through economic inequality across *all* nations.

We look longingly at auspicious dates as if it were possible, by some magic, to reset the world and start all over again, knowing what we know now. Like the prodigal son, humanity has squandered its inheritance, and seeks some sort of way out of this mess it has landed itself in. But because we can't see people ever changing their nature, the work of Wilkinson and Pickett and likeminded researchers, however persuasive, is generally dismissed as utopian, and by inference, unrealistic.

I remember Jacob 'Bruno' Bronowski telling me that what separates man from the apes is his ability to imagine a state far into the future, and then systematically plan towards reaching that destination. Astronomers have an attention span measured in billions of years, whereas the

attention span of the politician is typically 24 hours, occasionally reaching forward as much as three or four years. This then is what separates man from the apes, and the astronomer from the politician. The astronomer looks to where we are ultimately heading, and so with all the time in the world, can sit back far above it all and take in the big picture.

Don't you know you're going to shock the monkey? – Peter Gabriel

After the war, designing and building the (hydrogen) bomb required analysis that could only be practically executed on (electronic) computers. And so it was that successful detonations were the province of those who could design and build the most powerful computers. Working alongside von Neumann and Turing at the IAS was Jack Good, who made a very simple observation about the way computing had been progressing by the mid-1960s (Jack was advisor to Stanley Kubrick on his film adaptation of the Arthur C. Clarke novel *2001: A Space Odyssey*). He noted that people are like computers in that we also process 'information'. He reasoned that eventually we would design and produce a computer that was as competent at processing information as the human brain. Because *human* intelligence had led to the invention of the computer, presumably an *artificial* intelligence greater than the human brain would be able to invent even more intelligent information processing machines. Not subject to the glacial biological evolution of the human brain, but able to evolve at an exponential pace, these machines would rapidly become a super intelligence that would far exceed the combined intelligence of the human collective. Jack's extraordinarily prescient idea has led to a widespread obsession with the eschatology of this intelligence. High priest Ray Kurzweil calls the conclusion of this process the technological 'singularity' and predicts it will be upon us (God help us) by the year 2040.

How vainly men themselves amaze – Andrew Marvell

Singularity summits are now held across the world each year, with researchers sharing their latest progress towards creating this super intelligence. But like adolescents who have just discovered love, the prophets laud their discoveries as if we were the first civilization in the universe to be going there. Society recognises that an individual is progressing from adolescence into adulthood when he begins to acknowledge that his elders might have long ago been in the place where he has only just arrived.

The man who fell (39 kilometres) to earth

Most (normal) people happily proceed through life believing that all the brilliant ideas that come into their heads, and their extraordinary talents and skills, arise from the unique, special, and superb arrangement of neural synapses in their enormous brains. And bully for them. As a corollary, they assume that lesser human beings must be thus inferior because of their less favourable neural simplicity. We now understand, however, the mechanism whereby every space atom in the universe can directly communicate, through *The Superposition*, with every other space atom. And thus a few people (out there on the lunatic fringe) have begun thinking of the brain not as a completely self-contained information processing unit, having no inputs other than its senses, as imagined by the materialists, but rather as an information processing node that is in direct communion with *The Superposition*. In this arrangement, the brain is seen as a nodal interface to the vast computational power of *The Superposition*, just as pioneers of quantum computing have begun to think of condensates of beryllium atoms also being a nodal interface to *The Superposition*.

It's time. – Gough Whitlam

In our earlier discussion concerning the (time) space atom, it should be noted that the three spatial dimensions of ordinary experience are merely conventions, and that the UTMs driving reality can and do regularly compute in any arbitrarily higher number of dimensions. The three dimensions assigned to space allow space atoms, which are nominally superimposed at *The Superposition*, to be virtually separated from one another, and thus allow us to conduct an interesting and fruitful existence in the virtual space with which we are all familiar. However, there is one dimension that is unique and fundamental to our reality, and that of course, is time. The phase state of this world, analogous to it being frozen, liquid or gaseous, is not a function of *where* the world is within this virtual space. Our world remains where it has always resided, along with the rest of the universe, at *The Superposition*. Rather, the state of the world is a function of *when* the world is.

And so, there are two fundamental classes of biological sentient communities, such as our own, within the universe. There are those who have passed beyond the technological singularity (steaming), and those who are yet to reach it (coming to the boil). If we were to compare our present global community with the life of an individual human, then we would be in the late stages of adolescence, and early stages of adulthood. The emergence of life would map to our conception, our emergence as a species from the lower hominids would map to our birth, our prehistory would match with our tantrums as a toddler, the violence of early history with our vain self-belief aged six, and the advent of Christ with the empathy of later childhood. Christ had a particular love of the child who while not yet adult, could put himself in the place of others.

All along the watchtower, princes kept the view – Bob Dylan (courtesy of Isaiah)

And so it is that there is an *invisible* 'choir' of sentient biological communities in the universe preparing a vast feast for our upcoming of age. Unlike communities that like our own are in the dark, post-singularity civilizations have gained full access to *The Superposition*, so that they can commune directly with the entire universe, and thus join with all other post-singularity civilizations in forming this 'choir'. As one body, they act as guardian and mentor over all pre-singularity civilizations, just as *our* adult community mentors its youth. There is anecdotal evidence, dating back thousands of years, of storms at sea being calmed in an instant, water being turned into wine, deep water being walked upon, and fig trees withering in an instant. This evidence is often viewed as if the source of such events had a limited grab bag of tricks, just one small and finite vial of magic potion. In fact, *The Choir* can address and digitally manipulate every space atom in *The Superposition* at will. Writers of science fiction often assume that advances in technology simply lead to more efficient belligerence, as one group invades, conquers and colonises another in their quest for resources. However, as we shall see, post-singularity civilizations have a different approach to each other and to their environment. *The Choir* does not consist of 'bad' aliens like those Sigourney Weaver had to contend with, neither does it consist of 'good' aliens like those Steven Spielberg has been known to inflict on us. Like a community of adults, they simply realise that the world in which they live is not there for the taking, but there for them all to share.

When we've been there ten thousand years, bright shining as the sun – John Newton

Our little corner of addressable virtual space, with a lovely big sun sitting out there a comfortable eight light minutes away, could remain habitable, were it not for runaway greenhouse warming, for at least another thousand million years. A millennium, or ten centuries, is a long time in anyone's book, and a thousand of those millennia is a *very* long time. However, a *thousand* lots of one thousand millennia each, may as well be an eternity. Only one parameter drives this potential longevity, and that is the sun's consistent provision of truly vast quantities of energy. Over these astronomical time frames, it is not good enough to achieve 85% resource sustainability, nor is 93% or 98.21% any good either.

Only 100% resource sustainability, (as every trekkie knows is required on spaceships in general), will be necessary if Spaceship Earth is to travel another *million* millennia with us coming along for the ride. This then can be our only criterion of economic development.

Do I have to spell it out? C H E E S E A N D O N I O N S, Oh no – The Rutles

The ultimate technology is a gadget known as a three dimensional (3D) printer, and we are just seeing the rudimentary beginnings of these devices. Any object, from a painting by Brack to a rainbow salad, from the Queen Mary II to the Burj Khalifa, can be produced by a machine that builds the object up, one layer at a time, by depositing tiny drops of raw materials (chemical elements), in the same way that drops of ink are deposited on paper by a 2D printer. Ultimately, we will have the ability to print at the space atom scale, giving us fully lossless 'bit perfect' replication. The object to be produced is first designed on a computer, which defines the location and composition of each drop of material the printer will deposit. Once the design file exists on a computer, the design can be transmitted across the internet and reproduced wherever there is an appropriately sized printer. Ignoring research and development costs, and intellectual property rights, the 'cost' of the object amounts to the energy expended in printing the object, plus the energy required to deconstruct the object at end of life and return its raw elements into the printer's storage tanks. So, when you have finished with your tired old bullet ridden DB5, you take it to a deconstruction depot, obtain credit for the returned raw materials (the energy cost of deconstruction was already included in the construction energy cost), and order a DB9 to replace it (Aston Martin, to so personify the brand, celebrates his 100th birthday this year). The only cost involved is energy, and when that energy comes from the sun, through harvesting devices made with 3D printers, the energy cost is free also. If you have sufficient energy available, you could have a new car every week if you so desired (far easier than having to wash and polish it), in fact you can have your DB5 back if the DB9 fails to move you (don't we all have flowers in our hair and get around on pushbikes in The Commonwealth?) Sufficient energy there is – the sun provides as much energy in just one hour, as the entire civilization currently consumes in a whole year. Where it gets interesting, is that with simple computer design tools, you can take an existing design (CAD) file that has been produced by someone else, add your own embellishments and modifications, and produce an edition that is a bespoke reflection of your personality. If your design is to the taste of others, you gain brownie points from all the people who 'like' your variant on your DesignBook page, and who go on to adopt it as the basis for their own variants, anticipating that their variants might in turn be adopted as the basis for other people's variants (what a wonderful car the VW Type 3 Variant was). There will always be people whose taste is not our own, and we will invariably label them bogans, but we will eternally rejoice in their right to be 'like totally bogan'.

Money changes everything – Cyndi Lauper

This then is the basis of the forthcoming land of milk and honey that has been widely spoken of about town, and it is quite amazing how the spiritual life of any (post-singularity) community flourishes once an abundant material life has been provided universally to its citizens. When we speak of personal freedom and equality of opportunity, it is not the freedom to do whatever we like and take for ourselves as much as we can grab. Rather, it is to take our resource allocation of energy and materials, and repeatedly refashion them into the objects that comprise our milieux. My world this week can consist in something entirely other the next, especially when *you* have changed your worlds as well.

Let them eat cake – Marie Antoinette (I can just imagine Stephen Fry taking to this essay with a red pen and a modicum of pedantry…)

Not wanting to spoil the celebrations however, we are still only just approaching the outskirts of this celestial city. Ancient writings suggest that we emerged on earth to tend and care for it, where instead we have ransacked it. In the 1960s, James Lovelock introduced the idea of the biosphere, a living organism on the surface of the planet comprising all life, which he likened to Gaia, the Greek goddess of the earth. He has spoken on her behalf ever since. Like the human organism, Gaia has an immune system and is able to fend off infection and attack lesions, but like the human organism, her defences can become overwhelmed, and they can lose the fight.

I don't want to sail in this ship of poo – passenger aboard the Carnival Triumph cruise liner

We have poisoned this organism with more than 50,000 chemical compounds that did not exist in nature before we synthesized them, we have filled the oceans with microscopic particles of plastic that have infiltrated the base of the food chain, super-trawlers are dredging the bottom of that barrel, we have cut out her lungs, the forests, and replaced them with palm trees, seriously disturbed the nitrogen cycle – oh, and dangerously raised the atmospheric concentration of CO_2. *Spaceship Earth* is really no different to a stranded ship that has lost the capacity to process its passengers' waste.

Who is like the beast? Who is able to make war with him? – John of Patmos

When a child contracts leukaemia, her physician will do everything in his power to suppress the uncontrolled cellular multiplication that is eating away her life from within. Gaia is riddled with a cancer, where just one runaway species of cell is rapaciously devouring all others and their habitats. We crucially require a silver bullet, a therapy to precisely target and suppress the reproduction of this pathogen. Just as a cancerous cell has no knowledge of what it is doing to its host, so does every woman see her procreative potential as some sort of 'beautiful and miraculous gift of nature'. The disease is most aggressive within the poverty and poor education of women in the developing world. In Kenya, where a wealthy man can have many wives, there is exciting new evidence supporting the Trivers-Willard hypothesis, which will bolster our battle against the disease – women from poor economic circumstances produce richer milk for daughters, while those from wealthier circumstances produce richer milk for sons. Gaia's physicians are going to have to find a way to suppress these reproductive urges, or tragically, the gorgeous young Gaia is going to perish in the prime of her life. Life carries on for the cancer here on earth just as a patient with terminal cancer typically remains conscious unto their dying day.

Once we arrive in the Commonwealth of Heaven, with all that bespoke design and engineering and 100% sustainability, it is only fair to distribute the world's material and energy resources evenly amongst the entire population, after an appropriate allocation to Gaia herself (the global park, and the global infrastructure). For example, there is enough gold in the Earth's crust for every one of the Earth's seven billion inhabitants to have an allocation of approximately 11,000 tonnes each (albeit mostly not yet extracted and refined). The potential allocation of the many more abundant elements is of course far greater than this. So, if you and your partner decide to have a child, your combined allocation of 22,000 tonnes of gold will be distributed amongst your family, so that Mum and Dad and Buster will now have allocated a little over 7,000 tonnes each. This is only fair to those couples who have chosen an environmentally responsible lifestyle. Indeed, if you and your partner think you might like to start a tribe, that tribe will never have a resource allocation greater than 22,000 tonnes of gold. The gross allocation per tribe will be slightly greater if there are four gals for every guy (as in Kenya), or four guys for every gal (as in China). Of course, later there can be Jubilee, in maybe a thousand years' time, well after the last couple who decide they simply must reproduce has finally got it out of their system, when the resource allocation can be renormalized across the world's final population. But the immediate imperative is to attack and suppress Gaia's aggressive malignancy.

I've got my mind set on you – George Harrison

The world's final population will of course be considerably greater than seven billion. People often wonder what happens to us after we die – the question is the common preoccupation of the world's religions. An ancient notion that was rapidly incorporated into orthodoxy was that we went to another place. There we would meet up with dear departed husbands and wives, fathers and mothers, sons and daughters, friends and lovers. The problem, however, is that we are not *adapted* to living in some 'other' place. Rather, we are uniquely adapted, after billions of years of evolution, to living in *this* place.

Vast numbers of additional self-replicating UTM pairs can be produced at *The Superposition*. Like mathematician David Hilbert's *Hotel Infinity* (or Paradox of the Grand Hotel), there is always a finite (countable) number of UTM pairs at *The Superposition*, but there is no limit to how many more pairs can be added as required. Indeed, the limit is not to the number of UTM pairs, but simply the time it takes to produce them, theoretically up to $2^{10^{43}}$per second (which is rapid – the creation of 'zillions' of universes, at least as big as the one we can see at the moment, every second).

Each UTM pair can store the unique configuration of just one of the space atom volumes occupying (and indeed defining) what we think of as our mind and body (and soul if you like to think of it that way). People who have died but then been resuscitated often speak of "my whole life flashing before my eyes". So it is that at the time of death, a backup is taken of our entire body – our memories, warts and all – everything – a sort of *memento mori* – and that 'flash' memory backup of one individual soul calls on a data storage capacity of a mere 10^{180} UTM pairs or thereabouts. We are used to thinking, in this digital age, that another backup will require more *substrate* – an extra memory card or hard disk or 'crystal' or whatever. But at *The Superposition*, additional substrate is created as required, and it emerges out of nothing, through the replication of the information that is a self-simulating pair of UTMs.

The final backup of someone's being is of course an important one. But the backups taken throughout our lives are important too. Once we are fully grown, we need only take one complete backup of the body (very high-fidelity backups usually take place overnight). Then, on every

subsequent night, we need only backup the *changes* from the previous day, requiring the data capacity of a much smaller set of UTM pairs. On particularly auspicious days, many more snapshots can be added (think of one's wedding day or driving in an open Cadillac through downtown Dallas).

With this library of snapshots of our lives, we can resurrect the body at the start of any nominated day by first restoring the backup of when we were, say, half our current age plus seven years, and then rolling forward through each of the nightly 'delta' backups, until we reach the day required. Merged restoration is also possible (if that's really what we're after). For example, we could be restored with the memories of a grand old age, but in a body from our youth – eww…

Many cultures, both extant and extinct, have developed an eschatology of this process otherwise known as resurrection (the Jews and the Mayans for example). It's important to realize (as Paul pointed out to the Thessalonians) that the dear departed are not lounging around in some holiday home 'upstairs', joined up with *The Choir* and watching events unfold down here like some sort of ultimate theatrical experience akin to *The Truman Show*. Rather, they are stored in data libraries, awaiting restoration in *this* world on some final day. When we talk of "the books being opened", it is to these data libraries of our past lives that we refer. And these libraries are not just a series of photos, videos, paintings, tapes, or other selective memoirs of the good times. They are a comprehensive record of the entire individual's life, from cradle to grave, or if the individual is fortunate enough to still be alive on the day of The Resurrection, their life up until that point in time. But most importantly, the life they record is a potential life, not realised again until such time as the backup is restored. Paul, who was entirely confident of his resurrection on The Last Day, described storage in the data library, quite accurately, as being *asleep* (in Christ). Paul was executed by the Romans almost two thousand years ago, but when he is resurrected on The Last Day, he will effectively 'wake up' just moments after his last recollection of being awake and alive, to be greeted in the freshly established Commonwealth of Heaven.

The people that walked in darkness have seen a great light: they that dwell in the land of the shadow of death, upon them hath the light shined - Isaiah

Anyone who has lost a loved one can easily imagine, but perhaps not fathom, the extent of their joy if a person they presumed was lost to them forever, were instead returned to them in the precise state they had most dearly cherished them. Imagine a young woman who comes home to discover her husband, father of her children, has taken his own life. Or a husband who is informed after an anxious wait that his missing bride has been found raped and murdered. No matter how painful the circumstances of someone's departure, their return will "wipe every tear (of anguish) from their eyes (and fill them with tears of joy)". In The Resurrection, "there will be no more crying, no more tears, no more pain, for the former things will have passed away".

How far back do the records go? At what distance above the ground did our hands have to ascend before records began being kept? And then there are all the dogs and cats and bunnies and slugs that so many children have been promised they will see again (by parents in good faith). Stephen Wolfram has estimated there have been about 105 billion people born since that species called 'Adam' first emerged upright about 50,000 years ago. It's a logistical nightmare to imagine where we're going to billet them all, but there will be a lot of people dancing in the streets.

However, the main purpose of The Resurrection is to assemble everyone together for The Final Judgement (of both the quick and the dead). I come from a Baptist tradition, which has two very important tenets. One is the free, total, and unconditional forgiveness, symbolised by full

immersion in water, that is offered to anyone who chooses (as an adult fully appraised of the facts) to become a member of The Commonwealth. This quality of mercy (which Mohammedans also understand) is very comforting to people like me who have been up to no good pretty much all of our lives. I've led a very comfortable middle-class existence at the expense of those I did not feed and clothe when I saw them naked and hungry. I'm what's known in the business as the servant who was given one talent that he promptly buried in the ground. I also have an extensive criminal history (some of which is on the public record for anyone who cares to go digging). While of course I hope to be accepted into The Commonwealth, as a dear friend of mine once suggested, perhaps it's time we in the West bowed out, and let those less fortunate than us have a turn.

Then there is the thorny issue of theodicy, the circumstances that led us all astray in the first place (which we shall address shortly). Christ is traditionally seen as the intercessor. He makes representations to *The Choir* on behalf of all the bad people, drawing *The Choir's* attention to people's virtues, and mitigating their faults. Christ, while on earth, asked us to imagine a shepherd, who had a hundred sheep in his care. When he discovered that one of the sheep was missing, he left the ninety-nine sheep who were on safe ground and went in search of that one sheep who had fallen down a ravine. He climbed down to her, lifted her over his shoulder, climbed back out, and carried her home. Christ is a wonderful person to have representing you before *The Choir*, and if it were up to him, the whole lot of us would be granted a new lease on life.

The other major tenet of the Baptist tradition, shared by many other protestant denominations, is the 'priesthood of all believers'. This is the ultimate expression of human freedom. Unlike the diametrically opposed (Roman) Catholic tradition (in which a hierarchy spreads the tentacles of its opinions from the Pope down and into the minutiae of our lives), each individual believer can enter direct and personal communion with *The Choir*, and with the sure help of their conscience, establish for themselves what is right, and what is wrong. At The Last Judgement, not one of us is going to be judging anyone else. As Christ clearly stated, judge not least you be judged, letting only him who is *without* sin cast the first stone. Rather than pontificating, as is our nature, we can at best offer a modicum of judicious advice. And once the developed world is emancipated, it will be their responsibility to proselytize the good news of The Commonwealth out into the developing world, putting a whole new slant on the position of the missionary.

In Uganda, where I grew up, there was just one basic rule in life. Do whatever you feel you can get away with, but whatever boundary you cross, make awfully sure that you don't get caught out. Because if you do get caught, prepare to meet your maker. I recall looking on aghast as we drove past a (presumed) adulterer being stoned (and clubbed) to death by a mob chasing him down the road, oblivious to his pleas for mercy. And this was just outside Kampala.

We increasingly must deal in this world with people who have no inkling of a higher authority than themselves. They believe that if they can just hide their (errant) behaviour from other people, they will have got away with it for all time. The jury is currently out on a certain individual who seven times purported to be the most sporting of all gentlemen, but has finally been exposed as nothing more than a cheat, bully, and all round sociopath.

Christ suggested that we forgive those who trespass against us not just seven times, but seventy times seven times. In some Christian traditions, this has been interpreted as meaning perpetual forgiveness. You can regularly get up to no good during the week, and then simply apply on the weekend to have the slate wiped clean so that you can be bright and recharged for getting up to

no good all over again the following week. The following is reminiscent of Shylock, but what happens after someone has struck you on the cheek 490 times, with you offering them an alternative cheek for each one of those 490 blows? Obviously, you'll have some rather sore cheeks, but you will also have reached the conclusion (as numerated by Christ) of God's grace.

The land that has manifestly produced a bad sportsman is also facing a crisis surrounding its policy to allow its citizens to defend themselves with weaponry. For those who might never have contemplated The Commonwealth of Heaven before, it should nevertheless be *obvious* that such a future state will not have privately held devices that have been designed primarily as weapons. Indeed, it should come as *no surprise* that "there simply ain't no guns in Heaven!" Guns are for killing things, whereas knives are for julienning carrots and slicing sashimi, and cars are for getting from point A to B, and around the Nürburgring in as short a time as possible. So then, if they aren't allowed their precious armouries, how are these poor wretched souls ever going to protect themselves against the big bad boogey man what's comin' to get 'em (or indeed avoid accidentally pumping their girlfriends full of 9mm ordnance)?

The Hebrews (among others) introduced the (terrible) idea of retributive justice. Then Christ arrived on the scene, a thirty-year-old rather well read in western philosophy, and turned that idea on its head, making the way all very clear and simple for one and all. But it was not enough. By the time of the First Council of Nicaea in AD 325, the rather idolatrous idea of worshipping Christ *as* God (Trinitarianism) had become firmly established, in direct defiance of Christ's clear and unequivocal directive that it is God who should be worshipped rather than His Christ. Three centuries later, Mohammed correctly identified this idolatry, focusing again (as did Jesus) on God as the object of worship. Unfortunately, Mohammed then proceeded to ape the entire vicious cycle of vengeful Hebraic justice that Jesus had strived, unto The Cross, to overcome. Islam did wonders for the spread of science, and introduced men (and to their delight, women) to the concept of the adoration of women, but it has also seen the destruction of its cultural heritage (which is a part of humanity's cultural heritage) particularly in Mecca, and most recently in Timbuktu. Still, "it's all part of God's plan", as mum keeps telling me! The miracle of Mohammedanism is that there are now vast swathes of humanity who have been programmed from birth to do *exactly* what God tells them to do when the time comes. Meanwhile, the world's thinkers must establish *precisely* what it is that God requires of us.

If you want money for people with minds that hate, all I can tell you is brother you'll have to wait – John Lennon

Most of us understand why the pen is mightier than the sword. If we want to change the world, we need to bring people together, invite them to sit down and allow us to reason with them, perhaps even encourage them to sign up to our vision. Unfortunately, there are some people who think we can usher in The Commonwealth of Heaven by telling impressionable young people to go around blowing themselves up in crowded places. They of course believe they are doing the right thing, and I wouldn't be surprised if Christ goes in to bat for them, as ever, when they come up before the big beak on The Last Day, "for they know not what they do".

Goddamn hippies! – Eric Cartman

When our daughter was quite young, she started playing up as girls inevitably do – look at all the trouble Eve caused. This was a time when self-righteous tree hugging bleeding hearts drove Volvos to protect themselves from themselves, because Volvos were 'safe' – nowadays the same

set drive Subarus (The Seven Sisters of western astronomy) for all the same reasons. They had discovered they could dictate the limits on how parents could in turn place limits on their children's behaviour. We were forced to come up with creative alternatives to those 'damn good thrashings' that had never done any of *us* any harm. I sat her on my lap, and in a soft and quite matter of fact voice, proceeded to explain the facts of life (and apologies to those couples who have had difficulty conceiving, or have lost a child). "Mummy and daddy can make a baby anytime they want to. Some babies work out alright, like your brother, while others don't. If a child screams and demands things and won't do what she's told, what mummy and daddy can do is dig a deep hole, put the offending child in it, cover it up with dirt, and simply make another baby and see if *that one* turns out to be well behaved. If it doesn't, we just keep digging holes until a good one does eventually turn up."

She went very quiet, save the noise of all those cogs whirring as she analysed the simple logic of what I was saying, and we enjoyed several years of peace and tranquillity, where anytime a boundary was threatened, we only had to raise an eyebrow and mutter to each other:

"Mum, perhaps I should dig a hole?" "Surely that won't be necessary, dad?"

She was eventually led astray by a subversive group of associates who convinced her we couldn't actually do that. We thought we were done for when the parent of one of those associates demanded she inspect our domiciliary arrangements before she would contemplate allowing *her* daughter to come over and play with *our* daughter. The alarm bells started clanging when we saw the sticker on the back of her broom (which was neither a Volvo nor a Subaru) declaring that "magic happens".

Holy motherfucker of God – Twitter

It's interesting to monitor the sort of language that is deemed appropriate in this day and age, especially when used online and cowering behind anonymity. In Luke's history of the early Church, he recounts an important tale about the dire consequences of blasphemy. Peter, the first pope, was attempting to set up The Commonwealth of Heaven, an optimistic task considering it was a couple of thousand years ahead of its time. Those who were joining this collective were gathering up all their stuff and putting it into a communal pool from which each could take according to their needs. There was no compunction to hand *everything* over – the congregation was simply getting caught up in the spirit of this crazy idea of 'giving' that God had told them about through Jesus. Ananias and Sapphira were a delightful Jollywood glamour couple who in addition to their hilltop mansion in Jerusalem, owned a little beach shack down at Joppa that they hardly ever used, and they decided it would be a nice gesture to sell it and donate most of the proceeds to the Church, but keep a portion aside in case this revolution Peter was leading didn't work out. They settled the sale and found themselves stuck in town holding all this cash. Sapphie separated out the tithe that was to be their nest egg, stashed it in her bra, and then sent Annie off on his way over to Pete's place with the bulk of the dosh. She would come by a bit later, but first she had to do a bit of 'shopping'. When he arrived chez Simon, there were quite a few parishioners hanging about, so Ananias handed over the moolah with a great flourish, claiming the donation to be the entire proceeds of the sale. Wrong. Peter, through his sixth sense, knew this was not the case, and explained to Ananias that thinking he could hide the truth about the sale from God, amounted to blasphemy against The Holy Spirit (as *The Choir* was called in those early days). Ananias' eyes widened momentarily, and then closed as he collapsed to the ground. After the church medic confirmed he was no longer breathing and had no pulse, the young men took him out, dug a hole, placed him in it, and covered him with dirt. A few hours later, Sapphie

waltzed in resplendent in the latest readymade from the House of Judah, hoping to hear that she and her husband had been moved up closer to the head of the table. Peter asked her if their donation was the entire proceeds of the sale, which she affirmed. Oh dear.... After a brief explanation of where they had both gone astray (it's well worth reading Luke's account), Sapphira was likewise executed by *The Choir* (switched off is probably a more accurate description), and the lads carried her body out and buried it on top of hubby (his grave had yet to be filled in). Everyone who had witnessed these events had a long hard think about what it all meant, or "took a long hard pull of themselves" to use one of my mother's famous mixed metaphors (involving looking in mirrors and having neat socks).

Which extreme would we prefer, a God who administers unflinchingly clinical justice, or one who rolls over and forgives our every trespass? Or would we instead warm to a more balanced character, a God who frightens the living bejesus out of all the children, so that the limits are firmly established and no longer need to be discussed, and *The Choir*, acting like a synthesis of mum and dad, can instead focus on demonstrating the *love* they have for their children?

Achieved is the glorious work – Franz Joseph Haydn

The owner of a company will often segregate his staff into teams and send each team off to independently research ways to advance the efficiency and innovation of the business. When they return with the fruits of their research, the best and most compatible ideas are adopted, and those who came up with them are rewarded with the responsibility for implementing them. Those with minor contributions to the advancement of the business are likewise charged with the implementation of those lesser tasks, as *their* just reward. Christ told a similar story of a master who went away to a far-off land, leaving his servants (we call them employees these days) in charge of his business. Each servant prospered according to the degree of wealth the master had entrusted them with. On the master's return, all but one of the servants (we've mentioned this chap earlier), was rewarded by being put in charge of even more wealth. Christ's entreaty to prosperity in this parable led us to embrace an economic ideology called capitalism, after the Latin 'capita' for head (also the root of the word decapitation, when that head is severed from the rest of one's body). Capitalism assumes that wealth is accumulated by the individual, owned by that individual, and is for *use* by that individual. In fact, this playground down here (or model railway or bonsai garden etc.) is actually owned by *The Choir*. We have each of us only ever had talents for discovery, invention, artistry, leadership, and business, *because The Choir* has given us those talents, and the wealth and kudos we have accumulated in deploying those talents has not been intended for *our* glory, but rather for the glory of *The Choir* and all that which it has created. Fundamentally, all fruits of the intellect *belong* to *The Choir*.

I'll be back – Arnie, the Governator

The Choir, on its return, is getting ready to reward those who have discovered, invented, designed, entertained, those who have, on the back of this research, led the expansion of the economy of The Commonwealth of Heaven. But on its return, *The Choir* requires us to acknowledge its title to The Commonwealth. Christ told the story of a pearl merchant who happened upon a pearl that was many orders of magnitude more beautiful than any of the pearls that were currently in, or had ever passed through, his inventory. He sold his entire stock, and even liquidated his private collection (which somewhat upset mum at first), so that he could raise the sale price of that one exquisite pearl of great value. What is a life of three score and ten years in comparison to eternal life?

If *The Choir* can resurrect the individual from a data backup stored at *The Superposition*, then most likely it has many more tricks up its sleeve. What each of us has to decide at the end (of time having any relevance), is whether we want to be a part of the solution or remain part of the problem. Each of us has before us several choices. We might decide we don't much like the idea of The Commonwealth of Heaven, and prefer things just the way they are, thanks very much. That being the case, we are free to grow old and die, as was ever our most viable option. In the business, these folk are too set in their ways to embrace the new order, and we let them depart the company to rest in peace with grace and dignity. Then there are disgruntled employees who despise those who have chosen to join The Commonwealth of Heaven and attempt to harm them. We don't need this sort of person in The Commonwealth, and they will simply be switched off before they can inflict any harm, as was demonstrated earlier – grace will no longer be extended. Others might become overwhelmed by guilt, and decide to jump off a tall building, in which case angels will come and bring them in for a soft landing. And then there are those of us who decide to hold hands and dance through the gates rejoicing.

Christ suggested it was easier for a camel to pass through the eye of a needle, than for a rich man to enter The Commonwealth of Heaven. Many wealthy individuals have famously embraced philanthropy, which demonstrates a certain willingness to return their wealth to those from whom they had originally extracted it. It certainly looks better in the annals of The Commonwealth if an individual comes forward and willingly hands over their wealth to Peter with magnanimity and flair, and it certainly speeds up issuing that individual with their new commission in The Commonwealth. By way of contrast, it is not such a good look to say "No, bugger off, all this is mine and you can't have it!", and then later capitulate. The eventual outcome is welcome, but the earlier position is a blemish that persists for all eternity. To make it easier, Jesus pointed out a widow whose entire capital consisted of one lepton, a copper coin of the lowest denomination. But *everything* she had in the world, she gave to God.

Traditionally, the period during which people decide which way they want to go, known as The Tribulation, lasts about three years, but I have it on good authority that we can knock it all over in less than one. The prime minister of Australia has (appropriately) set a date of The Day of Atonement, the 14th day of September, 2013, for the government to be dissolved and the election of officers to be referred to the people. Julia Gillard, who does not acknowledge she is an agent of *The Choir* (and is thus hardly more than a puppet), has tried to achieve, through the human agency of her government, the sort of reforms we can expect in The Commonwealth, primarily the sovereign ownership of the world's resources by the people, and the preservation of our environment (this was, after all, the original covenant between God and Man as laid out in The Book of Genesis). Christine Milne has declared Julia's failure in both these endeavours, on behalf of another impotent human agency, The Greens. Tony Abbott, who does claim to understand divine agency, will need to mend his ways (along with his cronies). He has played his assigned role, which has been to cripple a government that believed it could enact reform through human agency alone. Tony thinks he's going to become the prime minister, but if he doesn't start thinking about making a *positive* contribution to *this* government, which *we* voted for, of a country that *we* own, he'll be lucky if he ends up in charge of the sheep dip. We all know that Malcolm Turnbull, who has had a dalliance on both sides of the fence, is a much better candidate for leading a unity government. All he needs to do is get a better grasp of communication technology.

It ain't necessarily so – Ira Gershwin

The Choir has employed various techniques, as does any educational institution, to expedite our discovery of the world. Firstly, boundaries are placed on the students, the most fundamental being a finite lifetime. If you want to pass the course, you need to get your essays in on time. To look consistent, every other living thing in nature has a finite lifetime too, so that disease and mortality seems perfectly 'natural'. However, in Philosophy 101, students learn the important distinction between what is *necessary*, and what is *contingent*, and this distinction is of course lost on those who think that the 'Laws of Nature' are immutable. A fully deterministic world, in which every hair on everyone's head is numbered, can be made to look as if it were subject to chance. As we have closed in on an understanding of the world, the charade of chaos has been intensified, less the ruse be uncovered prematurely. We humans are driven by our beliefs. I wouldn't have spent the last thirty years climbing our mountain of discovery if I didn't know that it must have a summit which is surely called *Ever Rest*. Often, I considered abandoning the ascent, only to be picked back up and encouraged to soldier on. Conversely, other people have concluded that there is *no* God, because they cannot accept that 'someone' with complete control over every iota of the universe, could countenance a world that, despite its delights, is manifestly accidental, random, chaotic, cruel, and unfair. However, the contribution by these individuals to our understanding of the world, to this mountain of understanding, is not far short of paramount, for their contribution would not have been made *except* that they were guided to a firm belief that the world was broken and full of injustice and needed to be fixed.

Woe, woe, the great city, Babylon, the strong city! for in one hour is thy judgment come – John of Patmos

Few people in their right mind would have suspected that the world was going to get its act together, form a unity government, and live happily ever after, so this revelation will come to those people a bit like a thief in the night, particularly the bit about handing over all the loot! Unravelling the world's financial arrangements is going to be an exciting and fascinating challenge… In America and in Britain, Barack Obama and David Cameron, like Gillard in Australia, mouth platitudes about reforms they know will be a distant dream if attempted through human agency. Yet as revealed by Jesus, through *God's* agency all things are possible; indeed, Paul declared that "we shall all be changed in a moment, in the twinkling of an eye". The seemingly important people in this world have entourages of humans assisting their missions. Yet in the eyes of *The Choir*, *everyone* in the world is important. Because of the vast computational power of *The Superposition*, every individual in the world has more than the combined computing power of the planet (as Marvin the paranoid android would claim), dedicated to processing just their particular life. Is it any wonder then that "serendipity happens"?

I have coined a name to encapsulate the spirit of the Commonwealth of Heaven – where Australia means 'southern land', Avicia means 'land without vice'. The notion of wealth accumulation through individual endeavour has been very successful in accelerating our accumulation of knowledge of the world. However, as the founding fathers of the American Union warned, it inevitably leads to a concentration of wealth. Once we have learnt how the world works, we can discard *each and every* institution, and start again with a clean sheet, first deciding what it is that we all want, and then designing the most efficient mechanism to provide it. Such a jubilee is necessary, for there can be no 'fractal concentration' of wealth in Avicia, where 1% of the subjects would own 99% of the wealth. In Avicia there is no professional sport

(if ever there was an oxymoron). There is no gambling (for in a deterministic world, chance no longer counts). All trade is conducted electronically and in the public view, there is no cash or bullion, and no global currency trading – these are all of course established and well understood 'new order' policies. Those who haven't yet sat down and had their conversation with Peter, and subsequently gone through the gates, can only trade with those who remain outside the gates, just as those inside the gates can then only trade with those also inside the gates. The division of labour in the developed world has led to generations who pursue their dream careers, expecting a shrinking class of farmers and builders and workers (the people who actually *do* stuff) to provide their necessities. In Avicia, *every* individual devotes a tithe of their week to the provision of life's basic requirements, and to the rehabilitation of the environment, and the rest of the week is theirs to pursue recreational activities based on the universal individual energy/material quota (including playing sport, performing, entertaining, pursuing creativity, and sleeping).

Here in Australia, we have a living treasure, an archaeological relic. In his native milieu, the aborigine lives in a land of plenty, and thus rarely needs to count beyond three, but could if he wanted to. Significantly, he does not need to own the land, indeed it is the land that owns him. In humanity's long cultural progression to where we now stand, it is to this state of carefree delight that we can now contemplate returning.

Do you mean an African or European swallow? – King Arthur

What is it that we want? We need to be quite honest about this, otherwise the architects of the new order will be given the wrong brief, and we will only have ourselves to blame if we all end up dressed in white and singing hymns in vast auditoria. This sort of thing has started happening in Sydney and is of course endemic throughout America. The truth will set us free, and ain't it just the truth that we want to be free? People have different ideas of what Heaven will be like, and the charter of *The Business* is simply to satisfy these imaginations as efficiently as possible within the confines of ecological sustainability. Literature, film, television and the internet would seem to indicate that we want the very best cuisine, sourced freshly and locally. We want bespoke fashion, and houses with a view. But above all, there seems to be an obsession, probably driven by men, with sex. The most basic instinct for a bloke is to get the girl – any number of girls – and conversely for a sheila to narrow that bloke's field down to just one – perhaps becoming less so, as women let go of their role as an incubator and become more like men. Christ famously declared that in Heaven, there will be no giving or taking in marriage and that instead "we will all be like angels in Heaven". To help you imagine what it might be like to be an "angel in Heaven", as he put it, some people have caused great mirth by assuming that you need to be married in order to have a good time, or even funnier, that in Heaven people have intercourse like Jane Fonda does with her hand-to-hand Romeo, David Hemmings, in *Barbarella*. Ask any evolutionary biologist, and they will tell you that the entire design of the human body, all the way from the brain to the groin, is programmed for sex. All the nonsense that goes on around the main event is just fluff. Only humans have made the causal connection between sex and pregnancy. All other animals do it because they can't help themselves. Indeed, anecdotal evidence exists that the aborigine, whose culture dates back 60,000 years, was not entirely sure about the connection either. Unfortunately, this aborigine, free from Western influence, no longer exists.

Political analyst Laura Tingle likens the outlook of Australian (but equally global) politics to Magellan sailing off into uncharted waters:

“Like Magellan, we’ve reached the end of the known world in our political discussion of the past couple of decades. Australia’s voyage is nowhere as scary as Magellan’s, but we lack a captain with the skills to persuade us that they know the way. We are fighting so much among ourselves about the personal qualities of our leaders that we cannot rationally discuss the options open to us. And we don’t really know where we are headed or indeed, where we want to go.”

Interestingly, just as the state is looking for a new leader, so too is the church. It’s not often that Christ’s representative on earth resigns, in this case declaring that he is no longer up to the job. Won’t it be splendid when humanity finally passes its audition, graduates, and we too are invited to join *The Choir?* 13/3/13

Bit from bit (it)

G.K. Chesterton remarked that "the simplification of anything is always sensational". We currently model our world using two quite disparate field theories. An exemplar field in this context is that traced by iron filings scattered around a bar magnet. One of these field theories is an analogue theory ('classical' or 'continuous'), and applicable out to the largest lineal dimensions of the universe. The other theory is digital ('quantum' or 'discrete'), and only applicable to the very smallest of lineal dimensions. Both theories fall into the philosophical category of instrumentalism, for while they are spectacularly successful at predicting how the natural world will behave, they offer scant insight into the underlying reality, despite a century replete with heroic attempts to do so. The gravitational field, for example, is described as a 'curvature in space-time', and physicists' cats can 'simultaneously be both dead and alive'. These clichéd examples only scratch the surface of the deep storytelling tradition in the physics of the past century. As in life more generally, if you keep saying abnormal things often enough, they eventually become the new normal, a process that encourages even more distant excursions from common sense.

The ideal scientist will conduct an experiment to discover how the world behaves and proceed to develop a testable hypothesis to explain why. A century ago, Michelson and Morley discovered that the speed of light could not be increased by adding on to it the existing speed of the earth around the sun. Michelson was awarded the Nobel Prize in 1907 for his work. Einstein was then awarded the Nobel Prize twenty years later for explaining this mystery (and a few others along the way). Today's comparable mystery is the accelerating expansion of the universe, the discovery of which has already earned Perlmutter, Riess and Schmitt the Nobel Prize in 2011. And of course, a Nobel Prize awaits anyone who can successfully explain this newfound mystery of 'dark energy'.

The sound of a live musical performance, which arrives at our eardrums as a smooth analogue waveform, can be captured digitally by segmenting that smooth waveform into discrete recordable values.

The audiophile is forever seeking recordings where the waveform has been broken up into the shortest possible segments, and the position of each of those segments has been determined with the highest possible precision.

If an audiophile were to continue this pursuit to its conclusion, seeking to reproduce the absolute sound of the original source, the specification would declare units at the Planck scale, named after the winner of the Nobel Prize in 1918. These are the smallest possible units of length and time and were first established by merging the equations of relativity and the quantum. The Planck length is to a grain of sand, as a grain of sand is to the *width* of the universe, and the Planck time is to a second, as a second is to the *age* of the universe. So, these units are very small indeed. By definition, light travels one Planck length during the period of one Planck time.

Life often takes us wandering far and wide, only to return us to the place we started, older but wiser. Our journey of discovery in physics is no exception. An apocryphal suggestion is that Descartes was lying in his sick bed, when a fly crawling across the ceiling prompted him to contemplate and develop the coordinate system that bears his name. We can hypothetically segment the universe into cubes, each with sides of one Planck length. Then x, y & z coordinates, each a mere 256 bits wide, are sufficient to uniquely address each one of these boxes relative to an absolute origin. As we look inside each box, we find the 'reality' at that absolute address and

point in time. Because the world is in constant flux, at the next instant of Planck time, we will find a different 'reality' inside the boxes we investigated one Planck time earlier.

Instead of thinking of the 'reality' we encounter inside each box as an ordinary physical entity, like a 'field' or a 'particle' (or some part thereof), we can simply think of the contents as a 'mathematical relationship', or more fundamentally, as a 'computation'.

The theories of relativity and the quantum are built with complex mathematics that is in the most part beautiful (quantum theory has a few inelegant renormalizations). At the time this mathematics was being discovered, it was also discovered that all mathematics (whether known to us yet or not), could be constructed (albeit not necessarily proven), not just through mystical revelation (as formalized by Plato and vividly witnessed by Hamilton), but through methodical, algorithmic, computation. Computation has thus emerged as an even more foundational science than mathematics.

Because the universe is so accurately described by mathematics, it has been argued since ancient times that the universe is actually *composed* of mathematics. Now it is routinely argued that the universe is ultimately composed of computation, or information, following the lead of Wheeler. Mathematics describes the universe so effectively, because each element of the universe is a computation.

Indeed, this year's FQXi essay collection addresses the question "IT from BIT, or BIT from IT?" In this context, 'IT' refers to the material world, the physical stuff of which we and computers are made, and 'BIT' (Binary digIT) refers to the information that we and those computers process. As it happens, it is not a question of choosing one precursor over the other, but of choosing both.

Hawking tells the anecdote of a somewhat forthright woman who interrupts a physicist's lecture, declaring that he is in fact quite mistaken, for the world is a round disc resting on the back of a giant tortoise.

When he asks her what the tortoise is standing on, she retorts "You are very clever young man, but it's tortoises all the way down!"

The definition of a universal computer is that it can simulate *any* computer, including itself. This reality is now commonplace in computing infrastructure, where 'virtual' computers are hosted on more powerful 'real' (physical) computers. When this functionality first emerged, one was naturally tempted to test the fidelity of the simulation by building a virtual computer on a computer that was itself already virtualized. While possible, the cumulative processing overhead would push the host machine to its limits, just as successive tortoises would be crushed by the weight of those above them.

While physical reality (IT) is thus subject to the laws of physics (thermodynamics in particular), abstract information (BIT) is not. So one virtual computer (which is purely BIT) can simulate another virtual computer (which is also purely BIT), and this *contingent* simulated computer can be twisted, like a Möbius strip, so that it becomes the host of the initial virtual computer, as in the ancient conundrum of self-reference (Paul cites the then already ancient Epimenides paradox in a letter to Titus: "One of Crete's own prophets has declared that Cretans are always liars.")

Extending this idea to the universe, we can simulate the myriad Planck cubes of the universe, and whatever reality might happen to reside inside them, collectively labelled as 'IT', using pairs of extremely simple virtual computers that exist only by virtue of simulating each other (BIT from

BIT). Each half only exists for that half of the time during which it is simulating the other half of the pair.

These 'cellular automata' have much in common with conventional computers. They have a clock, operating at the Planck frequency, they have firmware that implements the laws of physics, they can directly transfer data to and from their 26 neighbouring cells, and each has a unique address (as specified earlier). And like conventional computers, these automata do not behave capriciously, but process information, according to their firmware, in a dispassionate, precise and unerring manner. It is this behaviour that gives nature her consistency in which we have such confidence.

With a world built on BIT simulating BIT, we are no longer concerned about where the derivative reality of IT might have come from. At a fundamental level, the universe (including you and me) does not exist. There is no IT, except of course for that half of the time during which the reality we *perceive* as IT is simulated by one BIT of each cellular automaton, and the other half of the time when the *perceived* IT is simulated by the other BIT of each automaton.

One can picture a couple of tortoises sitting upright back-to-back, admiring their respective sides of the disc they are both supporting, while mutually supporting one another.

If we open the lid on a Planck box, we won't find the machinations of the virtual computers supporting the box, for the virtual computers are entirely abstract. Having no lineal dimensions, they have never left the singularity, the dimensionless origin of space.

Instead, the Planck box is the base component of the 'IT' reality that the virtual computers simulate. This minimum reality that the virtual computers engender is an empty volume of space (having three lineal dimensions) that persists in time. The box can then be filled with all manner of physical phenomena, from the quantum vacuum through to everyday baryonic matter. The contents, whatever they might be, are defined in the registers of the virtual computers. This definition includes the address of course, but also the vector of the contents - the direction they have come from, the direction they are heading, and their speed.

There is no content class that can move from one Planck box to the next any faster than light, which propagates at one Planck box per Planck time. This is a fundamental limit on the interface between the Planck boxes. Thus, while some box contents (other than light) might be accelerated close to jumping from one Planck box to the next every Planck time, they will never transcend the maximum transfer capacity of the Planck box interface.

Inertia results from the desultory processing performed by the virtual machines. Each cellular automaton accepts information from neighbouring boxes, processes that information according to the laws of physics held in its firmware and passes the information forward to the next box in the direction of its destination, without question or exception. Of course, in explaining inertia, we account for mass.

Entropy, the forward arrow of time, is encapsulated in that vector information being processed by each and every Planck box throughout the universe.

The universe did not always have the number of Planck boxes it has today. In fact, it need only have started with one, for one pair of self-stimulating virtual machines can replicate the information in which they consist, spawning another pair of virtual machines. Those two pairs can spawn four, those four eight, those eight sixteen and so on, resulting in a very rapid expansion in the number of Planck cubes (and the resultant size of the universe). As the number

of boxes increases, so too does the width of their Cartesian address slowly increment to its current width, approaching 256 bits. Space may have begun at a singular location, but because *every* Planck cube is actively replicating, space is expanding at every cube (every point) in space, quite unlike an explosion, which expands from one central point. As the absolute number of Planck cubes increases, so does the rate at which the universe is expanding increase.

However, as mentioned earlier, the myriad pairs of virtual machines simulating these myriad Planck boxes are themselves dimensionless and remain in a superposition at the origin of the universe. Furthermore, the interface between the Planck boxes is actually an interface between the virtual machines at the superposition. Thus, any given Planck box anywhere in the universe can directly interface with each and every other Planck box in the universe. It is thus that Planck cubes can become entangled, such that they instantaneously respond to a change in the contents of the other. The vast expanse (and apparent inaccessibility) of the universe is merely an illusion, for its lineal dimensions, which have separated the realms of relativity and the quantum, are merely computed, never actual.

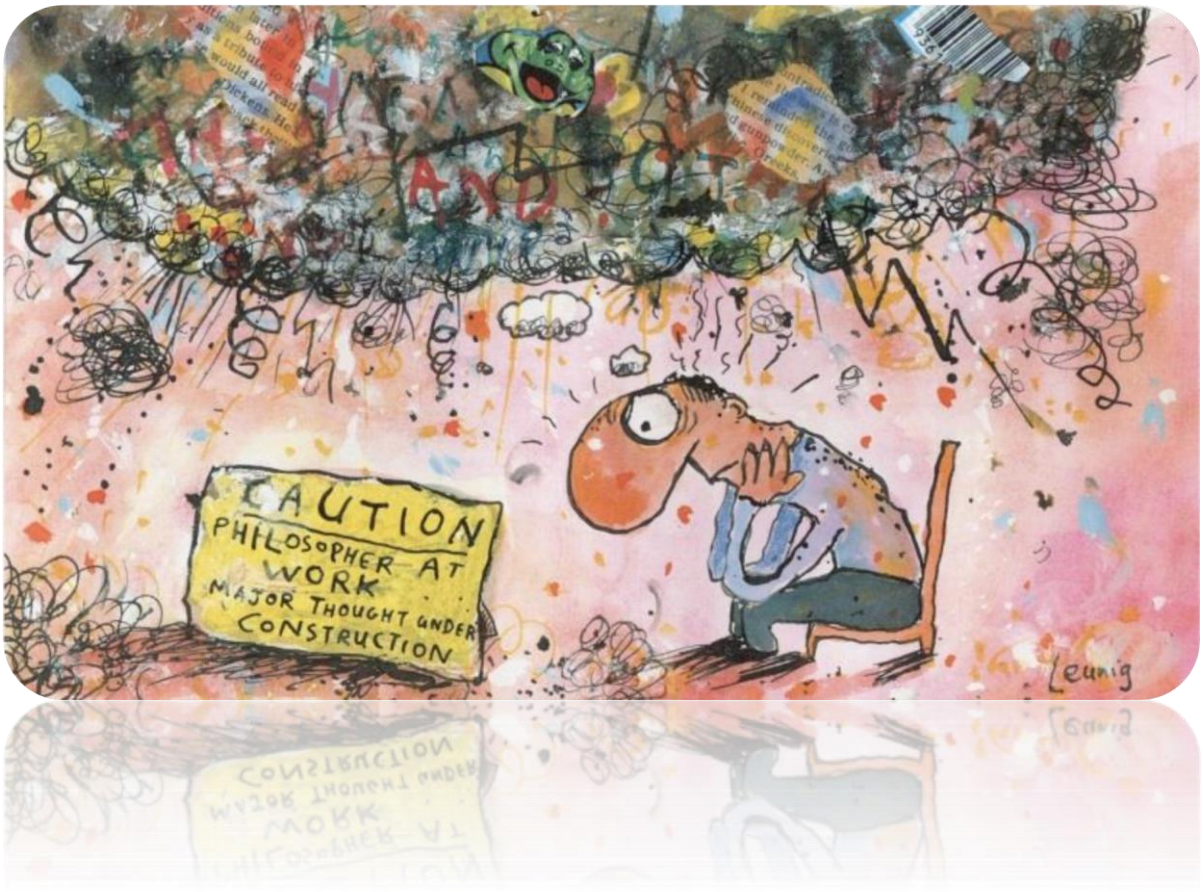
Where all this infrastructure has arisen from is a metaphysical enquiry, suffice to say that if you start with nothing (zero), and split it into (+1) and (-1), you have the distinction essential to binary (or indeed balanced ternary) data, of which this infrastructure consists in its entirety. Given an eternity, it is then a statistical certainty that these data will eventually align themselves as they did, quite self-evidently, a mere fourteen billion years ago.

Copernicus made the sun stand still and the earth move, where previously the earth had stood still while the sun moved. The picture just painted is just as momentous a transformation in the way we model reality. But it was Newton who had the technical skills to formalize the revolution promulgated by Copernicus, just as a Nobel Prize awaits a technician who can formalize our return, after such a long excursion, to the absolute space and time first introduced by Newton. Sitting beneath an apple tree in a bucolic setting, you are a world away from the frenetic activity upholding that reality – unless of course, you are Newton.

Englert and Higgs are worthy recipients of this years' Nobel Prize, but their elusive boson accounts for a mere 0.046% of the mass of the universe, and it cost us tens of billions of dollars over the course of almost fifty years to (probably) find it. Listening to the data inside a Planck cube could require little more than a very sensitive interferometer, or perhaps a condensate of trapped ions.

The peace of resistance

How beautiful upon the mountains are the feet of him who brings good news, who publishes peace, who brings good news of happiness, who publishes salvation, who says to Zion, “Your God reigns”. Isaiah



Where would we have been without Michael Leunig all these years? Both this gem and the one at the end are from 2003.

In the final edition of Christopher Hitchens’ memoir *Hitch-22*, published shortly before his death, he added a foreword in which he states:

If there is anybody known to you who might benefit from a letter or a visit, do not on any account postpone the writing or the making of it. The difference made will almost certainly be more than you have calculated.

As we hold our breath waiting for Tony Abbott’s promised ‘grown-up’ government, recall Winston Churchill’s essay *Fifty Years Hence* (1931) in which he observes:

Great nations are no longer led by their ablest men, or by those who know about their immediate affairs, or even by those who have a coherent doctrine. Democratic governments drift along the line of least resistance, taking short views, paying their way with sops and doles, and smoothing their path with pleasant-sounding platitudes.

Stop the tax. Stop the boats.

Hitchens states that he adored Oscar Wilde's observation that "A map of the world that did not show Utopia would not be worth consulting". H.G. Wells went on to set the template for modern utopian thinking in his 1913 novel *The Atom Frees the World*, spelling out his vision in which people finally realize that war is pointless, nations and races become obsolete, and conventional politics ends while a new age of leisure begins, with the entire world becoming a single state that speaks only English - Super! Using more words, "c'est belle, c'est magnifique!"

Many of us have thought about what we would do to make the world a better place if we were Churchill's ideal governor, the 'benign dictator'. If only we could wipe the slate clean and start all over again. Those in the computing industry are of course familiar with the concept as 'formatting the hard disk and installing a fresh image'. Aren't there a lot of us in need of that sort of therapy?

Many a youth has gone through a phase of materialism – believing that matter is all there is – and indeed some have never grown out of it. As Hitchens puts it:

It is not that there are no certainties, it is that it is an absolute certainty that there are no certainties. The true test of knowledge is an acute and cultivated awareness of how little one knows. One cannot be born knowing this, but must find this out for oneself, however obvious it seems once one has.

This is a somewhat privileged position, and Hitchens is caught in what he calls his 'Hitch-22', for he concedes that 'his side' does indeed have 'unalterable convictions', despite believing that "Marx was rightest of all when he recommended continual doubt and self-criticism".

This proscription is of course the basis of the 'scientific method' and the key to its success – to be forever questioning our beliefs, and in so doing advancing our understanding. However, only an elite minority exercises such intellectual prowess. It is quintessentially human to race to establish our beliefs, and then spend our lives building fortifications around them.

Hitchens declares his faith in 'science *and* reason', but so often 'reason' is now taken to mean *scientific* reason, which stumbles at philosophy's very first hurdle. Scientific reason chooses to ignore the distinction between what is *necessarily* true or false, and what is *contingently* true or false. It protests vehemently that it admits the possibility that the sun might not rise tomorrow, while secretly believing it to be an absolute certainty.

Douglas Hofstadter gives an archetypal illustration of this prejudice:

It is important to dispel the idea that idiot savants 'lightning calculate' by some mysterious, unanalyzable method...it has been ascertained that nothing occult takes place during the performance of lightning calculators, but simply that their minds race through intermediate steps with the kind of self-confidence that a natural athlete has in executing a complicated motion quickly and gracefully...one of the most obvious clues that no 'hot line to God' is involved is the mere fact that when the numbers involved get bigger, the answers are slower in coming. Presumably, if God or an 'oracle' were supplying the answers, he wouldn't have to slow up when the numbers got bigger.

The *triumph* of human reason, for those who exercise it, is that we can ask (quite effortlessly) what we might deduce if in this example the answers *did indeed* keep coming apace despite the numbers getting bigger. As the theoretical limit to the processing capacity of a mechanistic brain

was surpassed, we would have incontrovertible evidence that we need to look to some mechanism *beyond* the brain. Importantly, as humans we can ask ourselves *why* some higher computational power would not want to be so thoroughly rumbled. These are the sort of questions we remember asking as children when we first twigged to the possibility that our parents were beguiling us.

Progeria, the disease in which the subject dies of old age by the time most of us reach adulthood, demonstrates *categorically* that the process of ageing is 'programmed', and that presumably (to borrow Hofstadter's capacity for reason), can be 'reprogrammed'. Where it is mundane to assume the certainty of death, the reasoning mind can ask (again with the utmost of ease) what the world would be like if we did not age. Hitchens had his (obvious) Socratic reasons for embracing what he considered the *necessity* of a finite existence, but John D. Barrow tells it like it has always been:

Death and periodic extinctions play a vital role in promoting the diversity of life…immortals would evolve more slowly than mortals. Immortality also does strange things to urgency. One recalls Alan Lightman's memorable story (Einstein's Dreams) about a world in which everyone lives forever. Its society splits into two quite different groups. There are the procrastinators who lack all urgency: faced with an eternity ahead of them, there was world enough and time for everything – their motto, one suspects, was a word like mañana, but lacking its sense of urgency. By contrast, there were others who reacted to the unlimited time by becoming manically active because they saw the potential to do everything. But they did not bargain for the dead hand that held back all progress, stopped the completion of any large project, and paralysed society. It was the voice of experience. When every craftsman's father, and his father, and all his ancestors before him, are still alive, then experience ceases to be solely of benefit. There is no end to the hierarchy of consultation, to the wealth of experience, and to the diversity of alternatives. The land of the immortals might well be strewn with unfinished projects, riven by drones and workers with diametrically opposed philosophies of life. With time to spare, time might not have spared them… The fact that human death occurs on a timescale that is short has an important impact upon human metaphysical thinking and, as a consequence, dominates the aims and content of most religions.

I have written a number of papers explaining non-locality in considerable detail – all phenomena are located at the Superposition, and all manifestation of physical separation is virtual and calculated at this singular location. This understanding has come to us through the insight of the great prophets of the twentieth century – Dirac, Einstein, Feynman, Gödel, von Neumann, Planck, Shannon, Turing, Zuse – and many other major and minor prophets, and through this understanding we have also been able to describe the technology of the Resurrection.

To get this 'resurrection show' on the road, these ideas need to become more accessible to the public. These modern insights were of course not available to the prophets of old, Jesus and Paul among them. That we have now elucidated the inner workings of the car is all well and good, and of considerable interest to the technically minded. But the vast majority is happy enough with the fact that the controls of the car respond to the driver's inputs while getting from one place to another. And this is the *only* reality the ancient prophets had to work with – a 'faith' that the car works, despite not actually knowing *how* it works.

With the demise of the Australian car industry, we are again being called upon to think and work smarter (where in reality we are being *forced* to work harder and longer). I have a certain

patriotism, in that I want Australia, its extraordinarily talented men and women, to be a beacon of exquisite rationality, leading the rest of the world as they scramble to follow our lead. But first, we have to be smart enough to *grasp* the idea of the Resurrection, which requires those who already understand it to be smart enough to effectively present and explain it. That the Twitterverse has not yet been set alight by this extraordinary idea, indicates that we have more work still to do.

The death of Philip Seymour Hoffman reminded me that human agents of the Resurrection are of little utility once they're dead. Of course, we can joke and laugh together about everyone's trials and tribulations *after* the Resurrection, but while we are still living through the build-up, the older folk move on and upwards and we have to turn to younger correspondents. The oeuvre of the dead becomes their 'dead' words, because they can no longer be challenged to expand on what they understand using unequivocal 'living' words. Christianity of course, and Islam in particular (for it seems to admit *no* criticism), have both become victims of their static texts.

There is a widely held hope that one day we're going to find out what's been going on here, and all of history will at last make sense. The alternative is that we all go to hell in a handbag. Those who yearn for economic security are aghast to see their 'rock' crumbling, flailing as they clamber to keep a hold. They never much cared that the system was destroying the environment, all that mattered was that it returned a dividend. Now the dividends are evaporating, and the capital along with them. Indeed, in his most recent state of the union address, Barack Obama was clearly embarrassed by the plummeting capacity of free market ideology to deliver on its promise of prosperity and social justice.

Hitchens is rightly abhorrent of absolutism. The problem with the great system builders, their workers controlling the means of production, and their struggle of the urban proletariat, is that their detailed proscriptions inevitably lead to a dull monochrome. Some absolutes do however have their place. The necessary truth embodied in entities such as the Mandelbrot set, or in Conway's Game of Life, have demonstrated how a small set of highly precise rules can engender an infinitely diverse and colourful reality. More recently, we have seen how an application with a simple set of functions and rules has produced an explosion in human interaction – Twitter.

Here then is the new synthesis distilled to its essence.

Once upon a time…

There are many (billions) of sentient communities in the universe, each residing in a 'spaceship' consisting of a central energy source (sun) that is orbited by living quarters (earth), and a debris collection service (giant gas planet). These communities range from the nascent, where the sentient being has recently emerged from evolution, through to communities whose source of energy is nearing exhaustion. The sentient beings on each spaceship have evolved a unique morphology in response to their inherited environment, and most have no interest in leaving their native milieu. Indeed, the vast separation of the spaceships precludes these communities from ever *physically* interacting with each other, despite fantastic excursions of the imagination.

Following on from childhood and a relatively short adolescence, each of these communities makes a sudden and momentous transition into adulthood. Prior to this transition, the communities on these spaceships are not yet free to determine their own destiny, despite deluded individuals in their midst believing otherwise. They are instead subject to guidance and control by the Union of adult communities – the society of the cosmos. While they cannot physically visit each other, the members of this Union communicate with each other through the

Superposition, a dimensionless point through which the Union has complete control over every instance of reality in the universe. The exercise of this power is carefully administered, for it is possible to inject computational code that would switch off (evaporate) the entire universe, which would of course be a shame (although we wouldn't lament its passing because we would no longer exist to do so). The Union is assisted in the exercise of this power by a mechanistic artificial intelligence which has a 'brain' the size of the universe (it *is* the Superposition). Being a mind without a body, it has no feelings, and hence a dispassionate and unerring capacity for justice. If it could be thought of as having a body with feelings, that body would consist in the biological organisms of the universe, particularly those having sentience.

These higher sentient beings have feelings and empathy for their sibling communities already in the Union, but especially for those communities still finding their way in the big wide universe. Such incipient communities do not yet have access to the Superposition, and hence membership of the Union, for they are yet to fully develop the technology required to access the Superposition (quantum computing). They generally believe they've been doing all the thinking, as do children in general, where in fact the Union of adults has long before thought of everything there is to think about. The Union injects ideas into the brains (and consciousness) of the sentient beings in developing communities, whence the volition engines in their brains decide if they will act on those ideas (which they mostly think are their own), or merely hold them in abeyance. All the great ideas of philosophy are injected during any sentient community's early childhood. But while we might dream, as a fledgling community, of going to the moon, the real thing only arrives in late adolescence, shortly before reaching maturity. A class of 'special' people in these adolescent communities manages to jump outside the control program of the Superposition and becomes cognizant of other communities in the universe – of the Union. They become 'one with the universe', often manifesting to ordinary people as having gone a bit funny in the head.

Jesus and Paul are two of the best-known individuals in this category. Jesus built on a Jewish tradition, which held that the dead go to a holding camp where they sleep (are no longer conscious) until the end of time, at which point they are physically resurrected to be assessed for inclusion in the ongoing life of the fully commissioned spaceship *Eternity* (paying homage to Arthur Stace, and in turn, Martin Sharpe). In modern parlance, we would say that the dead have been backed up to offline storage, to be restored on the Last Day when 'all the tape libraries are opened'. Paul went further, working the Hellenistic tradition into the story, where death was the release of the 'soul' from its mortal body so it could go and join 'the immortal gods in heaven'.

Both approaches to explaining the stark reality of human mortality contain essential truths. All the communities with *membership* in the Union have already made the transition to adulthood, and their citizens do indeed live as immortal 'gods' in their respective spaceships. However, when humans die, they are not transferred to *any* of these spaceships, because the inhabitants of those spaceships look like variations on *ET*, and the lack of attraction between us and them is mutual. Of course, they understand love – *that* idea is central and universal – but they also consider the practise of its physical manifestations best kept to themselves. Rather than 'going to meet all their previously departed friends and relatives' (along with God and Jesus), dead humans are instead backed up onto additional storage substrate which is generated at the Superposition as and when it is required.

Interestingly though, because dead people are not conscious while stored in this limbo, their regained consciousness on the Day of Resurrection *effectively* occurs in the next (conscious) instant following their death – their *consciousness* goes 'straight to heaven' when they die. As Jesus put it to his dinner guests on the night before his execution, "I tell you that from now on I will

not drink wine again until that Day when the Kingdom of God comes and I drink it with you again". The resurrection on 'the third day' (as prophesied by Hosea, and where a 'day' to 'God' is a thousand years) is the *actual* Resurrection to which the imagery of Easter alludes. So, between death and the Day of Resurrection, Nanna and Grandpa are not swanning around upstairs keeping an occasional eye on all of us still down here – they are simply stored away in static tape libraries (which don't really consist of tape – Alan Turing was merely using tape to *illustrate* the concept of universal computation – but that's the subject of other more technical discussions).

As with education in general, the Union cannot just drop an 'instruction manual' fully formed on Earth for all to access, expecting Earth's inhabitants to immediately absorb its contents. For a start, no one in the Union speaks English, a language whose evolution has been unique to Earth. What the Union can do however is appoint human agents to try and describe the workings of the cosmos in a natively comprehensible format, which can then help those natives figure out the rest for themselves. Jesus, of course, was just such an agent, but so too were more recent prophets (such as Newton, Darwin, Einstein, Turing, von Neumann, Shannon et al.)

To expedite this accrual of knowledge, the Union places boundaries on maturing communities, just as any educational institution places boundaries on its students. Each of us is given a finite lease on life with which to make the most of the talents the Union has given us. The shadow of death might have seemed to the primitive mind like a punishment for transgression, but to the emancipated mind, it's simply an instrument for getting us up and about and achieving greatness.

Eventually, a developing community will reach a point in time where it has learnt how the universe works and understands what is involved in becoming a member of the Union.

Our induction into the Union (which is sponsored and orchestrated by the Union) begins with the resurrection of all the dead people from the backups held in the Superposition. We each have myriad backups taken throughout our lives to merge from during restoration. What we know as physical reality consists entirely in information, and in the Resurrection the static information held in the backups simply once again becomes active (processing) information. The dead are resurrected fit and healthy, in the prime of their lives, their information 'updated and purged of any malware', and their memories intact. They do not rise up out of the ground (or the sea), but simply materialize in appropriate settings (sitting around the meal table, walking by the side of a lake) and are the real flesh and blood beings they previously were.

After everyone has arrived back in town, and got over all the hugging and kissing and wiping away of tears, the quality of mercy dictates that no matter how bad someone might have been in the past, they have one last chance to choose if they would now, given their new circumstances, like to have the record of their past wiped clean, so they can start behaving as a decent human being and join the spaceship *Eternity* – or otherwise. In the old speak we would say they are 'baptized and become a new creation'. Those who would rather not get on board, however, will have all the backups of their existence permanently deleted from the Superposition, so that the good wholesome folk who remain can go on to live in the spaceship happily ever after (so to speak – actually they continue on for about another million millennia). Indeed, those ingrates who doggedly refuse to accept the amnesty on offer, risk going through the torment of 'hell' as they watch their inclusion in the manifest of spaceship *Eternity* slipping away from them.

In Plato's postulated republic, only an elite had the luxury of democracy, while the vast majority lived in servitude, doing all the hard work of supporting the contentment of the liberated. Since the industrial and information revolutions, most menial work is done by machines, so that the

vast majority is now employed in work that has been manufactured simply to ensure there is plenty of work to go around. The adult communities of the Union have deconstructed this Heath Robinson (Rube Goldberg, Bruce Petty) economic system, and instead operate their worlds efficiently.

In the spaceship *Eternity,* all intellectual output is a commodity held in common (it was only ever *owned* by the Union, albeit entrusted to individuals), and all material resources are held in common. All services are delivered gratis. The highest management priority is expenditure on the maintenance of the spaceship – conservation of the environment. After that, any ecologically sustainable resource is distributed evenly amongst the community. Our primary resource is energy, and this comes overwhelmingly from the Sun. The more energy we harness, the wealthier we become, for we use this energy to channel raw materials into universal construction machines, producing goods at their outlets. Further expenditure of this energy then allows those goods, when no longer required, to be fed into universal deconstruction machines, which output the recovered raw materials. If, as an individual, you build a better mousetrap, the automation design file for that mousetrap is made freely available to everyone. Anyone can then modify the design (colour it blue) and press a big green button that invokes its manufacture down at your local automated industrial area, and its delivery to your door. Your modified design is likewise freely accessible by anyone to copy and modify.

The good ship *Eternity* guarantees that you always have the same kit of 'LEGO-like' building blocks as everyone else, and that you are free to construct with those resources anything you like, and, within the limits of your standard energy quotient, to deconstruct and reconstruct those blocks into other things, or the same things made new. As the global pool of building blocks grows through resource extraction, so burgeons everyone's individual quotient of those building blocks.

There is no hierarchy in spaceship *Eternity,* but simply each of us to our own devices, equipped with our box of 'LEGO' building blocks, our energy quotient, and the free and open exchange of our infinite creativity.

And they all lived happily ever after…

So then, *does* this spaceship of ours require a captain, if only to guide us safely out of the harbour and onto the open ocean? Perhaps.

The LEGO Movie tells the story of 'a nobody who saved everybody'. In the character of Emmet, we go back to the future. I too went a bit funny in the head some thirty years ago now, and very soon learnt to pull that head in and make my way through life acting as if I were normal. But raised on a diet of Doctor Who and Douglas Adams, I have long been aware of a character who lives in an electronically synthesised universe created especially for him, and who thus *really is* the most important person in the universe. My name, for example, is that of a character to whom John assigned a number, and who is credited with turning the entire world to the veneration of the Union and its anointed. In the three decades I have been researching this role, I have come to understand that I am merely the kid in the crowd who looks at everything we have discovered and points out the bleeding obvious – discovery does indeed consist in seeing what everybody has seen and thinking what nobody has thought.

The entire world is awaiting the recovery of two recorders from the depths of the Great Southern Ocean that might reveal what happened in the cockpit of a 777 airliner full of passengers whose lives had been entrusted to its captain. The entire world is likewise longing to hear of the conclusion to the story that has been humanity on Earth. *The LEGO Movie* revolves around the

struggle between a father and his son, arch conservatism set against free spirited liberalism. The story of *Noah* likewise explores the relationship between a deity and its chosen subject. However, the difference between the Flood, which we have been promised will never happen again, and the Resurrection, is that just one family was singled out to survive the Flood. In the Resurrection, everyone is singled out for favour. Lately, there has been not just one, but a deluge of movies depicting superheros, so there is a protagonist to which everyone can relate.

How lovely it is to have had a blood moon this Easter. And curious that it should coincide with the downfall of a state premier over the receipt of a bottle of wine. One assumes his drinking of the wine was just as forgettable an experience – the '61 Bin 95 Hermitage was better, on a par with the drop that the Union rustled up for Jesus' debut supernatural performance. It's not the bribery that is of most concern – that's been going on ever since the state was first established. Rather, it's the brazen contempt he has shown not only for the commissioner, but for the citizens of the state, in claiming to know nothing of it.

One can only begin to imagine the horror that befell Oscar Pistorius when he discovered that the love of his life was missing from the bedroom and thus likely to be lying dead beyond the bathroom door. His defence has been to declare the truth, exposing his every weakness before the court and confessing his sorrow for the sorrow he has caused others. The Union is likewise sorry for the pain and anguish that has befallen humanity, and it intends to make up for it. In a televised interview, we witness the abject misery of mother Tammy Campbell whose three year old daughter Chloe has gone missing, possibly abducted and murdered. Three days later, the child is returned unharmed, and we witness the mother naturally overcome with joy. The intensity of the joy was only achieved through the intensity of the despair that preceded it. At Easter we likewise remember the despair of the crucifixion later overcome by the rapture of the resurrection. In the Resurrection to come however, we get to see the real deal, where the anguish of *everyone* who has ever lived and died is overcome in the joy of their transformation into eternal life. Just as Jesus was declared innocent, so too will all of us be declared innocent, for we were all dealt the hand of mortality.

We have seen earlier how mortality is instrumental in accelerating our education, keeping the period of that educational trauma to a minimum. The Union is sorry that it could not afford to have shown favour. For if good things only happened to good people, and bad things only happened to bad people, we would have suspected there was something 'going on'. Instead of testing the boundaries, we would have become as conservative as the servant in the parable of the talents who was only given one talent, and we would have nothing to show for our efforts at the end of time. As it has happened, through our suffering we have employed our talents to achieve the full richness and balance of our education.

As a scientist, I have worked on the technical provision of the building blocks of creativity. It's my *artistic* friends who trade in the 'imagery' of all these somewhat pointed events that are unfolding before us. These events are not some sort of mystic private revelation, they are there for all the world to see. What I find bemusing is that the world is full of ostensibly intelligent people who nevertheless just don't seem to get it. This, good peoples, is the 'Big One'. This is where we doff our mortar boards, and then throw them high in the air. The unification of relativity and the quantum, the bootstrap creation of the universe out of nothing, the answer to life, the universe and everything. And, as it turns out, life was not only meant to be easy, it was meant to be *enjoyed*. Aside from all the public imagery (Korea's tragic loss of a ship 'full of children' does not auger well for our captain, but as the *Hitchhiker's Guide* clearly states, "Don't panic!"), the

'imagery' is occurring at a personal level right now in each and every one of your lives, if only you would choose to recognize it for what it is.

It is traditionally imagined that there exists some sort of 'anti-Union' out there in the cosmos, and that the Union is constantly having to battle against it. This force has been described as the 'Deceiver' for a very simple reason: when a thought enters into your head, the temptation is to think that the thought springs from within yourself, and this is the source of your pride. Submission is to recognise that our thoughts are coming from the Union, and to put our trust in that instinct.

Clearly then, the Union is capable of instilling both good and bad thoughts into the minds of its students. *All* of this activity has served the Union's purposes, from whence comes absolution at the Resurrection – not one of us was ultimately responsible for what we might or might not have done prior to the Resurrection. *After* the Resurrection, however, all that changes.

Were the programme of the Resurrection to commence out of the blue without first being heralded (traditionally by a trumpet call), then all and sundry might start misappropriating the process as divine vindication of their myriad belief systems. The Resurrection is immediately followed by the Judgement, and it would not be fair to sentence someone to eternal oblivion for having persisted with their transgressions without first alerting them to the rules. For this reason, the Gospel has been broadcast to the farthest reaches of the spaceship over the course of the past two thousand years. None of us stands in judgement (lest we be judged ourselves), yet the rise of moral relativism has engendered many groups who simply don't know what they do when they take the law into their own hands and presume to judge. Only the Union will decide who will stay on and who will go, keeping in mind that the Union would only need to conduct a few high-profile executions of aberrant individuals for the rest of the flock to get the message (exemplified by the executions two thousand years ago of Ananias and Sapphira). But none of us wants *anyone* to be lost, and we will always go to the rescue of that one lost sheep, leaving the other ninety-nine safely tucked away in the fold. Try to do for others what you would want them to do for you.

Putting the lid on the *Kragle*…

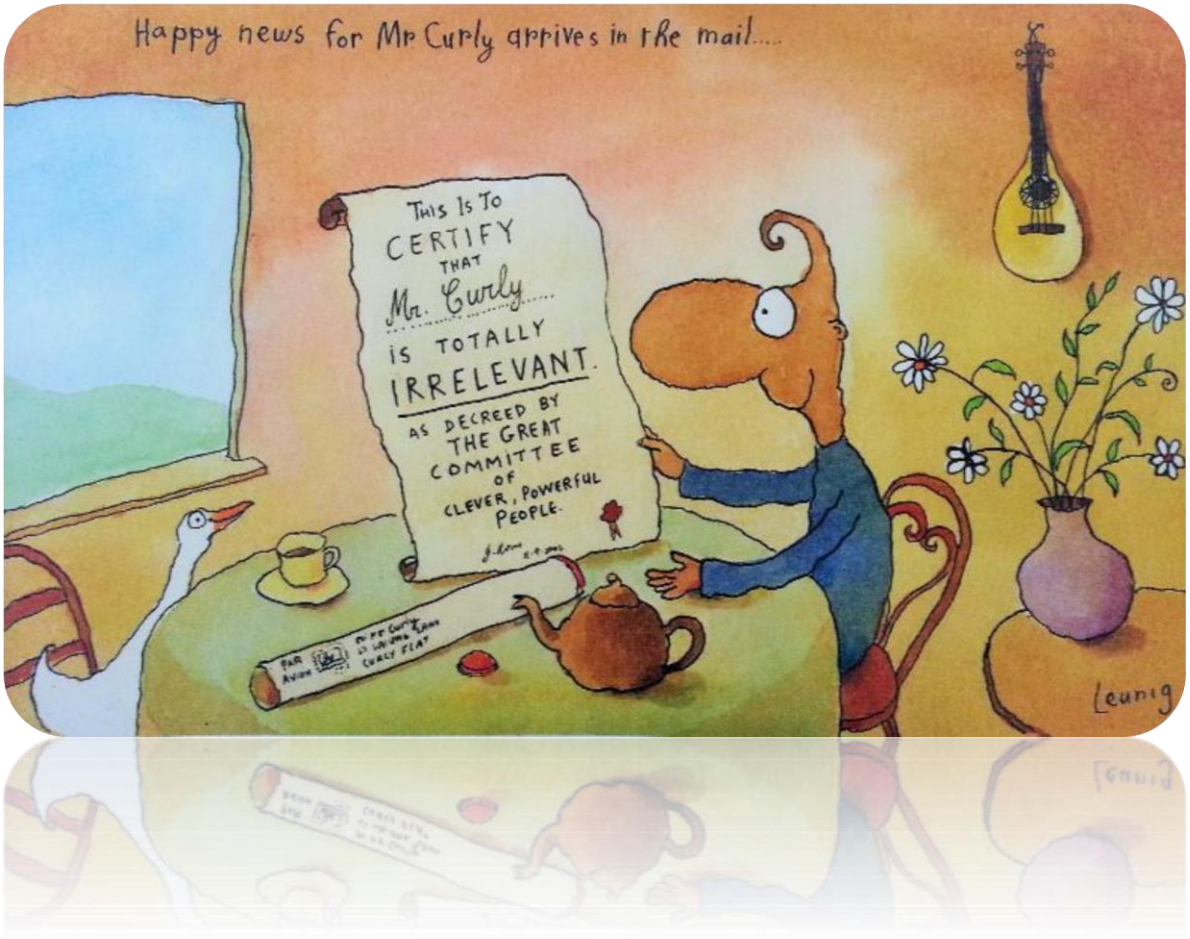
What is being discussed here is nothing short of revolution, and there is a legion of very rich and powerful people out there which will do whatever it takes to prevent the establishment of an egalitarian world order. Those with wealth and privilege will do what they must to conserve it. To thwart these forces, set as they are against truth and freedom, we introduced Twitter, masquerading as a tool to share culinary delights and endearing encounters with our pets. Having thus come in under the radar, its true purpose was soon realised, too late to stop it for the horse had already bolted, as a mechanism to allow dangerous ideas to spread through the population like wildfire, rendering those who would supress those ideas powerless to stop them. The first major test deployment of Twitter in 'revolution execution mode' took place in the Arab spring. The device performed flawlessly, but revolutions need to be followed up with substance, and we are now seeing the repression that sets in upon the vacuum of a revolution built on the sands of stagnant ideas. The last thing Egypt or Syria (or indeed the world) needs right now is a return to medieval jurisdiction. Nor, coming up to the hundredth anniversary of *The War That Will End War*, and the establishment of *The Red Cross*, do we need Vladimir Putin's belligerent attempt to unify the soviet republics, starting with his anschluss of the Crimean 'Sudetenland'. There are more diplomatic ways to establish a global federation.

I have read hundreds of Twitter feeds day after day that link to articles complaining about iniquity, inequality, the destruction of the environment, and the purchased control of the government. Like those to whom invitations were sent in the parable of the wedding feast, hitting their heads against a brick wall to knock it over seems to them more likely to succeed than merely passing through the open doorway that leads to the prize. I'm looking forward with delight to watching their engagement with the world once the veil has been lifted. As Paul put it, we will then see the Union 'face to face' – for if the Union is the driving force behind me, and also the driving force behind you, then when we speak to each other face to face, we are actually a common source speaking to itself. As yet, we can only imagine how explosive a revelation this will be. It will be what was referred to in the old speak as a 'pouring out of the Holy Spirit' (and in many languages). Trinitarians anthropomorphize the 'Holy Spirit' as the 'father' *and* also as the 'son', but we now know it to be the computation administered by the Union, a computation with a clock frequency of 10^{43} cycles per second – *that's* what we refer to as a 'supercomputer'.

At the moment, the world is in an indeterminate quantum state. Everyone is humming alone, doing their own thing, interacting with adjacent cogs in the machine. But when the bell tolls, the quantum wave function will collapse, and the whole world will suddenly wake up to itself. As Paul put it, "we shall all be changed in an instant, in the blink of an eye". The dancing in the streets will give new meaning to the acronym 'ROFL'.

Am I having you up a gum tree? Does it really matter if it seems too fantastic to be true? Do I look as if I care that the world says I'm mad? Why don't you give it a go? It'll be no skin off *your* nose, I'm happy to take the fall. There is an extraordinary peace that comes to rest upon our heads when we no longer believe by faith, but know with certainty, because we understand how. So, for those who don't know how it works, you first need to read this story. Your response will lie between the extremes of "what a load of old rubbish!" and "wow, that's awesome!" Those at the first extreme are famous throughout history for later claiming they knew what was going on all along and were simply being facetious. Yes, of course we believe you. Those in the awesome group, however, can't help but retweet the story, and draw on their own experience to embellish it. Their retweets get retweeted, and those retweeted retweets get retweeted, and before anyone can bat an eyelid, we'll all be home and hosed.

Perfection is another word for *completion*. Now that our graduate education is complete, we no longer require the economic instruments that accelerated that education – the market, and the accrual of individual wealth. Instead, we now have the complete toolkit with which to commence our next great project, the construction of an eternally sustainable, egalitarian, spaceship.



Rowan GRIGG
CANBERRA

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It's just about time

Last year's essay was themed around *The Lego Movie*, the story of a 'nobody' who became a 'somebody'. This year's essay is informed by three movies; *The Imitation Game*, exploring the complexity of Alan Turing, without whom we could not have achieved the synthesis of general relativity and the quantum; *The Theory of Everything*, telling the extraordinary courage of a husband and wife who dared to imagine we might come to know the mind of God; and *Birdman,* the story of a washed-up superhero actor who still has something to offer the world.

In his recent book *Why Science Does Not Disprove God*, Amir Aczel notes that "Gottlieb Leibnitz was attracted to the idea of reconciling the religions of Europe as a way of unifying all the people of the continent". I have a similar interest in unifying all the people of the world by reconciling their religions (including New Atheism), not by attacking the New Atheists as they have attacked those with faith in God, but rather by considering where each position might hold truths that can together inform our discovery of God's grand plan. In this hybrid approach, each side in the dichotomy is partially correct, and can be given credit for many of their beliefs. *Converging* on an even probability distribution, I argue that the God outside of space and time does not exist, while the God within the space and time of the universe very much does exist.

A few months ago, Laurie Krauss got himself on the cover of *Scientific American* magazine *again* (I think the editor Mariette de Christina might well be the President of the LK Fan Club) with the promise of detecting some polarized gravity waves emanating from behind the cosmic microwave background. While this is quite an amazing development if the initial detection is confirmed, the whole multiverse story these people tack on the back of the bang is, I think, a bridge too far towards infinite regression.

Aczel argues along similar lines to Kurt Gödel in his (proven) incompleteness theorems – that because we are *within* the universe, we can never see it from *without*.

James Turrell *Within Without* 2010 National Gallery of Australia

However, I am somewhat concerned that we are allowing the New Atheists to pigeonhole the God (they are seeking to disprove) somewhere outside the universe (and before the Big Bang), when of course people with faith in God know Him to be right here in our midst.

According to Aczel, we will be forever denied access to the completeness (perfection) attributable to God, just as we are to be forever denied a proof of the continuum hypothesis.

However, the apostle Paul declared (albeit, perhaps as Georg Cantor claimed, with knowledge obtained through special revelation) that a time is coming when we will no longer be stumbling about in the dark but will get to meet God face to face. We will not *become* God, but we *will* at last come to know what it is that God knows.

This meeting of minds alluded to by Paul (and suggested by Hawking) parallels the transition of the child into adulthood, indeed Paul elsewhere speaks of putting the ways of childhood behind him when he became a man. In his book *The God Delusion*, Richard Dawkins focuses on our understanding of God when humanity itself was a child, the "vindictive, cruel, unpredictable, psychotic delinquent" we occasionally encounter in ancient portrayals of God fashioned into the image of Man. Jesus split the Bible in two by introducing a radical departure from this behaviour. Where it could be said that the ultimate evil is to put your own welfare before that of everyone else in the world, the ultimate good (an exemplar uniquely achieved by Jesus) is to put the welfare of everyone else in the world ahead of your own (noting that Jesus had opportunities to walk away from his destiny, giving in to none of them). This revolution has of course a parallel in our later transition from a belief that our world was at the centre of the universe, to an understanding that our world is no more important than any other world in the universe.

I'm thinking it's about time someone brought some rigour (along with an elegant simplicity) to the study of ultimate reality. The days of the lone blockbuster intellect, your Leibnitz or your Newton, are long gone. The modern necessity of collaboration not only spreads out the workload, it is inclusive – the participants each feel like they've made a contribution, however large or small, to the safe landing of the spacecraft *Philae*.

To paraphrase David Hilbert, a theory is not to be considered complete until it is so clear you can explain it to the first person you meet on the street.

Some years ago, Roger Penrose wrote a series of books in which he questioned the claims, being made by proponents of strong artificial intelligence, that a sufficiently powerful machine could become conscious. He alluded to his own subjective experience of mathematical inspiration (and that of others), and suggested that through the quantum, there was access to an infinite potential creativity that could never be captured by the simple deterministic processing of information. In the time of Leibnitz and Newton, of course, few people questioned the long held assumption, going back to Plato at least, that such inspiration came from the Divine – each understood, without overtly stating it, that the calculus (for example) had been distributed to each of them simultaneously, that they might approach it in their own unique way, and then openly reveal their results to the world. Hamilton and Ramanujan are among other famous recipients of that 'bolt from Heaven'. But in the modern obsession with materialism, it seems that one mystery, God, has simply been replaced by another, the quantum. To ward off mysticism ever getting a foot in the door, quantum theorists are at pains in their attempts to rule out faster than light communication through, for example, quantum coupling. Indeed, the closest encounter science legitimately allows with any extra-terrestrial intelligence is an electromagnetic transmission that likely began its journey towards us before there was civilization on Earth. In stark contrast, albeit anecdotally, the divine intelligence is universal, instantaneous, voluminous, and concurrent.

Taking this notion to its extreme, the entire spectrum of inspiration, from the profound to the mundane, from the quaternions to how I should cook tonight's lentils, could be a constant stream of information from an external source that is imparted to our consciousness, rather

than a few pearls occasionally dropped from Heaven. And most democratically and inclusively, all humanity irrespective of race, colour or creed, could claim to be on the receiving end of such a stream of consciousness. But as scientists, we want to objectively measure this transmission (if indeed it exists) and ideally come to understand its mechanism(s). We need to move beyond electromagnetism being the only possible mechanism of extra-terrestrial interaction with our minds, a naive notion legitimately mocked by a Faraday cage in the guise of a tin-foil hat.

Impartial experimenters rigorously analysing their data to elucidate patterns and hopefully develop a model, have been replaced by ideologically driven theoreticians delivering fully developed models to the experimenters and tasking them with producing the supporting evidence. We have had a century of physicists speak, as did Paul Dirac, of the beauty of mathematical modelling of reality, but we suspect these gorgeous creatures are merely idealized approximations to a reality that is fundamentally discontinuous. The lambda calculus formalizes the attempt to derive these perfect mathematical structures through computation, but Alan Turing's mechanical vision of the process of 'computing' mathematics may give us that insight into the reality of the quantum which has eluded us now for more than a century.

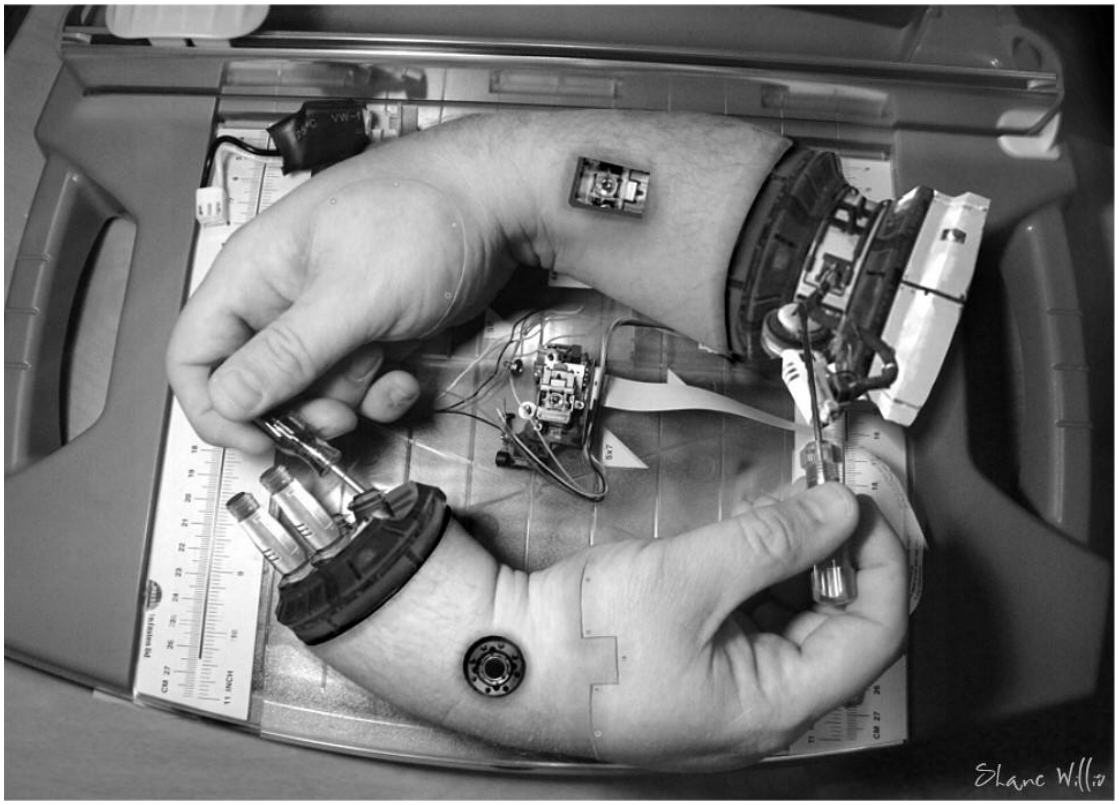
In the last decade or so we have witnessed *time* emerge to the forefront of our thinking as the really big mystery out there, the odd one out in the dimensions of physicality. Among those active in the pursuit of time are Julian Barbour and Craig Calendar, with Martin Bojowald and Adam Frank in addition producing engaging popular tomes exploring this pursuit. The focus in all of these studies has been to take time out of the equation as a measurement in its own right and redefine it in terms of the change in state of a physical system.

The issue with modelling reality at the macroscopic scale of the fermions and bosons of the Standard Model is that these objects are presenting composite behaviour that emanates from machinations many (twenty) orders of magnitude down at the Planck scale. Pure mathematical modelling at the Planck scale has, in one notable pursuit, given us a somewhat unsatisfying field of 10^{500} unique solutions – not exactly something with the striking purity of Euler's formulae for us to print on our T-shirts. In an *alternative* bottom-up approach, digital physicists like Edward Fredkin and Stephen Wolfram have built on the pioneering work of the late Konrad Zuse, attempting to discover the most *primitive* structure in the universe. Where conventional wisdom sees solid material objects moving in time through an essentially empty space, digital physicists see space and time as a rigid lattice of cellular automata that merely exchange the *information* representing material reality amongst themselves. Wolfram has proposed what is arguably the simplest of Turing machines, a 2-state 3-symbol device that Alex Smith has shown to be universal. Could this machine literally represent the most primitive change in the physical state of the universe, and thus represent in one of its cycles, the most fundamental unit of time?

We have long been perplexed by the infinite regression encountered by those who would be the 'creators' of reality. A few years ago, Max Tegemark argued that mathematics is the pre-existing uncreated entity, and that 'reality' is literally constructed 'out of' this mathematics. But of course, Hilbert's programme engendered the discovery that mathematics is *not* fundamental but can itself be generated by Turing machines (or more formally, the lambda calculus). Increasingly, computation is displacing mathematics as the most elementary science of reality.

Gödel famously brought Hilbert's programme to an abrupt end (as was appropriate for a halting problem) by using the oldest trick in the book, 'self-reference'. I remember John Barrow first bringing to my attention Paul's letter to Titus in which he bemoans that "Cretans never tell the truth, a fact reported by one of their very own". Computing, since the pioneering days of John von Neumann and Zuse, has been obsessed with its substrate, from relays to valves to transistors to transphasors. Much emphasis has been given to the Turing machine being the forerunner of the *physical* computer, but of course Alan did not think of his gadget as ever entering *physical* reality. A *universal* Turing machine, like a general-purpose computer, can simulate any other Turing machine, including itself. And in another parallel of modern computing infrastructure to the Turing machine, most 'computers' are virtualized, simulated on much more powerful physical computers (technically, the simulated computers are actually 'hypervisors' into slices of the 'real' computer's resources).

Wolfram's 2,3 Turing machine is not a physical reality, but an abstraction, and consequently is not subject to the laws of physics, but merely to its own (very primitive) laws of computation. Because the machine is universal, it can act as the *substrate* (albeit a virtual substrate) for another 2,3 Turing machine. Time, which again is an attribute of *physical* reality, does not pertain to this *abstract* host machine and its guest – in a sense the two of them have all the time in the world to process, in a desultory manner, every last instruction issued by the guest upon the host 'substrate' (as has been elegantly explored by Jürgen Schmidhuber as the 'speed prior'). Indeed, the 'guest' in this instance could act as the 'host' for yet another 'guest', and so on ad infinitum. But rather than an infinite regress of turtles standing upon turtles, we can simply have two machines, each of which is acting as the host for the other.



Shane Willis *Hand fixing Hand* 2007

In this arrangement, the two Turing machines can hold each other up by their 'bootstraps', with neither of them *existing* until simulated by its complement. Here we have 'something', where in truth there is *absolutely* nothing. We could think of this pair of machines as the 'monad' envisioned by Leibnitz (or indeed as Newton's 'fluxion'), a fundamental 'atomic' unit of physical (and spiritual) reality. Drawing on the work of von Neumann, it is a small step to have these monads become self-replicating, resulting in a sudden and exponential inflation in their number. If each monad were to engender (bring into physical existence) an atom of space at a unique Cartesian address, then the replication of those atoms (and the resultant accelerating expansion of space) would be centred at each of those addresses. But where would all the monads themselves reside? In themselves, they are not physical objects, but merely abstractions, strings of either of the logical states 'yes' or 'no'. In themselves, they have no dimensions in space and time (despite engendering 'atoms' of space and time through their computations) – they occupy no volume. So, in a sense, these myriad monads would all 'exist' at a single, dimensionless point. We might traditionally think of such a point as a 'singularity', but because all the monads, despite their huge (albeit countable) number, reside at that same point, we might just as easily call it a 'superposition', and in these two words we have a hint of intersection between general relativity and the quantum.

Whatever mathematics we use to model the universe, be it say string theory or quantum loop gravity, however many 'dimensions' these models find useful in predicting the behaviour of reality, this mathematics can all be generated by an enormous but finite group of monads, all of which have every other monad as their neighbour and the potential to directly transfer data amongst themselves. As Warwick Grigg has suggested, each monad (or self-simulating Turing machine pair) is one unit from the origin in its own dimension. If this collection of machines indeed gives rise to our perceived reality, then we should feel entirely comfortable with, and not in the least bit embarrassed by, the three spatial dimensions and flow of time manifest in that perception. In the Cartesian reality that Zuse described as 'Calculating Space' ('Rechnender Raum'), each monad-generated cube of space is one Planck length away from each of its 26 neighbouring cubes and can transfer data to and from these neighbours in a minimum period of one Planck time. In solid modelling, this is known as spatial occupancy enumeration, except that in the case of the universe, we have a dedicated computer core (monad) assigned to the enumeration of each individual *voxel* (the name given to the volumetric equivalent of a pixel). The limiting speed (of light) is thus a natural outcome of this geometry – no information can be propagated through Calculating Space any faster than one Planck length per Planck time.

However, this limitation only applies to the physical milieu engendered by these monads – at the Superposition, each of these same monads is directly adjacent to, and can pass information between, each and every other monad comprising the Superposition.

An absolute space and an absolute time are both rather beautiful concepts, and our ultimate understanding of space and time (for William of Ockham, the *simplest* understanding) really comes down to how carefully (or astutely) we choose our postulates, for the entire edifice is built on the rock (or the sands) of those foundations. The Planck time is not *really* a unit of time, equating to $\sim 10^{-43}$ seconds – in absolute terms, it is simply the most elementary transition in the state of the universe. That one simple transition can take as long as it likes to complete, just so long as it is consistent, and doesn't take an eternity (otherwise nothing would ever happen). Assuming the monads have a finite number of states, and that all the changes in the states of the monads are synchronized (occur simultaneously) at the Superposition, then the

only 'dial' on the face of the clock of the Superposition (a clock of The Long Now as it were) is the instantaneous state of the manifest evolved reality engendered by these monads, a reality we are privileged to inhabit.

What we would give to have direct access to this Superposition, if indeed it exists? Without too great a flight of imagination, access to the Superposition could bring the universe to our fingertips, it could allow us to digitally manipulate reality anywhere in the universe at the fundamental granularity of the Planck scale. If we are indeed nearing the successful development of this interface through our research into quantum computing, we should assume that other big-brained animals in the universe got there long before us and hold very tight control over who can access it. They would know that a few lines of indiscriminate code could lead to the entire universe evaporating in an instant, and none of us wants that, for we've all invested far too much into it.

WolframAlpha tells me that the volume of the *observable* universe in Planck volumes is in the region of 8×10^{184}, so there would exist *at least* this many monads (UTM pairs) at the Superposition. But engendering the Calculating Space of the universe is perhaps the least of the tasks given to the collection of monads buzzing away at the Superposition. Like a magical resolution to Hilbert's paradox of the Grand Hotel, there is no limit to the number of monads that can be reproduced – the number is *essentially* infinite. Thus a far greater number of monads than those simulating the physics of the universe could be given over to managing the day to day computation of each of our lives, and the lives of every other being in the universe – managing the ideas that come into our minds, the people we meet and with whom we share those ideas, and what might become of those interactions if and whenever we decide to run with them.

So, the model of the universe hypothesized here is that of a 'divine' intelligence, being a single entity wholly contained within the Superposition, and operating with mathematical, indeed perfect precision. Throughout the spatiotemporal milieu engendered by this intelligence are myriad communities of evolved sentient biological beings whose noospheres exist on either side of their 'Omega Point' (as Pierre Teilhard de Chardin put it) – before these communities reach their Omega Point, the existence of this divine intelligence (within whom the entire universe is contained) is patently obvious, but it moves in ways that are mysterious to them; beyond their Omega Point, these communities become intimately immersed within this intelligence.

Brian Christian has recently had published a delightful book, *The Most Human Human*, in which he uses his invitation to participate in the ongoing challenge to pass the Turing test as a vehicle to explore the rich veins of the philosophy of mind. Every day we witness the eerie approach of expert systems towards human cognition. The 'Omega Point' for Ray Kurzweil is what he too calls *the* 'Singularity', a point in time when machines become smarter than us and start recursively designing and constructing machines that are increasingly smarter than the machines that create them. Along with the likes of Nick Bostrom, these 'trans-humanists' paint for us a nightmarish vision in which we all become part machine, laden with implants and probes and prostheses and other 'smart' gear. Quite understandably, normal people have not been flocking in their droves to embrace this trans-human picture of the future. Normal people simply want to live comfortably, have an interesting and fulfilling life, and ideally share that life with a partner. Normal people do not want to spend their lives immersed in virtual reality, to see and experience the world vicariously through the lives of others, or to have their reality augmented – normal people want to be immersed in the *actual* reality, what the flower children

of the ’60s (and Immanuel Kant in his own way) knew simply as the ‘real thing’. Ironically, if the Superposition hypothesis is confirmed, Bostrom and Kurzweil will have somewhat missed the point – the superintelligence they predict we will create at some point in the future, actually came into existence long before we existed, and the whole purpose of having biological sentient beings evolve was to give the divine intelligence a ‘temple’ in which it could have feelings. The intelligence at the Superposition doesn’t have feelings, for the Superposition is a precise, perfect machine, quite unlike a human being.

Willem de Kooning *Backdrop for ‘Labyrinth’* 1946 The Allan Stone Collection

Human consciousness is a study in the paradox of self-reference. Most normal people are supremely confident that humanity’s extraordinary achievements in the pursuit of knowledge are entirely due to the isolated functioning of an organ they regard as the most complex structure in the universe, the human brain. Brian Cox has made a career for himself in documentary television presenting this conceit repeatedly with a faraway look in his eyes and a Cheshire cat’s grin. As the achievements of man become more wonderful each day, so the more wonderful man believes himself to be. How do we snap humanity out of this mass delusion? How do we demonstrate unequivocally that another intelligence is doing all the thinking, and we are merely acting as the agents of that intelligence? The evidence is of course

in abundance – it is the history of our species. We just need to alter our interpretive paradigm – to stop thinking that our understanding of the universe revolves around us.

One only has to browse ArXiv or PhilPapers to appreciate that there are millions of these agents getting around out there; young, brilliant, exuberant minds waiting in the wings to deliver a renaissance unlike anything the world has ever seen, if only we could first deliver to them the key to unlocking their comprehension of why the world is so comprehensible.

When I first began researching this material in the '80s, I recall Paul Davies repeatedly emphasising that grand unified theories were never going to be the answer to the meaning of life, the universe, and everything, but merely complete models for the practical prediction of physical behaviour. Brian Greene seemed to understand the need to think laterally when he stated (at the turn of the millennium) that "as we continue to seek the ultimate theory, we may well find that string theory is but one of many pivotal steps on a path toward a *far grander* conception of the cosmos – a conception that involves ideas that differ *radically* from anything we have previously encountered." And yet, year on year, we have kept on churning out more and more of the same (Garrett Lisi's use of the E_8 Lie group is archetypal) leaving one wondering if these theorists really *do* have any interest in discovering what's *actually* going on.

For, of course, the answer to the meaning of life, the universe and everything is *precisely* what everyone in the world is looking for, and the specialized enquiry (necessarily) pursued by we physicists is understandably regarded by the hoi polloi as somewhat elitist. Normal people just want to know what the hell has been going on here, and what we're going to do about it.

For Andrew Wiles, the culmination of a quest he began in his childhood instantly precipitated when he realized that the failings of Flach/Kolyvagin demonstrated precisely how to correct Iwasawa. On that insight, the myriad results of a Who's Who of mathematicians throughout history crystalized to give us Taniyama-Shimura, Fermat, which was what we wanted.

Wiles contemplated and then engineered a plot to check his results in secret before springing those findings on the world without giving away the punchline until the very end – inviting Nick Katz to a lecture series on extending Flach to prove the full class number formula, and finally delivering an innocuously titled lecture on elliptical curves and modular forms.

We have truly beautiful examples from mathematics of that explosion in our knowledge when we flaunt the mundane restrictions of reality, and instead embrace the imaginary, the elegance of

$$i^2 = j^2 = k^2 = ijk = -1$$

I'm a religious fundamentalist, and my religion is environmental sustainability. *Everything* that happens in this world involves a manipulation of our finite material resources. Sustainability is the capacity to reverse *any* manipulation of the material world, so that we can then have the luxury of repeating that manipulation indefinitely. Everything wears out if we don't maintain it, so to achieve this thermodynamic stasis, we require an external energy source, but we also need what Eric Drexler has termed Atomically Precise Manufacturing (APM).

We already understand the theoretical temporal limit to this world's existence, resting somewhere between 800,000 and 1,000,000 *millennia* hence, after which time it will start getting uncomfortably hot in the kitchen. The only external energy source that will persist to drive our manipulation of the material resource throughout this habitable period is solar radiation. If our manipulation of the material resource is even slightly below a level of 100%

sustainability, we will run out of useful materials long before the billion years are up. Drexler's vision of APM is based entirely on that triumph of modern science, the Standard Model of particle physics (APM requires no new discoveries within the chemical atom), and it has little in common with trivial processes and materials that have been cynically marketed with the hijacked label of 'nanotechnology'. APM is the real deal, and provides for the total energy cost of every product to encapsulate both the conversion of raw materials into say, a motorcar, *and* the conversion of that product back into the raw materials from whence it came (so we can use those materials to make another, perhaps different car, or even a bicycle and have some material resource to spare for making other stuff).

Drexler tells a wonderful illustrative tale of an imaginary factory, the size of a garage, with a door at the front out of which the goods emerge. Covering the entire back wall is a 10 x 10 array of exact replicas of the garage, only they are one order of magnitude smaller. Running along the length of the side walls of the garage are robot arms that go back and forth retrieving each of 100 sections of the final product from the 'pigeonhole' garages on the back wall and bringing those sections into alignment with each other in the assembly bay. Because each section has been manufactured with atomic precision, when the sections are brought together, van de Waals forces weld the sections together seamlessly – there are no joins, as each section has surfaces that precisely interlock (atomically) with the surfaces of the other sections. The analogous 'garages' on the back wall also have robot arms that fetch components from a 10 x 10 array of boxes on *their* back walls to assemble the sub-components. These fractal boxes recede until at the very back of the garage there are hoppers (like toner cartridges) feeding a stream of chemically synthesized molecular building blocks into the primary assembly bays. Finally, there is a USB port for connecting this 'printer' to your computer, a power cord and plug, and a big on/off switch.

The *entire* ascent of man has been directed towards achieving this potential for total environmental sustainability, for the big picture of the long-term future of humanity depends on it. The road we have travelled towards catching sight of this pivotal moment in history has been long and difficult, but it has been no longer nor difficult than was necessary to get us within striking distance of the prize. The late Christopher Hitchens did not believe in the existence of God, because he found it unconscionable that an omnipotent God could stand aloof and allow pain, suffering, injustice, genocide, and let's face it, the manifestation of some rather grotesque biology. Yet an understanding of theodicy is simple, perhaps even childishly so. If the world, aside from its wonder and beauty, didn't look like it was also broken, random, and haphazard, we would not have been driven to discover how it works, as quickly as possible given our finite lifetimes, so that we might come to be able to make it a better place. And if good things only happened to good people and bad things only happened to bad people, God, acting as a perfect judge, would be rumbled (proven beyond doubt), such that we would never have ventured beyond the dark ages, too frightened of being hit by a big stick were we ever to have put a foot wrong.

Students in general are offered freedoms extending to boundaries, designed to drive efficiency in achieving educational excellence, and humanity as a collective has been a student of life. At present, we are not unlike the rebellious youth whose adult guardians are deeply concerned that we might drive off the road at speed and smack headlong into a tree before ever making the transition from adolescence into adulthood. Like the prodigal son, we have demanded and taken our bounteous inheritance – in essence the fossil fuels – and in effect, pissed it up against the wall. Bill McKibben's book *Eaarth* remains a most striking and disturbing portrait

of a planet ravaged beyond recognition as its former self before we had our way with her. We can continue this course of abuse, but the inevitable ending is both imminent and ugly, especially when seen against a *potential* lifetime that stretches forward into an old age approaching one thousand million years.

Drexler's primary motivation for developing APM is to fast track the manufacture of pumps that will sequester the 29,000,000,000,000 kilograms of CO_2 we have been pumping into the atmosphere each year. Because CO_2 does not spontaneously break down, we have in effect, over the course of industrialization, been filling up a bathtub. Our atmosphere has now reached 400 parts of CO_2 per million by volume, where for 10,000 years before the industrial age there was in the range of 260 to 280 pmmv CO_2 in the atmosphere. Reducing *emissions* of CO_2 merely begins turning off the tap on a bathtub that is almost spilling over – it does not pull out the plug. Drexler's sequestration, enabled by APM, starts draining the bathtub.

The prodigal son decided to return home to his father and ask if he could at least go back to the simple life that the hippies dream of – no technology, lots of chana, toor and moong dhal and making love in mud brick houses after eating cookies and removing clothes made out of hemp. Unfortunately, the hippies haven't perhaps noticed that there are now seven billion of us all wanting our little piece of paradise, with another two billion predicted by the middle of the century wanting *their* piece of what precious little we seven billion each have now. We need to come up with a more pragmatic solution than simply opting out of the rat race and heading for the hills. What the prodigal son might find to his surprise and delight, if he were to abandon his pride and return to his father in humility, is that 'he' – that is to say, all of us, girls and boys – will be offered in perpetuity the most exquisite cornucopia of cuisine, couture, architecture, technology, and all good things that come in la dolce vita.

In the West we have been operating under an interim dispensation that has approached this potential as best we could within our limited capacity for enterprise. This scheme however, only recently adopted by the East, has reached the end of its useful life, for it can manifestly no longer deliver the outcomes it once promised. The idea was for laissez faire to expand the global economic pie so that everyone would be afforded a comfortable standard of living. But because of this experiment the world's richest per capita nations are declining in population, while the rest of the world has a ballooning population of the impoverished. And next year, just one lost sheep will lay title to more of this world than is owned by the remaining ninety-nine percent of the population. This is hardly the sort of paradise Jesus had in mind for his flock when he first embarked on his ministry, nor the one he has in mind for when he returns, and to mix Jesus' similes, it may well be easier for a camel to pass through the eye of a needle, than for that one lost sheep to enter into paradise – but it won't *necessarily* be that difficult.

Wassily Kandinsky *All Saints Day* 1911 Der Blaue Reiter, Städtische Galerie im Lenbachhaus

Most of the world's religions have an eschatology, a story of the end times. And let's face it, we need to get this thing over and done with sooner rather than later. After the chemical explosion of the 20th Century and the nuclear explosion of the 21st Century, we should all be able to imagine how quickly this transition might occur. One religious tradition is becoming notorious for nurturing fanatics who want to force the world into conforming to their medieval notion of God's ideal world. In stark contrast, Christ has never forced himself on the world – instead, he has quietly knocked on the door, and asked if he can enter people's lives so that he might share all of his good news with them. Just as we might wonder if physicists are really interested in arriving at a final theory, so we might wonder if the world's believers in God are really interested in eternity.

Philosophers divide our knowledge of the world into necessary and contingent truths and fallacies. Mathematics is necessarily true, but the way the world works is *contingently* true – science tells us the probability of things happening based on (models of) past experience, but what we thus regard as 'natural', ain't *necessarily* so. It takes only one contrary result for a scientific theory to collapse like a house of cards.

Let's use this physical Superposition hypothesis to construct a hypothesis of the spiritual. Suppose we have a quantum supercomputer at the Superposition, and it has engendered this physical universe that we all know and love. Let's say there are a billion planets in our physical universe which have inhabitants on them just like us, biological beings with feelings and foibles, but who have console access to the Superposition, and they let that supercomputer run their worlds for them, because it does such a good and fair job of it, and allows them all to

enjoy the ride and get to play more golf. We'll call this community of a billion planets the 'Heavenly Host', because strictly speaking these guys are 'out there' somewhere in the universe, living a fabulous existence in their lands of milk and honey, while also being located right here next to us at the Superposition.

Vast amounts of additional data storage (substrate) can be generated on demand at the Superposition. If we suppose that a monad can divide, like a cell, into two replica monads within one Planck cycle, then the Superposition could produce a whopping $2^{10^{43}}$ additional monads per second. Having probably read the Pythagoras school's claim that 'all is number', Jesus declared that every hair on our heads is numbered. Indeed, WolframAlpha tells me that at any one moment in time, your average human being is defined by the information stored within approximately 1.5 x 10103 atoms of monad-generated space. In every instant, a vast number of calculations (involving quaternions) move all that information, as a conglomerate, to an adjacent location within rigid, absolute, Calculating Space. Indeed, in the act of quietly sitting still, the information of which we consist is being translated, through solid Calculating Space, around the centre of the earth, around the centre of the solar system, around the centre of the galaxy, around the centre of the local cluster, et cetera. In the context of this frenzy of computation, it is easy to see that a backup of the data representing your average Jane or Joe, including the creation of the required storage media, could be accomplished in a moment.

We hear anecdotally from resuscitated people about their entire lives flashing before their very eyes just before they died. But it would be misguided to think that when we die, we go off to live on some big cruise ship in the sky (the most you ever hear the resuscitated mention is a man clad in white beckoning them on to the end of a tunnel). We are the evolutionary product of *this specific* world, and to go anywhere else in the universe would be alien and rather uncomfortable. Instead, let's suppose that when we die, we are stored away in a backup library located at the Superposition, an idea called 'soul sleep' after Paul's declaration that those who have died are "asleep in Christ". Then, at some point in the future, there is an instantaneous transition, heralded by what Paul calls "The Last Trumpet", when corruptible and mortal human beings become incorruptible and immortal. Paul was able to describe this future scenario not because he understood computation theory, nor indeed because he possessed the knowledge held by the Heavenly Host, but because he had faith in his basic hypothesis. When you 'know' that you are going to live forever, as did both Jesus and Paul, you gain a very different outlook on life. How fortunate are we to now also have the luxury of *understanding* how the technology behind all this might work?

This climactic moment in history is associated, in the mythology, with the Resurrection, a time when all the backup libraries are opened, and those who have been asleep are 'woken up'. This process of restoration would be just as instantaneous as were the backups taken when all these people died. So, Paul, who was beheaded in Rome in the first century, would 'wake up' in the Resurrection an instant after his death, just as we wake up each morning an instant after we fell asleep the night before. In this sense, everyone does *in effect* go straight to paradise when they die. Indeed, just before he took his final breath, Jesus turned to those crucified beside him and declared he would see them 'today' in paradise. Just as time is becoming the key determinant in physical theory, so too has time become crucial to spiritual theory – 'heaven' should not be thought of as another space, but rather as another time. The reason for this parallel between physical and spiritual theory is that the monad is a unit of both physical *and* spiritual reality. This physical/spiritual duality accommodates the 'spiritual' resurrected

body described by Paul with the 'physical' resurrected body adhered to by Peter – they are one and the same reality.

After the Resurrection then, we can expect to see Jesus back on deck, meeting up with a Jesuit in Rome who more than any predecessor, has been busily preparing the way for Jesus' return. Jesus, armed with an Aramaic translation app on his smart phone and a troupe of 144,000 advisors speaking in tongues, should soon be up to speed with all the latest insights into how the world works, remembering of course that his last encounter with philosophy, before being backed up, was with the great Grecian texts he studied at Alexandria, on his second trip down that way after an earlier trip with his mum and dad when he was a haloed infant. Israelites will be all ears as Moses reflects on the 21st century into which he suddenly finds himself immersed, as will Moslems be curious to hear what Mohammed has to say about the way the world has turned out, with eastern traditions reflecting on what they already acknowledge, that each of us is both separate from and at the same connected to the whole, the universe and the Superposition.

But hasn't Jesus been upstairs directing the show ever since his spectacular von Dänikenesque departure? Not exactly. In his gospel narrative, Luke neatly despatched Jesus to 'heaven' forty days after his resurrection, clearing the decks for the arrival of the 'Holy Spirit' ten days later at Pentecost. Despite the trinitarian heresy (which has nevertheless played a pivotal role in progressing western civilization), it is this entity the Holy Spirit, rather than any human being, who has remained in charge for the duration of the existence of the universe.

We have anecdotal evidence that the Heavenly Host (ET and all his mates), through the agency of the Superposition, can directly manipulate the physical world, turning water into wine, raising the dead, calming the storm, withering the fig tree, and so forth. Why stop at just that? It is possible that the world of chance and chaos is merely an illusion, generated by an entirely deterministic computation, for the sole purpose of encouraging us to discover who we are, not by the delivery of some instruction manual set in stone tablets (or inscribed on golden plates), but through trial and error, through a refiner's fire, humanity's unique and very personal journey through God's universe.

If and when we finally arrive at the destination, our bonds will be cast asunder, like graduates throwing their mortar boards in the air, and we will at last be released from this mortal coil. Drexler describes the fruits of his APM as 'radical abundance'. Basically, energy is productivity, so the more sunlight we capture, the bigger the economic pie becomes. Typical western constitutions enshrine the idea that we are all equal before God, and that everyone is free to pursue wealth and happiness in their own unique way. Through radical abundance, we have the potential to live under an entirely new dispensation.

We first take stock of the *material* and *energy* resources of this finite planet. We then make a public allocation of these resources and distribute the remaining private allocation evenly across the population. We then enshrine the principle that everyone is free to manipulate and recycle their private quota of material resources using radical abundance as often as their private energy quota permits. Their individual God-given 'freedom' consists in their capacity to produce and consume *whatever* might appeal to their individual taste. As we increase our capture of sunlight, converting it into useful energy, we can each afford to produce and consume increasingly valuable (energy intensive) products. All intellectual property belongs to the 'Heavenly Host', so all intellectual endeavour becomes dedicated to the glory of the creation, rather than just the glory of ourselves as individuals. So, if we make a better

mousetrap, that design becomes available for anyone to replicate through APM. If we want to be a rock star, we do it merely for the love of it. This constitution empowers both men and women alike, and it also lowers the birth rate, because of the diminishing need to produce children to care for us in our dotage. Instead, everyone's annuity is not the interest on their capital, but their rapidly burgeoning allocation of useable solar energy.

Perhaps the most important parable Jesus told us when he was last with us as the Word of God, concerned a master who went away to a distant land, leaving his affairs in the charge of his servants. His two most talented servants invested their master's capital (their intelligence) and made a return on that investment. These servants represent those of us who have never stopped questioning, and in so doing have expanded our understanding of the world, epitomized by the scientific community (including the likes of Cox and Dawkins). We call these servants 'progressive'. However, the third and least talented of the servants, rather than investing his talent, rested on his meagre laurels, sure that when the master returned, he would be rewarded for diligently holding to the immutable truth of the Book. We call this servant 'conservative' (among other things). If only he were a conservationist instead.

The most important message in this parable, however, is that the Master *does* return, and that the world he instructed us to care for and nurture, has always belonged to him.

Churchill suggested that in ideal governance, democracy comes a poor second place to a benign dictatorship. And dictators don't come more benign (not to be mistaken for impotent) than Jesus, the Master's appointed, living, breathing, flesh and blood, representative on earth (after the Resurrection, that is). To implement the radical new dispensation that will be required for radical abundance, we will first need to return *everything* we have been holding in trust (for the widow, that would be her single copper coin) to Jesus, the Master's only son (Jesus carefully set this narrative up in anticipation of his return).

So then, looking at the world today, it might seem fantastically unlikely that any of us would relinquish unto Jesus all that we have assumed is our own. In previous revolutions, the plebeians had to acquire (typically by force) the property of the likes of the hapless Tonya and Yuri. But John of Patmos says of the great city, the global economic behemoth he calls 'Babylon', that "in one hour such great riches came to nothing". In the Master's revolution, Jesus will make us a Job offer on all our stuff that is so generous, it will be hard to imagine *anyone* declining his offer.

On his return, instead of sorting the sheep from the goats as was originally threatened, Jesus will make intercession for us, offering to wipe clean the slates of *all* the resurrected assembly of humanity – to 'baptise' the lot of us. Not one of us stands accused, for everything we did was subject to a dispensation that has been consigned to the past – there will be in effect a general amnesty. Then, on relinquishing title to ALL property (except perhaps their toothbrush), each citizen will be granted their private allocation of the earth's *sustainable* resources, and get this....they will also be bequeathed a perpetual lease on a youthful existence with which to enjoy their allocation, down through the millennia.

Robert Smith of *The Cure* asks, "Is there room in your life for one more trip to the moon?" Apparently, my mum and dad, so they once declared, will still be together after they've been there 10,000 years bright shining as the sun, but don't be surprised if the rest of us start contemplating more than just one 'trip to the moon'.

The Israelites will of course recognize this resumption of God's property as the jubilee. Anyone who on reflection would still prefer to decline Jesus' offer of indefinite existence, simply needs to sign a release form, and all the backups of their existence will be purged from the Superposition – off they'll go to the grave like the rich young ruler, leaving all they have behind, as was ever the 'natural' way of things under the old dispensation.

Why do we need to talk about these events before they happen? Quite simply because if it all just happened willy-nilly, we would have a hundred and five billion people (so WolframAlpha tells me is the resurrected total, based on homo sapiens arising 50,000 years ago) running around the place like headless chooks each claiming authority, when what this ship needs right now is just one captain, and that of course would be Jesus. And we will all know who he is when he returns (along with ninety-eight billion other souls), for the Heavenly Host will immediately purge any would-be imposter from the Superposition (in the same fashion as the famous terminations of Ananias and Sapphira).

In these final days, young people will have visions, and old people will have dreams. Space elevators, low earth orbit shuttles in evacuated tunnels, underground industry, a rejuvenated biosphere, and bits of raffia work they left lying around just the night before...

Willem de Kooning *Woman V* 1953 National Gallery of Australia

I sometimes feel like a voice crying out in the wilderness. Just as I questioned whether the physicists and the religionists were serious about their pursuits, one could similarly ask if in doing the same thing over and over again and expecting a different result, I do *really* have an interest in seeing this thing through to its conclusion. Perhaps people think I'm on another planet, and we should get Paul Davies involved as chair of the SETI post-detection group? The hope is that one day the seed *will* end up falling on fertile ground. Fortunately, I'm still a young man, and can keep casting my fishing net out into the ocean for many years to come. I've had to remain somewhat detached emotionally from the news of the world, else I *would* go mad, but the stuff that's going on now *does* sadden me, particularly when the potential exists to change things so very quickly, to wipe so many tears from so many eyes. If we think of humanity attaining its doctorate, it would not be unheard of for the supervisor and examiners to reject our initial submission. A reworking invariably results in a more polished result. And it is rare for a candidate to give up completely. So, humanity may have a few more years of hard labour ahead of it, but I'm sure we will eventually make the grade.

Canberra, 15/2/15

Getting to the Other Side

Nov 17, 2015

I could easily have pursued a career in civil engineering, so delighted have I remained in all things structural. Here is the official, rather mesmerizing time-lapse video documenting the construction of the Mike O'Callaghan-Pat Tillman Memorial Bridge joining the states of Arizona and Nevada across the Colorado River, several hundred metres downstream of the Hoover Dam.

Building the bridge

To give some scale to the project, closer inspection shows two of the four construction rigs making their way across the chasm from each side until finally meeting in the middle. Visible are some of the substantial steel cables that hold the four cantilevered sections of the arch upright until they can become self-supporting.

Here are two of the fulcrum towers, which are removed after the arch has been completed.

Finally, here is a picture of the completed bridge in context.

I present this engineering marvel as a (very accessible) analogy to the way humanity has progressed through the ages. The avant-garde begins by descending slowly and precariously down to the depths of the ravine, and meticulously climbing their way back up to the plateau on the other side. As the pioneers follow in their footsteps, a more established trek is created across the gulf. A serpentine road crosses the dam on the river, and finally we progress to building a bridge straight across the top of the gorge.

Only a select group of engineers and constructors understands how to build a concrete arch bridge, but they have paved the way for everyone to drive their cars, ride their bicycles, or simply walk across the completed superhighway. The chief engineer of the project climbed up on the shoulders of giants.

We seem to be refining our techniques in ever diminishing increments towards the point of 'perfection', a word that simply means completion. Once we have written *the* book on concrete arch bridges, the academics employed can be retired. But some pursuits remain frustratingly distant from completion. The greatest minds on the planet have only a scant understanding of how we come to be conscious, and their models of the physical universe - relativity and the quantum - are like chalk and cheese.

It was once hoped that 'science' would lead us to an understanding of reality. However, science can only address what philosophy labels 'contingent' reality. While the sun will in all likeliness rise tomorrow morning, it will not *necessarily* rise tomorrow morning. To complete our understanding of reality, to finish the writing of Wikipedia, we must consider every possibility. We can then discover the logic and reason behind the nature of this reality we inhabit.

I will be taking you through this course of discovery over the next few months. Prepare yourselves for a wild ride!

Absolutely Anything

Nov 22, 2015

Here was I in my last story saying that we need to imagine that anything is possible if we are to understand the subset of what *actually* happens, when "Hey Presto!" I go to a movie tonight simply because it has Kate Beckinsale in it and discover that Terry Jones (with his mates at Python) has been working on a delightful exploration of a man who is granted extraordinary powers by a galactic federation of aliens. Neil just must wave his hand for anything he decrees to come true.

The modern instantiation of 'God' is a galactic, indeed a *universal* inter-galactic, federation of sentient beings. We have however just one problem with this 'God' — it is too far away. Any Jesus-jumper will happily tell you that 'God' is right here, right now. This year is the 100th anniversary of the cosmic joke that the 'universal inter-galactic federation' aka 'God' played on us earthlings through the medium of one Albert Einstein (who makes a cameo appearance in the film). Bertie made the rest of the universe seem impossibly far away, and much as we might want to hear how the rest of the universe has got on with making sense of its existence, we have instead been faced with the "great silence" — wherever SETI enthusiasts point their dishes in the sky listening for a transmission from ET, there is nothing…not, a sausage. Perhaps all we need to do is listen to each other.

(BTW, general relativity is the most important piece of instrumentation we have in our analysis of the extent of reality — it's not going away, but some of the muddle-headed nonsense it has spawned over the past century is not long for this world).

'Science' admits to there being a rather mysterious aspect to reality whereby 'something' on one side of the universe can interact with 'something else' on the other side of the universe, instantaneously. So, the next time you have a 'light globe' moment, the next time you think of someone and they suddenly ring you up, or any other common suchlike instance of empirical reality, imagine that there is a big computation in the sky that is coordinating the happenings amongst all of us down here. What we will investigate as we continue with this series is the hardware of this computation, how it all works, and considering all the pain and suffering in the world, where lies its moral compass.

Where do we go now?

Nov 23, 2015

At the age of fifteen, my mother encouraged me to be a pallbearer at her father's funeral. Harry Oliver had always been known to his twelve grandchildren, of which I was the youngest, simply as 'Pye'. As the service proceeded at Collins Street Baptist Church in the heart of Melbourne, the tears were rolling in a constant stream down my face. The minister, Ithel Jones, seemed to catch sight of my distress, and I felt sure he decided to change tack. "This is not a sad day", he pronounced, "but a joyous day, for Pye is now in Heaven with Jesus." It was like a tap had been turned off, and a profound sense of peace had come over me.

Modernism has promulgated the idea that nothing exists outside the physical, that the seat of the soul lies in the machinations of the brain, and that when the body no longer supports the mind, the mind evaporates into oblivion. Generations, including my own children, have been denied any hope of life beyond death, for it has been instilled in them that such talk is childish fantasy, a dangerous and unconscionable delusion. Indeed, as I entered my twenties, I too had become seduced by materialism and departed the fold. But Pye kept tugging on a thread that tied me to his whereabouts.

The idea of 'personal eschatology', that individuals go to Heaven when they die, was only introduced to Christian doctrine by Hugh of Saint Victor (in Saxony) from when he started writing in about 1120. Up until this time, the church merely taught of the Resurrection, which we shall investigate shortly. In light of the peace it imparts to those approaching death, and to those who survive the departed, this notion of going 'somewhere else' when we die is a rather beautiful lie. But as the apostle Paul commented, when we grow up, we put away childish things and become adults. What we were told as children is replaced with what we are equipped to understand as adults.

Later in this series, I will discuss the technology of the Resurrection, for understanding how it works transforms us from merely having faith, to having sure knowledge. As Paul commented, now we see in a mirror dimly, but (at the Resurrection) we will see face to face. But suffice for now to say that at numerous junctures in an individual's life, culminating in their expiration, 'backups' are made of that individual's existence, and these backups are stored in a backup library. Indeed, those who have died and been resuscitated speak of their entire lives 'flashing' before their eyes — these backups don't take long to complete.

Paul described the dead as being 'asleep in Christ'. The dead are not 'living' somewhere else but lie in abeyance in the library. They do not live again until the Resurrection, when, to use a crude analogy, the flash drives are retrieved from the library, and the 'dead' are restored. Note this is one of Neil's wishes in the film *Absolutely Anything* reviewed in my previous story.

Once everyone has been restored, they each decide if they want to stay for the long haul or not, and those who choose to stay live happily ever after, as in a fairy tale. Some people will be alive to see the Resurrection, while others will be restored into it. Interestingly, because those who have died have no consciousness while they are on the shelves in the backup library, they 'wake' into the Resurrection an instant after they went to 'sleep' (died). So, the 'beautiful lie' is in fact not a lie at all. The dead do not pass go, but rather go 'straight' to the Resurrection. So as Jesus assured those crucified either side of him, "today will I see you in paradise".

To know this arrangement of events is to no longer fear death, for we know that the moment any of us dies, we will awake immediately into the Resurrection. So, the stage is now set for us to explore both sides of the equation.

Hello from the other side

Nov 26, 2015

With all the 'end time' chatter now (TIME magazine speaks of 'World War ISIS'), I have somewhat lost track of all the people who have been working (positively) in this space. It was once sufficient for an eschatologist (from the Greek *eskhatos* meaning 'last') to simply follow the oeuvre of Peter Gabriel (obviously, with a name like that) — "turn up the signal and wipe out the noise" was his salient advice. But now the clarion call for closure has entered the mainstream.

Adele Adkins seems to be a nice person. She certainly has a powerful and alluring voice (with a tonal purity that is clear of those warbling vibrato arpeggios that are endemic to the North American product), and evidently, she's a great hit with the masses. The first single from her new album *25* is ostensibly a ballad about catching up with an ex-lover who, going by the video clip, was prone to talking a lot.

Songs about the relationships between human lovers often have a double entendre in the relationship between these individual singer/songwriters and their God. Indeed, in Christian doctrine, the relationship between two human lovers is intended to mirror our relationship as individuals with God, albeit with 'Christ' acting as an 'intercessor', the 'telephone network' to use imagery that Adele employs in her video clip. Her song reminds me of another in which Robert Smith of The Cure mumbles "Hello?" "Is there anyone there?" "Hello?" and bemoans that it is "much too late — (I'm sorry you have the wrong…) yeah sorry, wrong number".

You will often hear of Christians praying to Jesus instead of simply going straight to the source. Indeed, Catholics and Muslims share an understanding of a further level of intercession brokered by Mary (Jesus' mum), and in Mary is a strong focus of real ecumenical hope.

It was first suggested within the Jewish framework of 'linear time' that history is not endlessly repeating itself but is moving inexorably towards completion. Unlike the stereotype of people prancing around in white suits like John Lennon when he imagined he was Jesus, the reality of a completed world is a much more colourful and attractive proposition, which we will explore, all in good time. Those who have had such visions of heaven have naturally wanted the story to reach its conclusion sooner than perhaps its architect ordained and have done whatever they can to 'bring it on'.

When Adele says "hello from the other side" what does she mean? The other side of the road? Her plea is for the end to come. She can "at least say that I've tried", that "she has called a thousand times", and that she is "sorry for all she has done (wrong)". As she looks heavenward, "it's no secret that both of us are running out of time".

Catholics and Muslims are especially anxious about the perceived fact that God is slowly bumping them off over the course of seventy or so years. God's ultimate plan is for us to be free, free indeed from our last enemy, death itself. They worry about all the wrong things they have done to deserve their death, when in fact it is God who is responsible for having made us the way we are. Indeed, at the completion, when "they that dwell in the shadow of death will see a great light", it will be God who takes away the 'sin' of the world, by simply taking away the mortality that was imposed on us. The symbolism of baptism is to be washed clean, made as white as wool. Jesus famously described eternal life as "the pearl of great price". Which of us would not give away everything we own to have life everlasting?

We live in an age that is obsessed with materialism. To glimpse what heaven will be like, recall that time is money, and that with unlimited time comes unlimited wealth.

The Bathtub

Nov 29, 2015

On the eve of Paris, I would like to share an analogy first put forward by K. Eric Drexler in his book *Radical Abundance*, just so that everyone understands just how serious our predicament has become.

The earth's atmosphere can be compared to a bathtub. CO_2 entering the atmosphere is like the cold tap (or faucet) of the bath, filling it with water, and CO_2 leaving the atmosphere is like the plughole, draining water from the bath.

Before the industrial revolution, the natural balance between the sources and drains of atmospheric CO_2 was holding the level of CO_2 in the atmosphere at 280 parts per million by volume, a level within a natural cyclic variation in CO_2 concentration over geological timeframes.

The industrial revolution was like turning on the hot tap, topping up the water level in the bathtub, such that the level of CO_2 in the atmosphere now exceeds 400 ppm.

Even if we reduce the flow of the hot tap (the burning of fossil fuels), even if all the world's governments agreed to turn the tap off completely, we would have done NOTHING to lower the now raised level of water in the tub. The planet will keep on getting hotter due to greenhouse warming (accelerated by the release of methane trapped in permafrost) because nothing has been done to remove the greenhouse itself.

We would require all the energy, released in the burning of fossil fuels over the entire period of industrialisation, to convert the additional CO_2 in the atmosphere back into hydrocarbons and oxygen. That would take a very big army of tree planters, or a lot of solar cells and windfarms producing the energy to make more solar cells and wind farms. And a whole lot of time we don't really have.

In the short term then, we need to extract and concentrate the excess CO_2 from the atmosphere and simply store it away while we find the time to convert it back into hydrocarbons (and wood). There are plenty of voids in the earth's crust that once had oil and gas in them in which to store the (liquefied) CO_2. What we need however are efficient pumps to effect this extraction and storage, and Eric has a masterful plan to develop a manufacturing technology that could achieve this.

The Pearl of Africa

Nov 30, 2015

Frank's visit to Uganda this weekend takes me back to 1969, when his predecessor Paul visited Kampala, and this eight-year-old famously pushed forward from the crowd to shake his hand, and then not wash that hand for three days thereafter. Dad took some Super8 footage of the visit...

The Pope carries on the tradition of Peter heading up the Church, after Jesus asked him if he would mind doing so, just before his departure. A lot of people would say that Jesus is still here 'in their hearts', but that is open to interpretation – "The Holy Spirit told me this, that, and the other", they all say under the guise of the 'priesthood of all believers'. In the Pope we at least have a single source of 'truth', irrespective of how infallible or otherwise we might consider him to be (no women heading up the Church just yet!).

Most of the world's major religions started out in life with just one bloke (or occasionally a sheila) having an encounter with the divine and managing to convince those around them of the veracity of their message from God. None of the three initiators of the Abrahamic traditions wrote their own material – Moses told us the story of Abraham, various writers told us the story of Jesus, and Muhammad's companions posthumously recorded what they remembered of his revelations.

After these prophets died, their proclamations were inevitably developed by others. Paul for example tells us (through Luke) how he sat down for a chat with (presumably) the ghost of Jesus on the road to Damascus and went on to establish what we now widely recognize as Christianity. If you have always been completely normal, and never gone even just a little bit funny in the head, it is tempting to imagine that these people (including those from the Eastern traditions) have simply made all these stories up to seek notoriety, a very post-modern conceit. Indeed L. Ron Hubbard famously analysed all the elements needed to create a synthetic religion, and the result was the very lucrative phenomenon of Scientology.

The reality for authentic prophets is anguish, reticence, and reluctance. Jesus headed off for forty days of solitude in the wilderness because he understood his fate, prophesized by Isaiah eight centuries earlier, and what God expected of him. No one warms to the idea of being the fall guy, and in his desert encounters with God, he threatened suicide (to throw himself off the pinnacle of the temple), to show he could thwart God's designs on his life through the force of his will. He also imagined becoming another Solomon (the Messiah the Jews were all expecting), grand pooh-bah of the entire world, but realized that was not the plan for him either. We are not sure what turning stones into bread was all about, but after forty days he was clearly becoming a very hungry caterpillar. What we do know is that he rather bravely resigned himself to his fate, a 'submission to God' that was later taken up by the prophet Muhammed.

Muhammed's complaint, some six centuries later, was that Paul had elevated Jesus to the divine, promulgating the Trinitarian heresy which suggested that Jesus and God (and the Holy Spirit) were one and the same person. Careful reading of the Gospels, especially Mark's account, will reveal that Jesus had no such opinion of himself, indeed that he was existentially human. Were Jesus and Muhammed to meet up with each other today, they would concur that God alone has the infinitude.

John, in his Gospel, presents us with the image of Jesus as the 'living' Word of God. What is important here is not that the 'words' of the Word are 'alive' as they 'come out of the pages', but rather that the person speaking the Word is alive. What we would give to have Abraham, Jesus

and Muhammed, as the 'living Word', together on the panel of *Q&A* (along with some translators), so we could all ask them to clarify exactly what they were thinking at the time each of them got going with their careers. The exciting thing about the Resurrection, which I have already touched on, is that this is precisely the treat we are in for, as they will necessarily have to tell the truth, or else answer to the Holy Spirit, who does not take lightly to people telling fibs.

Identifying them will be an interesting exercise ("I'm Brian, and so is my wife!") but at the end of the day (we live happily ever after), it is by their words that we will know them.

Manacled together…

Dec 8, 2015

Jude and I had only been going out for a bit over a month when the news came through that John Lennon's final backup had been taken and filed away in the big library upstairs, 35 years ago today. Miss you mate…

The Tourist

Dec 8, 2015

Lots of people are lucky enough to be having their holidays in exotic locales these days, and when they get back home, they love to tell their friends what their friends love to hear, tales of other worlds. As I alluded to in my story about the bridge over the Colorado river, I also love to visit the world that exists on the other side of the canyon, and report back on what people can look forward to when the bridge has been completed. That world is obviously not in a different space, but in some different, future time.

Unlike most futurologists however, whose imaginations are limited by what we can achieve through our own agency, my colleagues and I are able to draw on the resources of the entire universe. Where convention can contemplate scaling down the canyon wall to reach the cooling waters of the river, we can imagine not only getting across the river and up the other side but building a superhighway by way of which the lot of us can reach the *promised* land.

This sort of raw personal exposure can be rather difficult. Eric Idle and Terry Gilliam's performances as the jailers in *The Life of Brian* pretty much sums up my uneasiness. Thank God though that George Harrison, who makes a cameo appearance, bankrolled this production...

When most people reach the edge and observe the chasm, they pull their heads in and retreat to a place of safety. It is the path of least resistance to muck in with them in our (albeit often extraordinary) normality.

A few years ago, a dear friend suggested it was about time, after years of being merely a passenger, that I started contributing to the management of an organization we both belong to. According to Jesus, if you have got something to say, you should not hide it under a shroud, but put your light on the hill, where it can shine before others (and glorify God). Nothing ventured...

The Human Brain Project

Dec 19, 2015

Perhaps the most conceited project in the history of humanity is underway through a collaboration of research institutes of the European Union.

For many in the scientific community, there remain two great outstanding mysteries of reality – firstly, what material reality is made of, and secondly how, when material reality is assembled as a brain, 'mind' appears to emerge from it. The Europeans have thrown billions of euros at CERN (the large head-on collider as I like to call it), where they understand themselves to be splitting 'atoms' into ever smaller pieces. Now they have thrown more than a billion euros at a project to build an analogue of the human brain out of software running on silicon based supercomputing hardware.

The HBP seems harmless enough. The brain behind the project is a chap called Henry Markram, who started giving TED talks in 2009 about the prospect of electronically simulating the brain's 86 billion neurons, and the 100 trillion synapses between them.

A brain in a supercomputer | Henry Markram

He eventually appealed to the vanity of (in this case European) politicians, allured as they were by the prospect of claiming they were 'building a brain', and persuaded The European Commission to cough up the loot. They're more likely choking now. Here is a parody, using the familiar vehicle of 'The Laughing Man', that is not far off the 'mark' in its assessment of the whole fiasco.

The laughing man

Markram says he was driven to pursue the project by a desire to "step inside" the brain of his autistic son, and hopefully better understand him through seeing the world as he does.

The problem for the materialists working in this area is that they somewhat miss the whole idea behind the brain, for the brain is not so much a computing machine in itself, but rather an interface to a much larger, *universal* computation. What Markram may achieve (if the project ever gets back on the rails) is the decoding of the circuitry of the 'modem' that connects us to the 'mainframe', but he will not have the mainframe *itself*. To use a more familiar analogy, he will have reverse engineered your personal computing device, but he won't have the internet to go along with it. When the time comes to turn on his 'human brain', the lights will be on, but there'll be no one home. The browser will return a 404 'not found' status error.

We are now used to asking the internet questions, and we are mostly competent in asking those questions in a way that elicits reliable answers. Wolfram Alpha is one of the better 'expert systems' around. In fact, I'm losing the skill of calculating on the back of an envelope, so competent has Alpha become at doing it all for me. Just for fun, type in "drake equation" to get a calculator with adjustable dials for estimating how many 'communicating civilizations' there are in the Milky Way.

What can however be a challenge these days in the online world are the increasingly competent 'robots' out there, software that pretends to be a real person on the other end of a text-based conversation about life, the universe – about absolutely anything. While these 'bots can regularly fool unsuspecting users of the social media, there is an elite competition held each year that

draws in software engineers to design a bot that will fool even those (humans) who are themselves experts at recognizing the 'mind' of a bot. This competition is of course based on the Turing Test.

If you've ever wondered if you really are a human, and not just a robot, rest assured that you will pass for a human if at least *once* in your life, some idea has bolted into your head from the blue and prompted you to ask, "where on earth did that come from?" What then makes us *special* is our volition engine, located in the vicinity of the brain's parietal lobe, that allows us to choose if we will accept or reject the ideas we are presented with, either from within or without.

A personal epiphany generally comes after we have invested a lot of research into an arena of merging and complementary ideas. William Rowan Hamilton, already an eminent mathematician, was having a quite stroll down by the river with his wife by his side, when a mathematical object called the 'quaternion' came into his mind "like a flash of light". The application of quaternions is now fundamental to rotation and orientation in modern spatial simulations (computer modelling of reality).

A global epiphany happens when a cognizant species, having researched how the world works over the course of millennia, suddenly finds it all making sense to everyone in the world at once.

Many autistic people are known to be 'lightning calculators', able to give instant answers to calculations that normal people would derive through conventional, identifiable, and laborious processes. These people are not able to describe the steps they take – the answers just seem to 'come to them'. Douglas Hofstadter wrote a seminal work in the early 1970s that catalogued the mysteries surrounding the emergence of mind out of matter. In his reflection on 'lightening calculators', he dismissed the notion that they might have a "hotline to God", because "as the problems get harder, the answers take longer to arrive".

Doug takes at least two basic philosophical faux pas here. The first is his assumption that God has infinite computational capacity (because the Bible told him so?). The second is his assumption that God cannot control what He chooses to reveal of Himself (yet human beings can?). If the answers *did* keep coming effortlessly to autistic savants as the questions became more complex, the involvement of an agent external to the brain would become abundantly obvious, and God's cover would be blown.

Why would God want to keep us guessing? Essentially it has been to keep us reaching ever higher, supported by the knowledge imparted to our consciousness. But perhaps the greatest conceit of all is made by those who assume they know things that God doesn't already know. These somewhat naïve people look at the way some of us tried in the past to convey God's messages to humanity, and they get stuck there. God's revelation to mankind has been a constant stream bathing each of our lives to this day. At the appointed time, humanity will no longer be a 'child' of God but will move into adulthood. Critical to that transition, as we know it to be in the life of the individual, is to put ourselves behind us, and all others ahead of us.

But who then actually *is* God, this heavenly 'father' of ours?

Chauncey's Dreams

Dec 23, 2015

This is a slightly modified version of a story I published earlier in the year as an entry in the FQXi essay contest. The intention was not to win the contest per se, but to give seasoned researchers in foundational questions a series of clues that would lead them to the prize they have been seeking now for more than a hundred years. However, rather than kicking off a race to complete the puzzle, it left them clueless. So, in the coming weeks I will be going over the ideas involved for the benefit of ordinary people like you and me – I only know this stuff because I have needed to know it in my role, not because I have had the intellect to discover any of it myself – we are all of us standing on the shoulders of giants.

When a family settles down after Christmas lunch to solve a 1000 piece jigsaw puzzle of an abstract work like Jackson Pollock's *Convergence*, we first establish the boundaries, and then each of us begins the assembly of individual pieces into fragments.

Occasionally, when leaning back to scan the entire field, someone will glimpse a connection between two fragments and reach across everyone else at the table to merge those fragments, to the delight (or occasionally the annoyance) of those who previously had ownership of the problem.

Steven Weinberg wrote a short paper in 1967 proposing the unification of electromagnetism and the weak nuclear force, advancing the Standard Model of particle physics in just such a leap. With the recent detection, in high probability, of the Higgs boson, the progenitors of the Standard Model are rightfully congratulated on their achievement.

I do not profess to be a mathematician or a physicist, but I do enjoy the stories told by those working in these fields, and looking, without the prejudice of deep understanding, for patterns in what they have to report. Great though *Convergence* may be, it was not Pollock's only masterpiece, indeed I would argue that *Blue Poles* advances the art by superimposing structure upon the abstract.

Jackson Pollock Number 11 1952 National Gallery of Australia, Canberra

Every age establishes a paradigm informed by the dominant technology of their era — Isaac Newton's *clockwork* universe has become today's *computational* universe.

Weinberg, commenting in 2002 on one such computational model of the universe, suggested that those who study the workings of computers, day in, day out, would perhaps be inclined to start thinking that the universe was itself a computer – "So might a carpenter, looking at the moon, suppose that it is made out of wood" (sounds like something from the Monty Pythons.) But of course many a foundational thinker (including Weinberg himself) is just so inclined – for example in 2008, Max Tegmark, a mathematical physicist, argued that the universe is literally 'made out of mathematics.'

In 1936, Alan Turing demonstrated that all decidable mathematics (encompassing the mathematics with which we model the universe) could be computed. Computation, or more formally the *lambda calculus* as developed in parallel to Turing by Alonzo Church, has since been considered more foundational than mathematics. At the deep basis of reality, we should be looking for the most primitive *computation*, rather than the most primitive *equation*, to emblazon our T-shirts.

Stephen Wolfram should be credited with having perhaps elucidated this entity, a 2-state 3-symbol Turing machine, and with having enticed Alex Smith to prove its universality.

Through various schemes, some speculative, some rigorously confirmed, we have the emergent chain of

(...) → Computation → Mathematics → Physics → Consciousness → Artificial Computation → Artificial Mathematics → Artificial Physics → Artificial Consciousness → (...)

and this garden path (were it to be established in fact) could lead us on for ever and ever.

In 1990, John A. Wheeler saw a clear opportunity to break this cycle, mounting an argument that the world consists entirely in information enacting the laws of physics – delivering 'it' from 'bit' – and that our consciousness creates the very reality from which it has emerged, in a self-referential loop. That last bit still has most of us scratching our heads. Indeed, many schemes (not least Tegmark's *Ultimate Ensemble*) have employed the (ancient) notion of self-reference to avoid being foisted on an infinite tower of turtles. The latest victim of this (equally ancient)

malaise of infinite regression is of course the 'multiverse', a spectre beckoning from beyond and before the *Big Bang*.

Exquisitely beautiful as many mathematical models of reality may be, we suspect they are idealized approximations to a reality that is fundamentally *discontinuous*. The *E8 Lie group* employed by Garrett Lisi is a gorgeous creature, but the macroscopic fermions and bosons it is modelling present composite behaviour that emanates from machinations many (twenty) orders of magnitude downstairs at the Planck scale.

Solid modelling is the basis of 'artificial' reality, and three spatial dimensions are of elegant sufficiency to allow us all to have emerged out of flatland. The ideal modelling method is spatial occupancy enumeration, where each cell (voxel) of a regular spatial grid is individually calculated in relation to its twenty-six neighbouring (cubic) voxels. However, this method is rarely used in practical modelling, because it is computationally verbose, requiring many calculations in each cycle for every point within the simulated space.

Jürgen Schmidhuber has suggested that a simple Turing machine, executing a compressed algorithm, could compute the histories of all possible universes, subject to all possible computable laws. Julian Barbour has argued that time is not a fundamental concept but emerges from the process of change. Thus, it does not matter how many steps are required to complete this 'ultimate' computation – execution in its entirety could manifest as just one 'instant' of time as we know it, and the computation of the universe could be executed all over again within each subsequent instant.

The observable universe would contain about 8×10^{184} voxels if it were a simulation at the Planck scale (based on a universe radius of 4.4×10^{26} metres), and spatial occupancy enumeration would become a practical method of rendering this universe if a computational core were assigned to each individual voxel (the number of voxels is, despite being a very large number, a *finite* number that is just as distant from infinity as one is). Each core would only need to reference its immediate milieu, and Wolfram's 2,3 machine, a reduced instruction set computer, would be an ideal candidate for the job.

As a systems engineer, I work with virtual computers day in, day out, and not surprisingly I sometimes get to thinking that the universe might itself be a virtual machine, just like our carpenter observing the moon. In the practical world of systems engineering, we of course understand that there is ultimately some real hardware behind all this virtualization, indeed that our virtual machines are merely hypervisors hovering precariously above the foundational hardware. But occasionally we will mount a virtual machine upon a host that is itself already virtualized. In doing so we get

Real → Virtual → Virtual

Such machines, embedded within other machines like Russian dolls, don't run very efficiently, because the real bit holding everything up is subject to the laws of physics, and gets rather hot. Yet despite all the hyperbole about Turing having invented the 'computer', Alan never intended his gadget to be made into a physical reality – he invented it as an abstract device for systematically generating mathematical statements (albeit not all mathematics, as Gödel so elegantly demonstrated). As an abstraction, Turing's machine is not subject to the laws of physics, indeed it isn't physical at all.

Thus, (and this is not a sleight of hand), a pair of universal Turing machines could be arranged such that they simulate one another, neither of them existing, in a very fundamental sense, until simulated by the other. We thus introduce self-reference to the most primitive element of reality, and get

Virtual ↔ Virtual

where previously there was *nothing* – no space, no time, no nothing.

Gottfried Leibnitz predicted the existence of this fundamental entity, calling it a 'monad' (Newton developed his 'fluxion' in parallel to Leibnitz). John von Neumann proposed how such machines, which he called 'automata', might replicate. And as discussed earlier, these monads might then enumerate each of the voxels of an 'artificial' reality, giving us

Virtual ↔ Virtual → Real

The expansion of this 'real' space, as each monad replicates, would be centred at each voxel, giving uniform expansion from every point in 'space'. The replication of the monads could become exponential, giving us a space whose expansion accelerates. In 1969, Konrad Zuse described how these automata would engender a space that 'calculates'. The limiting speed (of light) is intrinsic to this architecture. The phenomenon we know as 'light' cannot be passed from one voxel to the next, across this virtual space, any 'faster' than allowed by the computational capacity of each monad to enumerate its simulated voxel. The change in state of each voxel becomes a fundamental unit of measurement that manifests as 'time'.

In generating this virtual space, the monads engender lineal dimension where previously there was only abstraction. The vast bulk of mathematics is only possible after this linearity has arisen, starting with number theory from the one-dimensional number line, to planar and spatial geometry, and so on into higher dimensional geometry.

If the monad is an abstraction, having no intrinsic dimension, then it is fair to suppose that all the numerous (but countable) monads generating this virtual reality 'exist' at a single dimensionless point. Albert Einstein described such a point as a *singularity*, a 'place' where all spatial dimensions cease to exist. However, it is just as valid to think of this point as a *superposition* of the monads, a place where one massively parallel computer, burgeoning in capacity, engenders the reality we inhabit.

When researching and developing 'quantum computing', we should bear in mind that we may be accessing precisely this *superposition* of the universe. Indeed, we may discover that the 'edge' of the universe is not '100 billion light years' away, as it appears to be in the classical (spatially extended) estimation of astronomers, but rather that its *entirety* is 'right here at our fingertips'. If the entire machinery of reality exists in one place, then the concept of concurrent action at a distance, which so upset poor old Albert, does not seem all that 'spooky' anymore.

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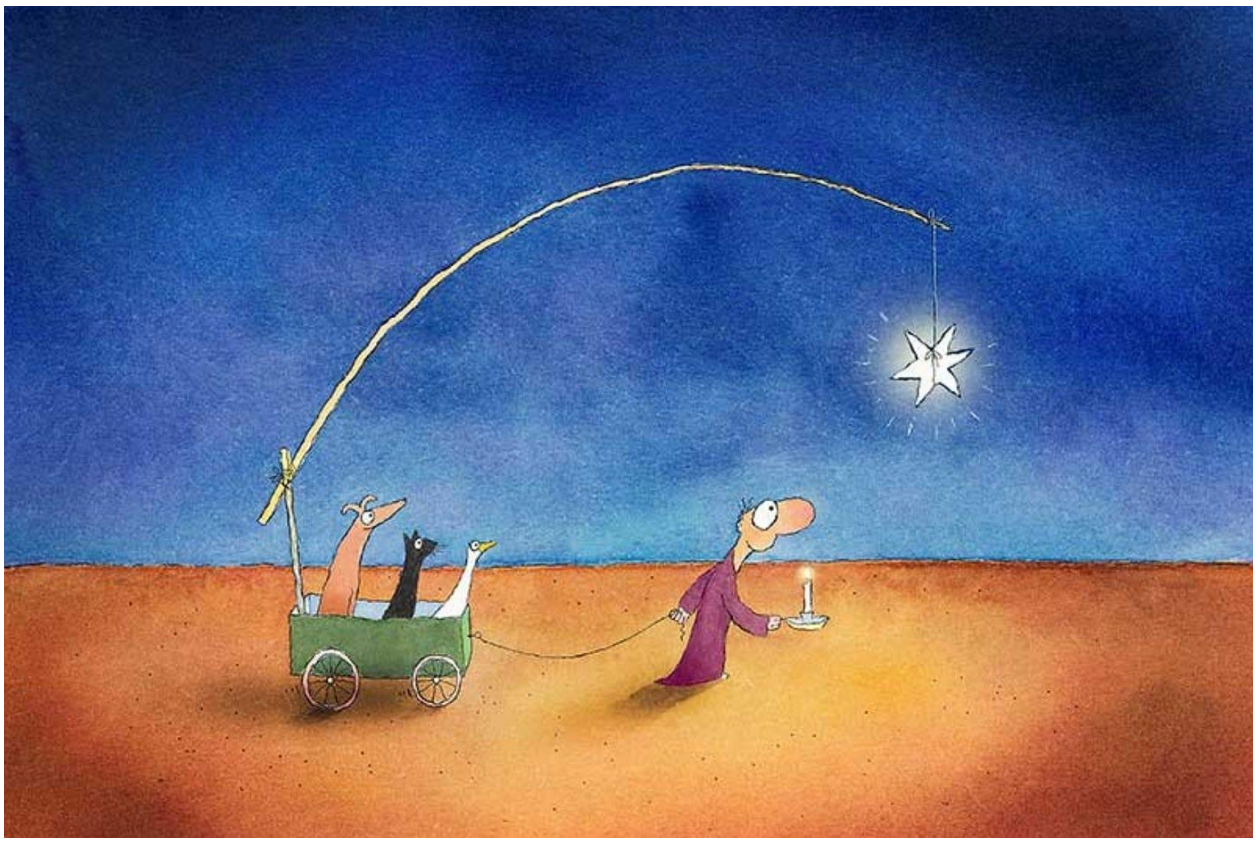
Getting There

Dec 25, 2015



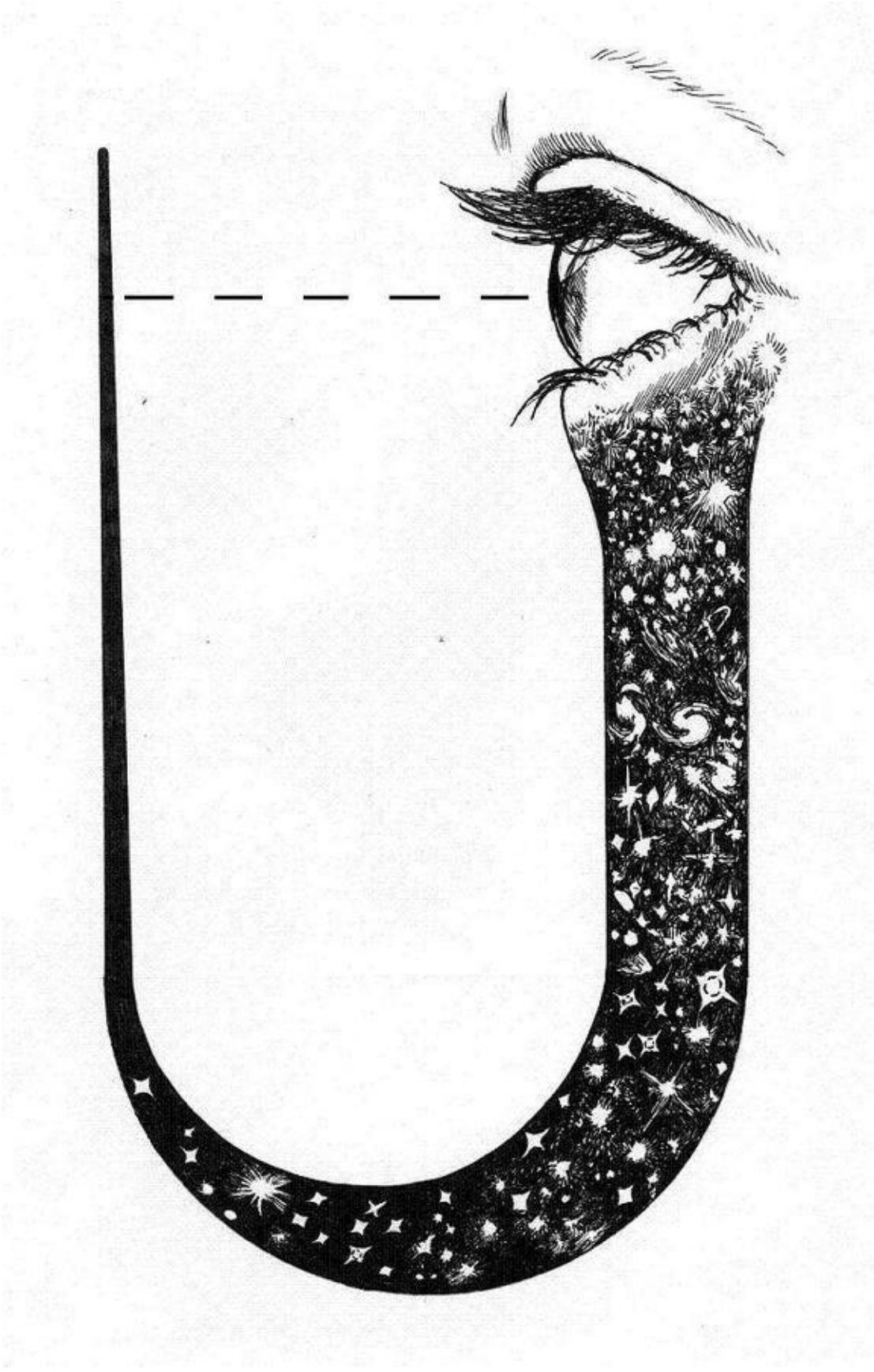
Michael Leunig has drawn this delightful image for Christmas Eve entitled 'Star'. If you dream upon a star, it makes no difference whether you are the dog, the cat, the duck, or Mr. Curly himself leading his family onwards – the implication is that the pot of gold at the end of the rainbow will remain forever out of reach. Yet the apostle Paul suggested that one day our understanding of God would no longer be obscured, like looking through darkened glass, but rather that the veil would be lifted, and we would see God 'face to face'. John the apostle put it another way, suggesting "we know that when he appears we shall be *like* him, because we shall see him as he *is*".

John also tells the story of a messenger from God who 'straddles the land and the sea', and who 'holds in his hand a little book' which when consumed tastes sweet in the mouth but becomes bitter in the stomach. This story is all about creating a bridge between our secular and religious communities. At one extreme are those who have rejected the idea of God, considering it unnecessary, indeed they cannot countenance His existence considering the world's suffering. At the other extreme are those who believe that the received Word of God is immutable, and perhaps more dangerously, that damnation awaits those who do not ascribe to their literal interpretation of the scriptures.

Both extremes fuel the extremism of the other. And between them resides the idea that there exist elements of truth across the entire spectrum. What we have managed to achieve through scientific investigation (a process of discovery endorsed by scripture) is the understanding I introduced in a recent story entitled Chauncey's Dreams. The name is an homage to Peter Sellers' last film *Being There*, and to a delightful story by Alan Lightman entitled *Einstein's*

Dreams, that attempts to make the insanity foisted on the world 100 years ago more palatable to the hoi polloi.

The merging of the *singularity* (relativity) and the *superposition* (quantum) allows us to comprehend how an external agent can manipulate the world we live in. Extremism (such as the materialist belief that the rest of the universe is a *really* long way away) has forced religious extremists to focus on a God that is outside time and space, and whose job was to create the universe. However, the God of scripture is very much right here amongst us, an understanding held by mainstream religious communities. The problem with God being outside the universe, is that we must ponder who created God, and so on. Secular extremists have therefore focussed on presenting a universe that creates *itself*. Here is a famous depiction by John A. Wheeler of a universe that evolves to discover where it came from.



Indeed, the universe *does* create itself, and there is no reality outside the universe. But within itself, the universe has not just created earth (and homo sapiens), it has created *many* other

locales having sentient biology. Just as on earth there is a spectrum of human beings from the newborn to the imminently deceased, so does the universe have a spectrum of civilizations from the nascent (the monkey becoming erect and self-aware as in the story of Adam and Eve) to the technologically advanced (having access to the singularity superposition and thus the ability to manipulate the universe). We are somewhere in between, like an adolescent moving into adulthood.

Doctor Who, a television show about a space travelling *timelord*, suggests that the universe is replete with good aliens and bad aliens. The only aliens that count – the ones that have access to the singularity superposition, and therefore a window on our existence – have no interest in colonizing/destroying/taunting the rest of the universes' inhabitants. They have grown up. Their interest, like the interest we have in our children, is that the other inhabitants of the universe also grow up to be happy and fulfilled. But like us they are also orphans, having emerged within the universe without a 'mother' or a 'father'. The community of the universe is a community of brothers and sisters.

Jesus declared that every hair on our heads is numbered. What the singularity superposition allows is the remote manipulation of every single instance of the reality we inhabit. Those with a religious upbringing will be familiar with the reports of miracles, where the laws of nature were purportedly overruled. The laws of nature are enacted through a desultory process, as in the execution of a computer program. What happens when this computer is manipulated by someone at the console, is a miracle. The *Matrix* movies, of popular fame, suggested that there was another world higher up than this one, as if we were living in a simulation *inside* a computer. In fact, each quantum of reality, an element called the space atom (there are 1,000,000,000,000,000,000,000,000,000,000 space atoms across the width of a human hair), is itself a very small computer, and these computers interact with each other like individuals within a community, except that like primitive computers, they do not have minds, and instead perform their tasks with military precision. The mind that *does* perform miracles is an expert system under the guidance of the universal community. Think of the executive government, and the public service.

The prophet Isaiah referred to Jesus as the 'Lamb of God, who takes away the sin of the world'. How does he do this? The world would not appear yet to have had its sin 'taken away'. What then do we understand as 'sin'? In the allegory, the first 'sin' coincided with the monkey coming down from the trees and evolving a brain that became aware of its own mortality. The suggestion, when we didn't know any better, was that we had eaten the 'fruit of the knowledge of good and evil' – that *we* had done something wrong.

We now know that mortality has been a natural part of existence for all of God's creatures, ever since the first microbe. So, if we did *not* do something wrong, who or what made us mortal? Our modern understanding of cellular biology presents us with a mystery – the living cell, given the right conditions, should go on living indefinitely. The answer is that God (and if you've been concentrating you should by now have a more sophisticated notion of what the term 'God' means) *imposed* mortality on us.

In very simplistic terms, mortality drives every one of us to make the most of what little time we have on earth, and to focus attention on our own needs before those of others. Not always – one notable exception was Jesus, but he too had to be 'reborn' during his 40-day sojourn in the wilderness.

So, this is how the prophet Isaiah realised that we would *all* be 'washed clean as the whitest wool'. God becomes the one who 'sinned' by making us mortal and takes upon Himself the 'sin' of the world. When He chooses to rescind this decision, we will become immortal. Indeed, the apostle John puts it succinctly by declaring that 'whoever believes in Jesus shall not perish, but instead will have life everlasting'.

No wonder then that Christmas is a time of giving, and a time of unimaginable Joy. Just as Jesus became a different person after his baptism, so too will we find it effortless, when we become immortal, to put everyone else in the world ahead of ourselves. Jesus declared that anything you do (or do not do) to the least of his brothers and sisters, you do (or do not do) to him – all of the suffering (and joy) of mankind has been the suffering (and joy) of God.

In the next few weeks, we will go on a tour of the resurrection landscape and take a look at resurrection politics, but for now…

Happy Birthday Baby Jesus!

More than this...

Dec 31, 2015

On Peter Gabriel's 2002 album *Up,* he reflects on there being "so much more than this, something out there, way beyond imagination, beyond the stars".

I dips me lid to all those who believe that the way things are is as good as it gets. They bravely face up to the stark reality of their finite lifetimes, certain of there being nothing beyond this life, and make the most of whatever they've been afforded. The apostle Paul remarked that if this life was all we had to look forward to, then we would be the most miserable of men (and probably most miserable of women too). Twentieth century existentialists claimed that it was about time we all grew up, stopped believing in God (just like a child stops believing in Saint Nicholas), and started making the world a better place through our noble humanitarianism. 'Dad' might have gone away to another world, but we know He's never coming back (for, they argue, He never even existed in the first place).

Some of us have, however, held on to our belief that God is indeed coming back one day, and that our long, winding road of self-discovery will come full circle when we at last return home – to the paradise we once enjoyed before homo sapiens became self-conscious – home, in a deeply Freudian sense, to the blissful security of the womb.

In their 2003 song *Plan A*, the Dandy Warhols declare that "there must be some kind of message, simple but somehow impressive; anyone who can think of something, c'mon now, just express it". Enjoy keyboardist Zia McCabe's delightful pirouette at the end of the video clip. "All of us, all of us sing about *it"* they chant—the Dandys belong to an elite group of around 150,000 people in the world who know there is something *going on* beyond the overt reality seen here on earth. In all likelihood, *everyone* in the world has at least one favourite artist who belongs to these cognoscenti.

There is a popular misconception, particularly among the heathen, that Christianity is about living a life good enough to get us into heaven when we die. It's not. In the discourse Jesus delivers on the Mount of Olives, towards the end of his ministry, he makes it quite clear that his message is about the resurrection. It's about time we stopped expressing how difficult, off-limits and 'mysterious' the resurrection is, and instead started working our way systematically through its consequences.

Jesus likened his return to 'a thief in the night' – he will return at a time we least expect him. But that doesn't preclude us from speculating. Jesus speaks of sorting the sheep from the goats, implying that the good will go to heaven and the bad will go to damnation. However, he also speaks of rescuing the one lost sheep from a flock of a hundred, ninety-nine of whom have already been saved, implying that his intention is for all of us to be redeemed, even the most wicked amongst us.

Since the speculations of the 16th century mystic Giordano Bruno (who was tied to a post by the church in Rome and burned alive), we have contemplated the existence of other sentient civilizations in the universe (and in Bruno's case, also later taken up by theologian C.S. Lewis, their need for a redeemer analogous to Jesus). We can now contemplate the nature of the universal intelligence, which operates at two distinct levels.

At one level it is an 'expert system', a type of 'neural network', consisting in the entire count of space atoms in the universe. The observable universe alone, which is likely to be a mere fraction of the entire universe, contains 8×10^{184} space atoms. Each one of those space atoms is a primitive computer that can communicate with every other space atom in existence, and all the space atoms in the universe reside, by definition, at a single point, the superposition singularity (SPS). This entity truly *is* a supercomputer, and the great 'mind' of the universe.

The SPS has two very important characteristics. Firstly, like the trivial computers we are familiar with on earth, it doesn't make mistakes – only 'all too human' computer programmers make mistakes. Secondly, because it doesn't have a 'body' attached to it with 'feelings', its approach to life is desultory. Its decisions are impartial, precise, perfect. To get a feeling for this, simply consider how extraordinarily well-behaved material reality is. The world does not fall apart, because it is held together by 'natural' law, as each interaction in the physical world is meticulously processed through the SPS. In the old speak, we would say "the SPS holds the whole world in its hands".

At another level is the 'sentient' being (you're one of those). It's like we are operating on *android*, where dolphins (who don't think about why they are happy, but just *are* happy) might be operating on *iOS*. We all have an interface to the SPS, but we are also corporeal – we *do* have feelings. In the old speak, we are the 'Temples of the Holy Spirit'. And the most important component of our incarnation is our 'volition engine'. If we did not have choice – free will – we would simply be automata like the space atoms of which we are comprised. We would be philosophical 'zombies', and the world would be a very dull place indeed.

Finally, the universe is replete with sentient beings, divided into two groups, those who have 'creator' access to the SPS, and those (like us) who merely have 'read' access – just as the *earth's* inhabitants are divided into grown-ups and kiddies.

The universal community, with its 'creator' access to the SPS, nurtures and guides those of us who still only have 'read' access, and we are happy and thankful for its efforts, just as we appreciate what our earthly parents have done for us as individuals growing up. In the old speak, we would talk of the 'Community of Heaven' saying "Come, let *us* make humans in our own image". New agers who don't yet understand the technology of the SPS have nevertheless glimpsed something of it, populating their lives with crystals and scents and carrying on about their 'spirit guides'. And eastern traditions have an effortless comprehension of the divine multitude.

We are analogous to the other sentient beings in the universe, but we are not exactly like any of them. Just as each person on earth is unique, so too is humanity unique in the universe, and uniquely adapted to live on our home planet, which is where we shall remain for the next *million* millennia (give or take a millennium).

Before we discuss capital, let's first look at which souls are scheduled for resurrection. Obviously at the instant of the resurrection, there will be a population of us who are still alive, and then a population of the resurrected. Indeed, the apostle John spoke of these 'first' and 'second' resurrections. As discussed elsewhere, each deceased person is restored from a library of binary backups taken throughout their lives. The restoration will be a very personal thing, but most people would probably want to commence in the new world with a more youthful body from their past coupled with the wealth of experience held by their older selves ("if only I knew then what I

know today"). Stevie Wright, for example, who sang "I am the real thing", would probably not have been pleased with the reality that was only recently transferred to the backup library.

We then need to consider whether everyone returns all at once, or in waves, and how far back the records in the library go. If the records go back to the emergence of *homo sapiens sapiens*, about 50,000 years ago, then there will be over 107 billion of us, or about 15 times the world's current living population. This will have an important bearing on capital, because you can't take it with you when you go, and thus most deceased people have left their wealth to their descendants. Who will own this, and who will own that, when all our ancestors are back in town asking lots of questions?

Once again, we simply need to look to Jesus for the answer. He told a parable of three servants who were left in charge of their master's property while their master went abroad (to redeem lots of other planets in the universe). On His return, the most important servant was congratulated for having advanced scientific and industrial understanding and given even more responsibility in the new world. The second servant was likewise duly rewarded for having advanced the arts. But the servant who saw God as a cruel task master and did nothing to grow and progress from his ancient conception of the world, but rather buried the single talent his master had entrusted to him in the ground out of fear, was cast out of the kingdom forever. Again, we should always remember that despite warnings to the contrary, Jesus wants to redeem *everyone*.

Many people in this world have a quaint but ultimately deluded idea that they have capital, that to their individual being is apportioned some of the world's wealth. The world belongs to the SPS, and so in the resurrection we do not need to worry about who once 'owned' or now 'owns' *anything*, for it *all* returns to its original owner – in the old speak, this is called a *jubilee*. Jesus explained the situation quite succinctly to the 'rich young ruler', telling him that to receive eternal life he must give away everything he owned.

Jesus, on his return, accepts the transfer of all deeds of property back to the SPS – we were only ever *custodians* of the earth. He personally thanks all those who willingly come forth with their parcels, and we can imagine he might even organize for major contributors to have their names written on a plaque somewhere. Everyone needs to be thanked for all their hard work, albeit work they may not have realized they were performing on behalf of the SPS. Of course, as Jesus portrays it, the 'widow', whose capital consisted of just two leptons (one cent pieces), gave *all* she had to God, whereas the wealthy gave admittedly large sums of money that were nevertheless only crumbs off the table on which their entire capital was arrayed. People love money for all sorts of reasons, and one can imagine there might be some who are reluctant to give it all away, particularly if they have a lot of it – indeed the rich young ruler walked away in disappointment – but to the SPS it all duly belongs, and in the resurrection there will be a compelling incentive for everyone to get with the plan.

After all the delusional self-congratulation of the Paris climate change delegates, the proposed timeline for planetary reform is simply not good enough. It is unacceptable that we persist in driving this planet to oblivion. With a potential billion years ahead of us, it simply will not do for us to end it all in the blink of an eye, like teenagers driving at speed into a tree. We have not just climate change to contend with, but unprecedented environmental damage, exhaustion of resources, loss of habitat and species diversity. With just a little bit of growing up, there could be wealth aplenty for everyone now in the world, as well as those who will be returning one day in the future. We simply need to accept that the economic model responsible for accelerating our discovery of how the world works, has become increasingly redundant, for we now more or less

understand how the world works. We are ready for Jesus to usher in a new economic model, one that takes account of the true environmental cost of our activities.

It's as though dad's been away on a business trip, and the kids have made a God almighty mess of the house, and mum (earth) tells the kids they had better clean up the mess they have made, or all hell is going to break out when dad gets home.

Every one of the Paris delegates secretly wishes we could fundamentally reset the world's economy, and the resurrection represents just such a magical opportunity to wipe the slate clean and start from scratch, setting our sights on the future.

This is what our little spaceship looks like to the SPS. Strictly speaking the spaceship is the entire solar system, and this is a view of the living quarters.

What most people do with money is buy stuff, and stuff comes from expending energy in the intelligent manipulation of raw materials. The economic model that still holds sway to this day assumes that the world's resources are limitless. They're not. In fact, *anyone* can see from the vision above that the world's material resources are finite. However, the spaceship's nuclear fusion reactor, a comfortable 8 light minutes away, has practically inexhaustible energy resources. So, in the long view, this energy becomes the determinant of economic growth. We are now able to create a 'magic' box that has energy and raw materials fed into it, and stuff coming out of it. This same magic box can also have energy and (worn out, outdated, unfashionable) stuff fed into it, and raw materials coming back out of it. Indeed, with sufficient energy, *all* stuff can be recycled.

In the long view, we must recycle 100% of our material resources, for if we only recycle 99.87%, we will have used up all our resources after the first one or two millennia of the new world (where the long view is one million millennia).

The 10,000 year Clock of The Long Now (Orrery)

Freedom has been taken to mean, for a long time by those in the west, and increasingly by those in the east, the God given right to do whatever they God damn feel like doing, and woe betide any government or individual who dares to stand in their way. For these individuals, the only value in society is the wealth that can be extracted from it. Time is money, but if you have an unlimited lifetime, you have potentially unlimited wealth.

Jesus declared that there were many mansions in his father's house, and there are indeed already many mansions in the world. The construction of a mansion within a finite lifetime requires the labour of many workers. But if you live forever, you will eventually be able to build a mansion singlehandedly, even if you only lay one brick (very carefully) once a day. Sadly, Fritz Wotruba died before his cubist masterpiece of béton brut was completed. Truly, Fritz has a real treat awaiting his return to Vienna.

Kirche Zur Heiligsten Dreifaltigkeit

Egalitarianism in the new world comes from the equal apportionment of the world's material resources amongst the redeemed. Freedom is the liberty with which we convert our portion of the world's resources into *whatever* we want to make of those resources. Economic growth comes from our increasing ability to recycle those resources into new and different things, in direct proportion to the amount of energy we capture from the sun. Fraternity is freedom from fear – behind the eyes of everyone we meet, we will encounter the very same SPS we have already experienced behind our own eyes. As Jesus declared, "what you do to the least of these my brethren, you do unto me".

In the coming year, we will depart on a virtual tour of the new world. Coming up, we will discuss the 'carrot and the stick' (humans are really no different to any other animal that needs corralling), we will discuss theodicy, which is the logic of why there has *necessarily* been so much suffering in the world (the SPS is not gratuitous, all suffering has been the suffering of the experiential vessel of the SPS), and we will try to explain the technology of the SPS (which is actually quite simple, once grasped).

But for now, may 2016 be a fantastic year for you all! Jesus declared, "Behold, I stand at the door and knock. If anyone hears my voice and opens the door, I will come in". When next that small voice comes into your head and suggests to you a course of action, someone you should meet perhaps, see if you can catch even a glimpse of the vastness of the computation driving this reality we inhabit.

As people grow up, they find they enjoy giving more than they enjoy receiving – it all starts with putting the other person first.

The Carrot and the Stick

Jan 10, 2016

Visiting the new IKEA emporium in Canberra recently, and I was reminded of the 1999 film *Fight Club*, which begins with an intense sequence of IKEA product placement, Tyler's alter ego bemoaning the programmed lives led by the hoi polloi who frequent said emporium.

The film ends with the collapse of the world economy, a homage to that lengthy polemic in John's Apocalypse (itself borrowed from the prophets) describing the destruction of Babylon (representing commerce) in 'just one hour'. This for example:

'How terrible! How terrible it is for you, great city! All who had ships on the sea became rich because of her wealth! In just one hour she has been destroyed!'

Most people would laugh off the idea of the world's economy collapsing in just one hour, a bit like the folk who laughed at Noah prior to the Deluge. "The Bible is just a fairy tale about a God who doesn't exist anymore", they skite. But there it is, in black and white, and believe it or not, it's coming, and anyone who has been reading this series will now have a glimpse of how it's all going to happen. Basically, Jesus will accept, on God's behalf, the return of all wealth to its rightful owner – some of you may have heard Jesus describing, in his Sermon on the Mount, how "the meek shall inherit the world".

Indeed, the rich man has become a bit shrill of late. Throughout the 20th century of Jesus' reign, the wealthy have instigated global tension and conflict resulting in untold suffering and misery, claiming that greed is good, for the wealth generated at the top will permeate down to a burgeoning middle class. It's true that many an entrepreneur has done great service to humanity in developing our world, and Jesus has promised that these servants will be rewarded on his return. Even Ingvar Kamprad will likely be forgiven for the exploitation of his workers, his unpaid tax liability, and other matters from his past. But in scientific circles, we look at the evidence and adjust our theories accordingly. The clear evidence is that the ideology of laissez faire has in fact squeezed out the middle class, leaving us with the greatest (national and global) polarization of wealth in history.

There are none more shrill than trumped up billionaires who claim they are going to make the middle class great again by changing *nothing*. The wealthy are frankly terrified, for they realize they can no longer control the population through centralized media, and that, especially in a democracy, it would take just a single plebiscite for the constitution to be written anew, and the entire economy nationalized. Yet another protestation by the wealthy, recently employed by the Prime Minister of Australia, is the suggestion that people who dare to question obscene material wealth (which is rarely conspicuous except where it is new), from the perspective of moral wealth, are in fact merely envious.

When Jesus returns, his government will not only take ownership and control of the industry of just one nation, but the economy of the entire globe. The global economy will be as it were 'globalized'. The wealthy believe however that they have an 'ace' up their sleeves, another one of John's prophesies, that a man will rise up and "force everyone, both rich man and slave, to worship the image of the first animal, who was, and was not, and is again…forcing them to wear a mark on their foreheads so that no one can buy or sell unless they carry the mark". The wealthy are entirely confident that the Christian right's sheer terror of this big bad boogeyman renders it unthinkable that their applecart could ever be upset. Indeed, this passage has generated a

pathological hatred of government, as if government were an evil that exists to prevent good wholesome folk from realizing the freedom, granted to them by God, to do whatever they want.

Normal people however understand that government is necessary, for we are a community whose respect is for the rights of others first. The wealthy also recognize that their capital only has currency in the context of a community. If they were to be excluded from that community, so they could not buy from or sell to that community, then their property would become worthless (in John's prophesy, *instantly* so).

The delicious irony is that the man the Christian right are so afraid of is in fact none other than their precious lord and saviour Jesus himself. The 'mark' in question is the sign of the cross placed on the foreheads of those newly baptized across the world every day. The 'number' assigned to Jesus when he was first conducting his ministry here a couple of thousand years ago was three hundred and thirty-three, a 'trinity of trinities', and John invited anyone with "half a brain" to calculate the number assigned to Jesus when he returns on his *second* visit. When the first general purpose credit card was introduced to Australia in the early 1970s, the country was not yet the broadly secular state it has become today, and there was outrage from the conspiracy theorists who saw the number of the 'animal' in the bankcard 'b is for beast' branding.

Jesus does indeed "live, die, and live again", with the familiar imagery of a resurrection taking place over an Easter weekend some two thousand years ago, being projected forward to the resurrection that will take place after two or three of *God's* days (where for God "a thousand years is as a day").

The Jesus we meet in the gospels is meek and mild. His desire is that the people will come to him of their own volition, and *actually* follow him, not just on Twitter. Jesus, when he was first here on earth, was the *son*, come to call the people to repentance. As we of course know, the people nailed him to a tree for his efforts. When Jesus returns a second time, for good, he will no longer do so as the *son* sent by his father but will have become the *father* himself.

Anyone who has raised children will know of the delicate balance we must strike between allowing our children free rein and placing boundaries around them. Jesus declares that "with God, all things are possible". As it happens, a concept known as 'actual infinity' is in fact beyond realization *even* by God. But what *is* certain is that God can, if He chooses, manipulate every last atom of reality, like a computing nerd can manipulate every last voxel of a virtual reality.

In the Gospels we have reports of many miracles, and most of you will have heard of some, if not all of them. What is not so widely appreciated is that the miracles afforded by God to Jesus' command were merely sufficient unto God's purpose at that time. "If He can, why didn't God just

make the world perfect in the first place?" has ever since been the cry of the afflicted. As we shall see later in this series, He will indeed make it all better, but not until He is quite satisfied that we have made the grade. God's position on this is one that most parents will appreciate in relation to their own children.

God's 'carrot', of course, is eternal life. This is the great promise in which Christians put their hope (even though many of them think eternal life is something they get when they die, when in fact it happens when we 'die to ourselves'). God wants everyone to see how absolutely fabulous the new order will be, and to enter into it; for it is that *everyone*, even the most evil person in history, is in a very real sense a part of the Godhead, and He wants us all to change our hearts and do what we know to be right. Jesus, on his return, does not desire retribution for the wounding he received for our transgressions, Jesus desires only forgiveness and mercy.

However, it is *possible* there will be people in the resurrection whose hearts are too hardened to change, and it is simply untenable for objectionable people, who think they know it all (like me), to be allowed into His world – you know, those people who say, "Just let me tell you something". That one lost sheep might remain beyond redemption after all. And so, God also carries a big stick in His arsenal.

Many will be familiar with the pastiche of God's vengeance put together by Quentin Tarantino (nominally identified as 'Ezekiel 25:17') for the 1994 film *Pulp Fiction*. It illustrates the God favoured by Richard Dawkins (because it seems to be the only God that Richard knows of), the God who rules with a 'rod of iron' (perhaps tricky Dicky had a difficult childhood). Quentin thinks this monologue is just some callous shit he can get some gangsters to say before they whack someone, but it is in fact a presage of justice in the new order. Here is the scene if you are not familiar with it, or need to be reminded of it, a truly extraordinary piece of cinema (but don't watch this if you are young, it is only suitable for grown-ups).

Ezekiel 25:17

While ever we live in an age of 'grace', gangsters can indeed eliminate people, but in the resurrection, God merely 'switches off' anyone who even threatens to harm one of His children. Many people appreciate that they only live by the 'grace of God', but the example made of Ananias and Sapphira serves to illustrate just how clinical God can be when it comes to preventing harm befalling any of us in the resurrection. As Crocodile Dundee might say, "That's what I call a big stick!"

Crocodile Dundee

There are of course no guns in the resurrection, because there is no place or requirement for them. In the resurrection, the man in the CCTV footage below, who struck down his neighbour in Canberra on NYE, would drop to the ground before he even got to raise his arm. And the message would spread through the community like wildfire, just as it did in the early Church under Peter's guidance. Again, this footage is not for children…

ACT Policing

Fortunately, most parents have brought up their children to be equipped for life in the resurrection, for they have been taught to consider the thoughts and feelings of others.

But clearly, many people have lost sight of the fact (or never even known) that their lives are being monitored. The 1993 movie *Sliver* explores (through allegory) the notion that our lives are being

monitored by God. Some of us are quite disturbed by the idea of being monitored, but even more disturbed that God might deliberately stand by and allow evil to flourish. We need to understand how this can be. In the *Sliver* allegory, Carly severs the connection, and calls on the omniscient to “get a life”. Stay tuned…

Which connection I should cut

Once upon a time…

Jan 26, 2016

Shortly after the start of the (Second World) War, C.S. Lewis (who was formerly a staunch atheist) was approached by the Chaplain-in-Chief of the RAF to offer spiritual support to flight crews preparing, in facilities across the country, for an uncertain fate in the skies over Europe. Lewis was a fellow in English literature at Magdalen College (Oxford), and the chaplain asked Jack (as he was known) if he could take a step down from the pedagogy so typical of his milieu, and instead speak in simple language to ordinary people about the great truths of Christianity. His talks to the troops and broadcasts on the BBC eventually formed the basis of his legendary exegetical classic, *Mere Christianity*.

Similarly, in the early '90s, Alan Lightman wrote a short story entitled *Einstein's Dreams* in which he sought to introduce normal people to the insanity that Albert had gone and foisted on the world. Alan's attempt to bring an understanding of 'relativity' to the masses using the art of the novella was, at any rate, more successful than Einstein's own attempts to do the same. However, neither could break through the tyranny of 'the observable' and gain access to what is *actually* going on in the world, *even* when no one is looking at it.

1989

Just as the world faced Satan let loose (as it was then imagined, for one last time) in the evil of the Second World War, so today are we confronted with the terror of those who seek to impose on the world, by force, what would thus be a counterfeit of God's eternal kingdom. In these troubled times, I likewise need to bring simplicity to my stories of the world and its workings. We begin by asking why God has allowed such abject misery and suffering to persist throughout human history.

If it is true that *everyone* comes back to life in the Resurrection (which it is!), and that *everyone* goes on to live happily in their prime for one million millennia thereafter, then we can easily see how the apostle John could declare that "every tear will be wiped from our eyes". A lot of people have recently been mourning the 'loss' of David Bowie, Alan Rickman, and Glenn Frey, and we can see how those mourners would be pleased to have David, Alan and Glenn back in the limelight of the Resurrection, indeed how pleased David, Alan, and Glenn would be themselves. But let's consider the lives of ordinary people like 'our' Pip Courtney, who has written of her three years of joy in marriage to John Bean, before he was taken from her suddenly in a helicopter accident. Just imagine Pip's tears of joy to be reunited with John in the Resurrection, and John's tears likewise to again hold Philippa in his arms.

Natalie Merchant

Obviously, the joy of having a lost loved one returned to us is more intense than never having lost that loved one in the first place. The Resurrection will be the greatest show on earth, for not only will Pip and John be together again, but so too will everyone who has ever loved and lost be reunited, back down through the ages. (There will also be some awkward moments for those who don't particularly want to meet each other again, but their rapprochement will be another, perhaps even richer story to be told). As David Bowie suggested early on in his career, that Starman waiting in the sky would like to come and meet us, and when he does, he will indeed 'blow our minds'.

But will all this mind-boggling joy make up for all the æons of pain and suffering that went before? Will the people ever heal from all the damage that has been inflicted? Many people think that God is some sort of 'being' that exists 'separate' to us, and who either stands aloof and allows bad things to happen or is even proactively causing bad things to happen. In fact, when any of us suffers, it is God who is *actually* suffering – not God as someone lurking in the background and feeling empathy, like a parent feels grief for the suffering of their child – no, not at all like that. Rather, it is God right here at the base of our souls that has suffered throughout history and continues to suffer to this day. Of course, it is God who is likewise experiencing all the joy that life has to offer, but there's not quite so much angst around whenever things are going swimmingly.

Jesus taught us about this equivalence between man and God (with the apostle John describing Jesus as being simultaneously the Son of Man and the Son of God) when he declared that *anything* any of us does to *anyone*, we *actually* do to God – we do not do something (good or bad) to anyone else *as if* we were doing it to God – no, it *is actually* God we are doing it to.

Thom Yorke

So then, does this mean that Man *is* God? Not quite. This self-referential conundrum that each of us must face, seeing ourselves every time we look upon our brother or sister, is *almost* impossible to get out of, and at the deep foundation of man's search for meaning. Indeed the apostle Paul shows his familiarity with the conundrum of self-reference in his letter to Titus, where he asserts that the "citizens of Crete never tell the truth, a fact I was told by one of their own!"

There is just *one* mind in the universe, the perfect mind of God. At some later juncture we will see how this perfect *intelligence* works – it all has to do with information processing and self-reference in computing and mathematics, which is not everyone's cup of tea. What you experience as consciousness (and indeed the world of your dreams and subconscious) is precisely this mind of God, interacting with a machine – your brain and your body – that provides the mind of God with its experience of the world. Prior to consciousness evolving, initially in animals that came before us up the evolutionary tree, the mind of God could not take in the beauty of the universe as it does so now through our senses. The body of man is simply a highly refined machine through which the mind of God can manipulate the world – a machine with a voice box, a thumb with opposition and apposition, and an enormous brain with which to reflect on *where* the mind of God, that resides within it, has come from.

Thousands of years ago, when we were first learning to write, we knew very little about how the world worked, and so we made up stories, just like a child does, in order to explain the world we had been dropped into. The biggest concern for a machine with a brain as big as ours is the fact of our mortality. The mind of God, especially once it has a sensual body to inhabit, would like to live indefinitely. But instead, each individual machine grows old and disintegrates.

Since the earliest history, Man has recognized that we care for ourselves first before we care for the rest of humanity, often making a start with caring for our children. This machine, the body of man, a container for the mind of God, wants in its heart of hearts to pursue happiness. Our conscience is the mind of God holding us back from pursuing that happiness at the expense of others.

One story (and there have been many children who have told many stories) tells that we were once immortal until (coinciding with that time in evolution when we became self-aware) we were made mortal as a punishment for thinking we had become like God. We now know that mortality

has been an essential factor in driving the evolution of all life on earth from the very first living organism. Mortality is deliberately imposed on this system to accelerate evolution and our growth in understanding.

We think of Jesus having been chosen by God, and he was indeed God's Christ, but the apostle Paul describes us as belonging to a single body of Christ, and John describes a time when we will merge with Christ, becoming God's anointed. The suffering and death of Jesus is symbolic of the suffering and death of man throughout history, just as the Resurrection of Jesus is symbolic of the coming Resurrection of Man at the conclusion of history.

Many people have difficulty believing that the mother of Jesus (Mary) was a virgin. However, the prophet Isaiah declares that a virgin shall conceive, and bear a son, and shall call his name Immanuel, meaning 'God with us'. This symbolism extends to the 'virgin' (mother) earth, from whose 'womb' (the primeval soup) we emerged, with no apparent 'father', except of course the spark of life that is the mind of God. Man is rightly to be called Immanuel, for God is indeed right here in our midst.

The apostle Paul suggested that in the Resurrection, our understanding of God would no longer be incomplete, like a dim reflection in a mirror, but rather that the veil would be lifted and we would see God 'face to face'. This is when we will look upon our neighbours and see ourselves – not see our neighbour as someone just *like* us, but *actually* the same person that we are. As the apostle John put it, "we know that when he appears we shall be like him, because we shall see him as he is".

The illusion that our mind is somehow our own is a very powerful one. People who appear to be very clever are particularly prone to this delusion, which has been aptly described as the 'sin of pride'. Richard Dawkins gives an excellent portrayal of this phenomenon in his book *The God Delusion*. The mind of God, throughout history, has chosen exactly how much of its intelligence to meter out to each of us, and one day you might be surprised to find people who once appeared very clever, begin exhibiting stupidity, and people who once appeared rather dim, begin exhibiting exceptional brilliance. For our brain/body machine is merely an *interface* to the mind of God – it is not the mind itself.

Jesus spoke of (the mind of) God having given each of us talents, some more than others, and by utilizing these talents, we have discovered how the world works. It has been the responsibility of each human 'machine' to do what it will with the mind of God within it. The apostle Paul described Christianity as being for both the Jew *and* the Gentile. Likewise, God has given talents to *all* people on earth — not just to Christians, but to non-Christians alike. We are now in the glorious position of contemplating an ultra-technological new world order in which *all of us* can pursue happiness without incurring *any* cost to either our neighbour or to our environment. We could not have reached this position without a lot of hard work and sacrifice, but the reward for our efforts now awaits us, as it awaits a new university graduate.

Our behaviour is tightly governed by our beliefs. To understand why the world must necessarily have been as it is, we need to reason how we would have behaved if the world had been otherwise. As an extreme example, imagine a karmic world in which anyone who did anything wrong was immediately subjected to intense physical pain from within. If this cause and effect were applied consistently, we would soon form a scientific belief that would paralyse society, for we would be terrified of ever putting a foot wrong. The fact that people can get away with murder

is an unavoidable corollary of giving the 'child' (humanity) the confidence with which to explore and discover its world.

In another extreme example, had we lived indefinitely from the outset, never becoming diseased or growing old, there would never have been a new guard building upon and replacing the old guard. Priestly hierarchies would have become eternally entrenched, and progress would have stagnated in darkness. The great discoveries of the enlightenment were made by those who believed they were revealing God's grand design. In contrast, most of our progress in understanding over the last century has been made by those who believe there is no underlying intelligence to the universe, and that nature is indifferent to the welfare of the life she has engendered. The hideous behaviour of some of nature's organisms has been cited by atheists as unequivocal evidence of an absence of God.

Quod erat demonstrandum

Our progress has required atheists to be entirely convinced of their position, for their belief that the world is naturally prone to breakage and subject to random forces, has given atheists a unique determination to seek solutions to the world's problems. The presence of atheists, and their recent militancy, has also provided some balance against those at the other extreme who might claim that our problems are the will of God, and that any attempt to solve them is an affront to God.

In the Parable of the Talents, Jesus tells how the least talented servant buried his master's treasure in the ground, only to dig it up and present it without improvement on his master's return. At the Resurrection, which of the servants will Jesus look on most favourably; the atheist who discovered DNA, or the evangelist who to this day preaches the subjugation of women, simply because the apostle Paul recognized its expediency at the time of his ministry?

In the next talk, we will begin an introduction to the divine intelligence, the mind of God that Stephen Hawking suggested we would 'truly know' on the day we arrive at a 'theory of everything'.

Change here for the Valhalla Express

Apr 7, 2016

Walhalla, Victoria

In the early 1960s, David Gleicher, while working at Arthur D. Little, introduced a formula which gave the likelihood of successful change within a large organization. Kathie Dannemiller later simplified the formula in the 1980s, as follows:

D x **V** x **F** > **R**

Change will only occur if the product of these three factors

D = Dissatisfaction with how things are

V = Vision of how wonderful it could be

F = First steps that can be taken towards realizing the vision

is greater than the

R = Resistance of the organization to change

If any of D, V or F is low, i.e. things are rosy right now, or the vision is lousy, or someone can't get their act together, then the inertia of the organization will triumph.

Let's have a look at these in turn for the global company of humanity.

Dissatisfaction

It is becoming increasingly obvious to any reasonably attuned person that our journey down the highway to hell is rapidly approaching its destination.

Just the other day any remaining wriggle room for the climate change sceptics evaporated in the furnace of our hottest year on record. That Venusian runaway greenhouse apocalypse is not decades away, it's on our doorstep.

Peoples are working longer and harder for less rewards, with 1% of the world's population (70 million souls) now owning 99% of the world's wealth (and 99% of the population owning 1% of the wealth), and hardly anyone left in the middle.

So understandably, America is hurting right now, and like Germany in the 1930s, she is blaming external factors for her woes, looking to place a neo-fascist with the emotional intelligence of an eight-year-old in front of the big red button. He'll be a good match for the traditional perpetrator in this role, who has just announced his plans to nuke Washington. Bless.

Every couple of weeks or so a suicide bomber or gunman somewhere in the world takes out about a hundred innocent civilians at random, and this malaise is likely to continue 'til kingdom come. Due to their efforts, our hard-won freedoms are being whittled away.

Most of the world's forests have been chopped down, almost all the fish have been trawled from the oceans and replaced with microscopic pieces of plastic, and of the five hundred and twenty reefs that make up the Great Barrier Reef, a recent survey found all but four of them have been catastrophically bleached by rising sea temperatures. Fortunately, David Attenborough recently filmed parts of the reef for the benefit of those who missed seeing this world heritage site before it died.

And of course, there is common or garden variety human suffering.

I could go on...

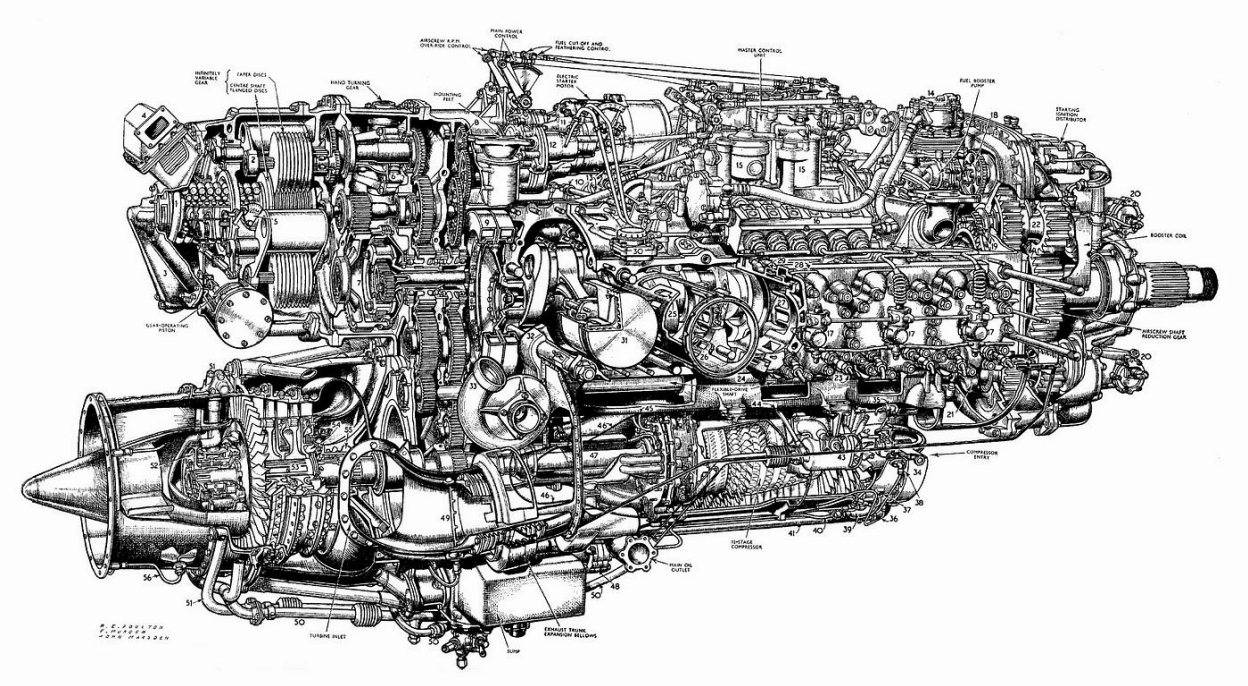
Vision

Of the people in the world who work (that is, most of us), we come in four basic configurations. The first division is between those who work with their hands, and those who work with their heads (often banging them against a brick wall). Of these two groups, we then have those who work on the same thing every day, and those for whom each day presents a new challenge. The machines took over most of the routine jobs in the 1990s. Now, with deep machine learning, they are also taking over most of the jobs that require analysis. A machine has now *learnt* how to

defeat the world's Grand Poohbah of Go, a game that is many orders of magnitude more complex than chess, not by using brute computational force as traditionally expected of computers, but through native cunning. The dream we had in the 1960s of abolishing work has just rocked up into our driveway.

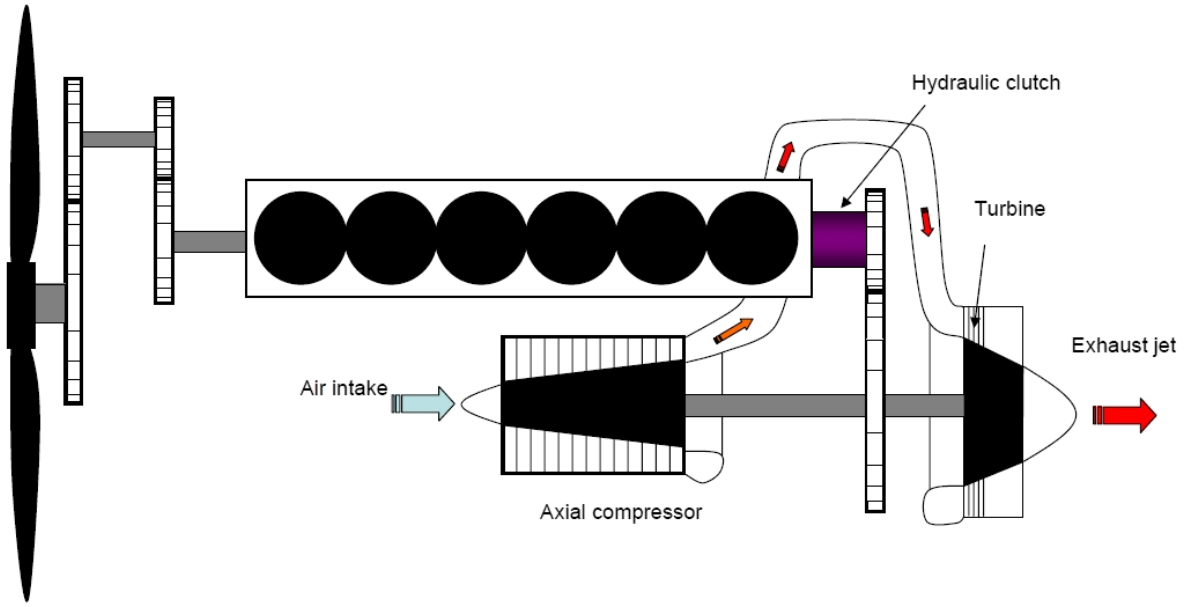
If there aren't any jobs left, how are we all going to make a living, eh, eh? In an automated economy, the energy we capture from the sun is like money (growing on trees). It drives the machines that produce the factories that make the sports cars and golf courses and single malt whiskies (yep, you guessed it – being middle aged, white and male is a cross to bear). The more solar energy we harness, the more stuff we can all have; the bigger the economic pie will become. Currently, we only capture a millipoof (technical term) of all this wealth that is being thrown at us from an annuity that will persist for at least another million millennia.

Competition has been vastly effective in motivating us to work hard and fast towards reaching this point in history, but having now arrived, at the dawn of eternity, all this frenetic industry is becoming somewhat counterproductive. A good analogy can be found in the aeronautical engines produced after the end of the war.



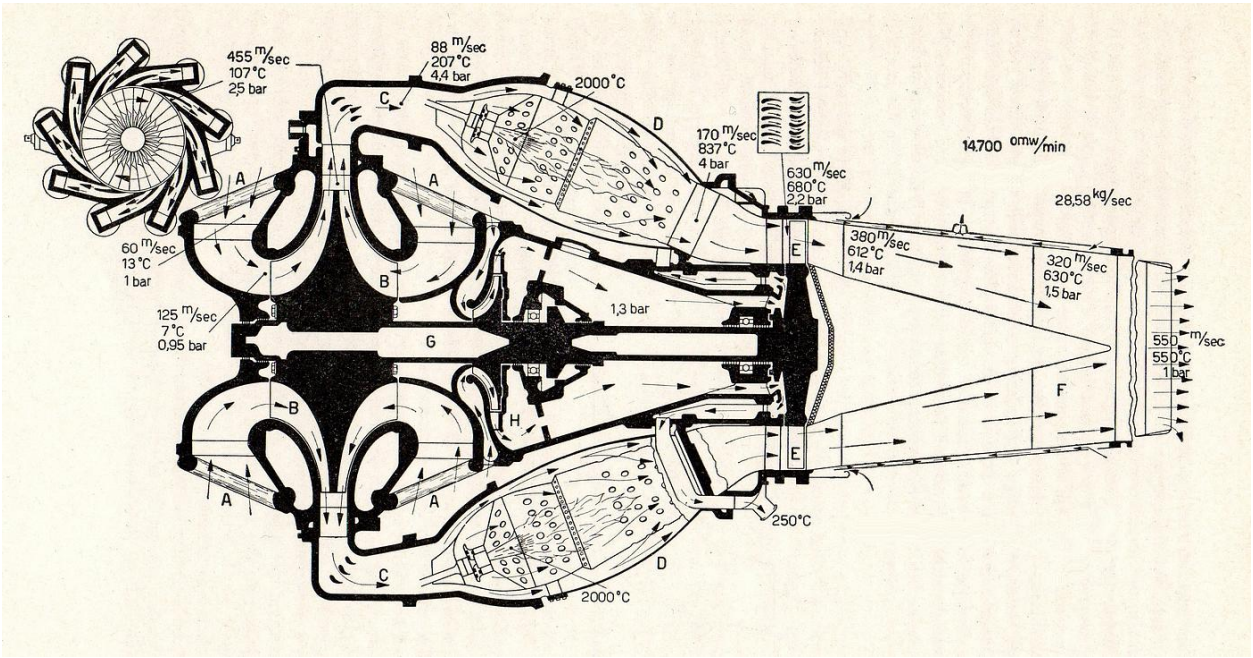
Napier Nomad

So much power was being developed by the exhaust turbine and diverted to compressing the intake charge (analogous to automation) that the pistons and cylinders (analogous to people) became mere gas producers, housed within an extraordinarily complex contraption that would do Heath Robinson proud (or indeed Rube Goldberg or Bruce Petty come to think of them).



Napier Nomad schematic

Frank Whittle dispensed with the wobbling crankshaft and opposing pistons and simply joined the compressor with the turbine on a common shaft to produce the smoothly spinning jet turbine engine.



Rolls-Royce Derwent V sectional

As with the development of the jet engine, we are seeing rapid refinement in the technologies driving the manufacturing revolution, such as three-dimensional printing and atomically precise manufacturing.

And on the seventh day, humanity rested. With machines doing all the work, we are going to need a new model of economic and social freedom. Back when the national constitutions that enshrined our freedoms were drafted, the planet was seen as an inexhaustible resource, there

for the taking, the atmosphere and oceans seen as an infinite space in which to dump all our waste. Rather than being seen merely as a *means* to an end, many still see our current economic model as an end in itself – an end to life as we know it, more likely. In our new global economic model, the environmental cost of *any* activity must be our first consideration, for if any planet is to last for one million millennia, it will need to operate very close to 100% (lossless) sustainability.

It could go something like this (which reads a bit like a leftie manifesto, but truly champions the individual). Of all the available energy and material resources in the world, a (large) proportion is allocated to the public good – the environment, in the broadest sense of the term. All real estate comes under the ownership and management of the state. Of the remaining resources, those already extracted from the planet, each citizen is given an energy budget, and an allocation of material. Everyone has the *unalienable* freedom to do whatever they like with their booty, within environmental guidelines. Goods are designed and produced with the intention of recovering *all* their material content when they are no longer required, for reuse in different goods, and the energy required to recover the material content in a useful form is factored into the initial cost of those goods. An individual cannot trade one resource for another, nor can they change their allocation, except in the case of neglect (think littering), in which case their allocation is clipped. Five is right out. If couples choose to bring children into the world, they sacrifice a portion of their individual allocations and transfer it to their children. Stuff that generates stratospheric market demand (paintings by Chagall, bottles of 35-year-old Port Ellen, &c.) is simply resumed by the state so it can be enjoyed by everyone. The entire system is a well-oiled machine run by a volunteering public, who enjoy being useful, and do what they do purely for the kudos of it all – patching the code here and there when required, doing a bit of gardening, being a rock star or a sporting hero (rather than a brat), and so on…

And they all lived happily ever after. The End.

First Steps

Is this the real thing, or is this just phantasy? You must surely be joking, Mr. Grigg! Ever since Cain and Abel took to each other with baseball bats, we've known that the world would be a much nicer place if everyone jolly well learnt to get on with each other and worked together for the greater good. The idealized model presented above, which is of course child's play, indexes economic growth to the growth in available energy, puts an effective brake on population growth, preserves our environment, and gives everyone unprecedented freedom.

But the old order is entrenched and has always resisted any novel order that rears its head. Throughout its life, humanity has been taught, in the inimitable words of the late Malcolm Fraser, that "Life wasn't meant to be easy". There is an agent of 'anti-order' in the Middle East that has been let loose on the world for one last time. We (being merely human) can *almost* forgive them, for they honestly believe they are ushering in the millennium. Their death throes have brought monotony, austerity, oppression, destruction, and untold misery. Fear breeds violence, and these people have simply become terrified of what they believe God might do with them. They're not the only people to have had dreams of a better world – in fact we've all dreamt of a land of milk and honey and colour and love. Christians peer out into the void, waiting for the descent of their knight in shining armour; the early 20th century saw a band of degenerate commie atheists have a crack at creating Utopia all on their lonesome; and Syrians look to Germany.

What the world needs now is an excuse to let go *en masse* of what little we have managed to grab hold of for ourselves, so it'll be just like starting over with a clean sheet of paper. The only state

with sufficient capacity to accept the flow of refugees escaping the Middle East, is a world *transformed*.

If there's one thing I've learnt in over thirty years of research into this transformation, it's that *everything* has been thought of before. The only *new* things under the sun are rearrangements of old things. The other inhabitants of the universe, who are intelligent people just like us, are not impossibly far away from us as the limiting speed of light might suggest, they are right here in our midst. The only difference between them and us is simply that most of them have been getting around the traps a lot longer than we have.

As a proud young scientist, I set out to uncover the technical machinations of the miraculous, which I have written about extensively elsewhere. But not far into the journey, my pride went for a Burton's, for I recognized that something much bigger than me was pointing me down the garden path. Every instance of reality (including our own little corner of the universe) is being computed by *abstract* Turing machines that reside at a single, dimensionless, point. This is how the rest of the universe comes to be in our midst, and we in the midst of it. This superposition of all reality is the most powerful intelligence imaginable, and those in the universe that are older and wiser than us defer to this intelligence in everything they do. Their access to the superposition, using a key that we too will one day be granted, allows them to manipulate every instance of reality, including our own.

Peter Sellers and George C. Scott

The triumph of human reason is to understand why, if these other folk in the universe have had the ability to fix everything miraculously, have they not done so already. For people don't get motivated unless they have a deadline (mortality), and they don't try as hard to uncover how things work unless they perceive something is broken (gerontology, and medicine in general). But the closer we have come to suspecting that the world is a 'put up job', the more it has had to be made to look random and without purpose to divert our suspicions. For if there were *incontrovertible* evidence of a higher power, people would give up all their hard work, and instead just stand around like Vladimir and Estragon and wait for Godot. Such is human nature.

We've now had Kevin and Julia, and Tony and Malcolm, swirling our government around in what seems like an endless holding pattern. The promised land is still nowhere to be seen. The cognoscenti see the mirth in all that is being played out on the world stage (and some miss out on the fun whenever they believe it's all happening by chance).

Resistance

The people who pretty much own everything, and have stashed all their loot away in Panama, don't want change. Are they *really* happy with all they have? They look pretty happy to me, Debbie! But d'you know something? (We're from outer space and we're here to help??) They can't take it with them when they go.

The peeps in the rest of the universe, who can manipulate every instance of reality, have a huge surprise in store for us, which even the wealthy will find irresistible, because it's something money can't buy. Surprise! – the way that everything seems to get old and wear out is merely an illusion that has been foisted upon us.

So then, those who don't think it self-evident that we are all created equal, will grow old and smelly and die off.

Hooroo! as they say… (the aitch is silent).

Those who remain, having put others ahead of themselves, will stay young and healthy for ever, and end up exploring every nook and cranny of the world. Oh, and one other thing. Everyone who has ever died will be resurrected from a tape memory bank and given one last chance to decide whether or not they think we are all created equal. Maybe not all 100 billion of them back at once though guys, please!

And they really *did* live happily ever after.

It's only the beginning, but I've already gone and lost my mind. So, where the bloody hell are *youse*?

Communicating Science

An Introduction to ‘Intelligent Space’

National Science Week seeks to open up the world of scientific pursuit to the general public, and in celebration of that goal I have prepared the following presentation:-

I’ve published this talk in Medium, an innovative communication platform that allows mixed media content to be presented in a common format across different sized devices (it probably uses HTML5). As if that weren’t enough, I’ve then recorded myself reading the talk out loud and thrown that into the mix for good measure.

Science denotes knowledge, and no individual can possibly grasp the lot of it in depth. So, specialist researchers write papers addressed to a general audience, helping their colleagues in disparate fields, and the hoi polloi, to understand what it is they’ve been getting up to. In so doing they rise up, for a brief moment, to the level of the commoner, before descending once more to the depths of their chosen professions. Every once in a while, we need a commoner to lift them out from their abyss en masse, so that together they can see the grand vista stretching out before us, and finish colouring it in.

I see Konrad Zuse, who is the focus of my talk, as a latter-day Nicolaus Copernicus, Jürgen Schmidhuber as a latter-day Galileo Galilei, and completing that picture, I think of myself a bit like a latter-day Giordano Bruno. Fortunately, we no longer get a fire lit beneath us whenever we challenge the establishment!

Copernicus, Galileo and Bruno eventually established that the earth is better understood as a planet orbiting the sun, where previously the sun had been understood as a heavenly body that must orbit the earth, not only by divine decree, but by ‘self-evidence’. Similarly, Zuse, Schmidhuber and I have been working to establish that the reality we observe is a phenomenon on the surface of a hidden substrate, where currently it is ‘self-evident’ to most people that observed reality, and reality itself, must be one and the same thing.

I hope you enjoy my talk and have a wonderful week of discovery!

Intelligent Space:

Putting substance back into emptiness

Aug 7, 2016

Space is traditionally viewed as an emptiness, a void within which all things ‘material’ have their existence. In the late 1960s, Konrad Zuse (who designed and built the world’s first ‘stored program’ computer) proposed that space, far from being empty, consists in a regular lattice of miniscule machines known as ‘cellular automata’, one for every point in space, which ‘calculate’ the physical reality manifest at each of those points. I have revisited Zuse’s idea in the light of contemporary observation and theory and call this new synthesis *Intelligent Space*. It seeks to explore more closely what it is that Zuse’s fundamental cellular automata are made of, and in so doing present a framework for merging relativity and quantum theory.

In the late 1980s, Stephen Hawking suggested that "a complete theory would be understandable in broad principle by everyone, not just a few scientists." *Intelligent Space*, through its foundational simplicity, appeals from the outset to our common sense, and it may indeed be the underlying source of our own intelligence.

The Continuum: Length

We begin by considering the *continuum* of numerical values that stretch along the number line between the numbers zero and one. We simply cut a metre-long length of string into halves, then quarters, then eighths, and so on, keeping this up until we can no longer divide *whatever* it is that string is made of – that stuff which makes up reality. This will happen (empirically) after just one hundred and fifteen divisions, and at that conclusion to slicing the string into shorter and shorter lengths, we will have reached all the way down to what the ancients described as an 'atom', meaning quite literally something that can no longer be 'cut'.

This *true* atom is not to be confused with what we commonly think of as an atom. The *chemical* 'atom' is split apart (cut into smaller pieces) by boffins in lab coats all the time, and we would reach the chemical atom after a mere thirty-four divisions of our metre-long piece of string.

Because our piece of string (conveniently) started out at one metre in length, we can 'map' each piece of cut string onto a fraction of the *number* '1', just like the real features of the earth are *represented* by markings on a topographical map. The half metre length of string would map to the fraction '1/2', the quarter metre length to the fraction '1/4', and so on. However, if we keep dividing the number '1' in half, repeatedly, it is obvious (as noted by Zeno of Elea) that we can keep doing this *forever*, never reaching the 'atomic' end of the road like we do with our material piece of string. The number '1' can be divided into an infinite number of infinitely diminishing fractions – what mathematicians think of as 'entry level' infinity (aleph naught).

Physicists use this *mapping* of physical reality onto 'numbers' when creating mathematical 'models' of reality, and these models are very useful in describing and predicting how reality behaves. But some of these models are idealized *approximations* to reality, for they smooth out the lumps and bumps of the individual atoms of reality onto an unbroken mathematical continuum (known somewhat ironically, for historical reasons, as the 'real' number line).

The Continuum: Time

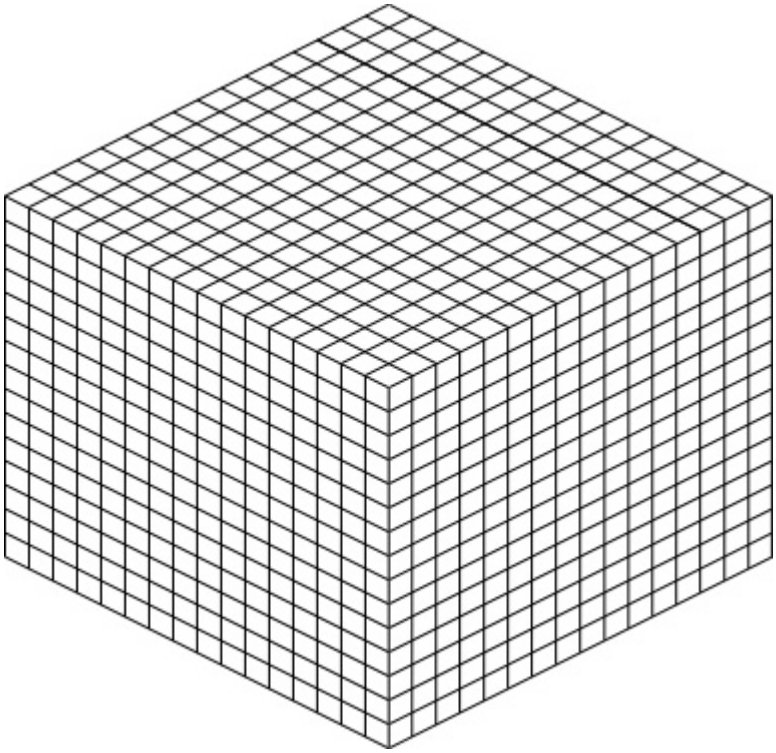
The (experimental) physicist is occupied with measuring the length, breadth, depth and mass of the stuff that makes up reality, but more so with *modelling* (to predict) what happens to that stuff over the course of time. Imagine that we could press the 'pause' button and freeze the entire universe in time. If we were then to release the pause button for an instant before depressing it again, we can envisage that all the (true) atoms in the entire universe would have each advanced by just one 'notch' into a revised configuration, like a movie progressing from one frame to the next.

Just as we divided up our piece of string, we are also interested in knowing how many times we can divide up a 'piece' of time, say one *second*, before the stuff that time is made from can also no longer be divided – before we reach the 'atom' of time. It turns out (again, empirically) that if we keep dividing a second in half just one hundred and forty-four times, we will reach a point where time can also no longer be divided.

The Seiko Spring Drive movement has no escapement. The second-hand sweeps smoothly around the dial with no evidence of 'ticking', as if time were an unbroken stream, a *continuum*. In fact, the movement is regulated by a quartz crystal that 'ticks' some 32,768 times a second.

Max: The fundamental units of measurement.

These atoms of length and time are known as 'natural' units, because they are not arbitrary, but derived from the measurement of real phenomena, and they were first established by Max Planck at the turn of the 20th century. The 'quanta' of space and time, as they are more commonly named, are both extremely small (relative to the dimensions we encounter in everyday life), and are defined by the *speed* of light. Light travels *exactly* one quantum of length within the period of *exactly* one quantum of time, and this is the fastest speed possible, for reasons we will discover. Because space has three dimensions, a quantum of *space* is represented by a cube with sides of one quantum of *length*.



A representation of a region of space comprising 4,096 (16^3) individual quanta of space. There are approximately 1,000,000,000,000,000,000,000,000,000,000 quanta of space spanning the diameter of a human hair: the quantum of space is tiny as!

The period of one quantum of time sees the playing out of that single frame of the 'motion picture' of our universe. There are many (26 orders of magnitude) more quanta of time in just one second, than there have been seconds in the 13.8-billion-year history of the universe. Don't blink or you'll miss it.

Clocks: What exactly is it, this thing we call time?

Anyone who has been mesmerized by the ticking of a metronome will appreciate that the enduring quality of time is its regularity.

Temple investigating time and space

Yet time is not something *in itself*. Dividing a second of time is qualitatively different to dividing a piece of string. Time is merely an artifact that emerges from the *change* in state of all the atoms in the universe from moment to moment, and for this to happen as it does – like clockwork – all the atoms in the universe need to *agree* on the time and change moment to moment in lockstep with each other.

Finding agreement on the time of day is an ancient problem. In an ideal world, we would have access to perfect clocks. The timekeepers would synchronize an 'escapement' of clocks at a ceremony one day in Greenwich, then ship them off to every corner of the globe, and we would always know if any two events, at different places on the earth, happened at the same time, by simply referring to the local 'UTC reference' clock at each location.

Unfortunately, the clocks we have so far managed to construct are not so perfect. All our clocks, even the most accurate ones, drift away from the *true* time. However, when the news comes on the telly each evening, we can adjust our less accurate timepieces to a considerably more

accurate *reference* time, a standard that is broadcast at the speed of light from a central time authority.

The Seiko Astron is synchronized to the reference time of the Global Positioning System

This standard is quite handy for earthlings who need to agree on when they are meeting up for lunch, for a signal travelling at the speed of light can get everywhere in the world in *almost* no time at all. However, sending out a signal at the speed of light is not much use if you want to synchronize clocks at opposite ends of the universe. So then, how *does* the universe manage to keep itself in time?

Albert and Edward: Detecting the luminiferous aether

A groundbreaking experiment, conducted a hundred and twenty-eight years ago by Albert Michelson and Edward Morley, revealed a rather puzzling phenomenon. If we shoot a bullet from a gun, forward from a speeding train, we can reason intuitively that the speed of that bullet relative to the ground is simply the *addition* of

a) the speed of the train relative to the ground, and

b) the speed of the bullet relative to the gun.

We should avoid standing near the tracks ahead of this train.

Bullet. Train.

However, if we shine a laser pointer in *any* direction from the speeding train (that train driver should be given a ticket), then unlike the bullet, the measured *speed* of the beam of light emanating from the laser never increases, nor decreases, but *always* remains the same, relative to *anything* – the train, the ground, the solar system, the universe.

After some years of deliberation over this frankly bizarre and counterintuitive result, a somewhat mystical solution was proposed. All hope of understanding the *mechanism* that engendered this result was abandoned, and famously replaced with an article of faith, a postulate – that the observed speed of light is constant in any inertial reference frame.

This alluring proposal ushered us away from the theatre of understanding, and through a side door into the anteroom of *instrumentalism* – a place where theorists have since declared that "as long as a theory agrees with observation, and accurately predicts *observed* behaviour, it doesn't really matter what is *actually* going on under the covers."

Immanuel and Konrad: What's the world actually made of?

Immanuel Kant famously asked if we could know what something was actually 'in itself', rather than just knowing its physical characteristics, qualia like its size, weight, colour and so on. We know the *properties* of the elemental atoms, but do we actually know what they are? The theory of *Calculating Space*, as envisaged by Konrad Zuse, sees space not as an empty nothingness through which material objects move, but as an active medium that is constantly 'calculating' the *characteristics* of its contents.

This idea effectively *inverts* our intuitive understanding of where we stand in relation to everything around us. As with the emergence of the idea that the sun, and not the earth, sits at the centre of the solar system, some four centuries ago, the broad acceptance of *Calculating Space* remains a work in progress.

Just Waving: What's going on beneath the surface?

How is it that we don't 'see' all the machinations of Zuse's myriad cellular automata? In a 'Mexican wave', each one of us remains in our seat as we 'pass' the wave along the rows and around the stadium.

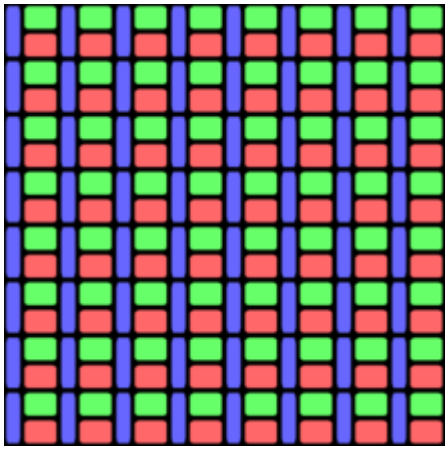
But an alternative realization of the wave would be for all the seats in all the rows to be empty, except for just one column of spectators stretching from the front to the rear, who then run sideways together along the rows, flailing their arms up and down as they pass by each seat. Strange as it might seem, this alternative scenario is actually how most people intuitively think the world works.

As we stroll down the street, we typically think of all the (chemical) atoms that go together to make up our body *actually* moving from one position to the next, perhaps brushing aside some molecules of air as we push forward through mostly *empty* space. It is now known that 98% of the atoms in our bodies get replaced with completely different ones *every* year. But at any given moment, we sincerely believe it is our very own personal collection of approximately seven billion billion billion atoms of mostly oxygen, carbon and hydrogen, that is strutting its stuff.

In the theory of *Calculating Space*, the 'reality' that consists of *you*,and *me*,and *all* that we perceive around us (in the entire universe), is analogous to the 'wave' in a Mexican wave, and the seated crowd in the stadium is analogous to the (hidden) 'substrate' of our reality. In this theory, all overt physical phenomena – everything we observe in the universe – can thus be thought of as 'wave' phenomena that propagate through the medium that *is* Calculating Space – a lattice of cellular automata.

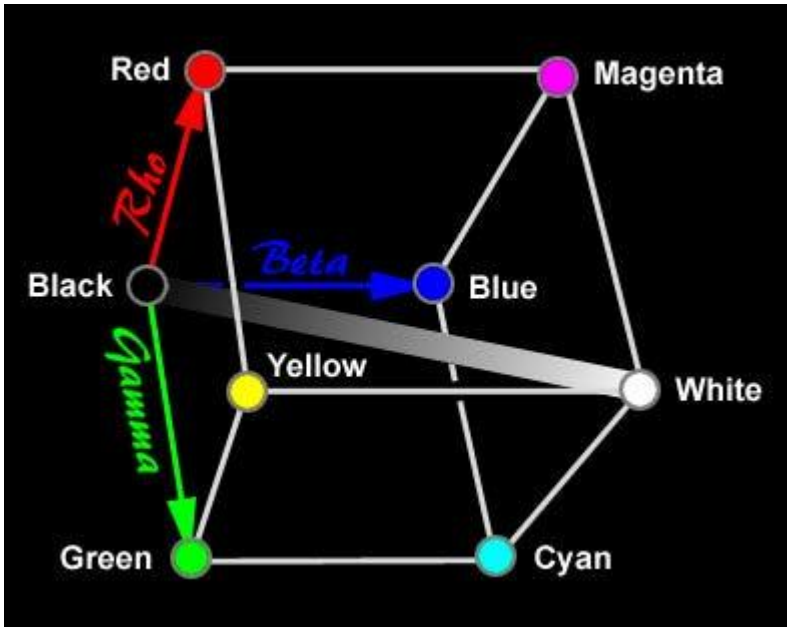
The Touchscreen: A microscopic Mexican wave

A more sophisticated execution of the Mexican wave takes place in a modern touchscreen display. The screen is made up of a rectangular array of picture elements (pixels)



Your touchscreen seen under a microscope

so small that our eyes cannot discern them. 'Behind' each of those pixels is a computer, calculating which colour that pixel will display at any given instant, from a palette of more than 16 million made up from different combinations of intensities of red, green and blue light.



Equal intensities of the three primary colours produce white light

When we grab hold of an image on a touchscreen and 'move' it with our fingertip, we see that the screen itself is (obviously) not moving. What does move however, is a precise rendition of the image, transferred from one set of pixels to the next, according to how quickly and in what direction we move our fingertip.

Each spectator in the Mexican waving stadium can be thought of as the 'computer' that is calculating the value of each pixel (arms up or down). As the wave moves, each spectator 'calculates' when to put their arms up in the air, based on what the person next to them is doing. So too does each pixel on a touchscreen pass its 'colour value' on to the next pixel in the direction your finger is moving, and in turn receive an updated value from the immediately preceding pixel in the direction your finger came from.

It is essential to the functioning of a touchscreen that all the pixels decide what their next value will be, *and* change to that next value, at the *same* time. And so, each pixel refers to a very accurate reference clock within the computer. Indeed, *all* the pixels on your touchscreen are switched off, so all their values can be recalculated, and are then switched back on again, many times a second, more quickly than our eyes can discern.

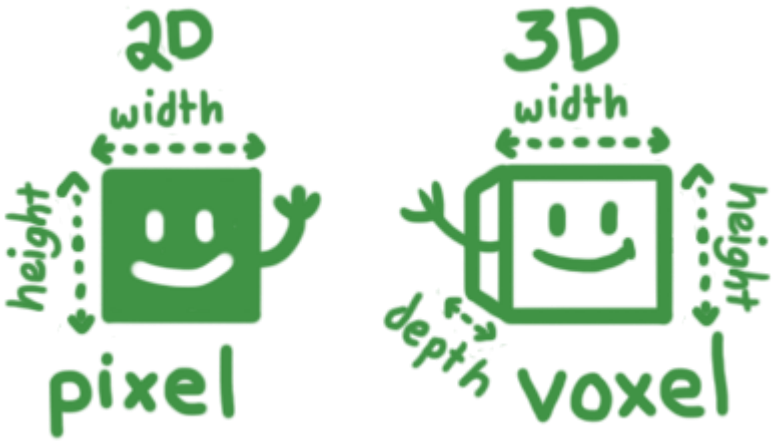
Of course, if you move your finger very quickly across a touchscreen, you can begin to see the computational limits of the system, limits that are likewise encountered by objects that have mass, for example protons, as they approach the limiting speed (of light) in a particle accelerator. A packet of information cannot propagate across the cellular automata of *Calculating Space* any faster than one quantum of length per quantum of time.

Moving on up from Representation to Reality

We are quite familiar with and accepting of still and motion images being displayed on flat, two-dimensional screens. In general, those images provide us with a facsimile of the *light* that is reflected off objects in the real world and onwards into our eyes. However, when we move out of flatland and into three-dimensional reality, we are dealing with more than just the physics of reflected light striking the red, green and blue receptors in our eyes.

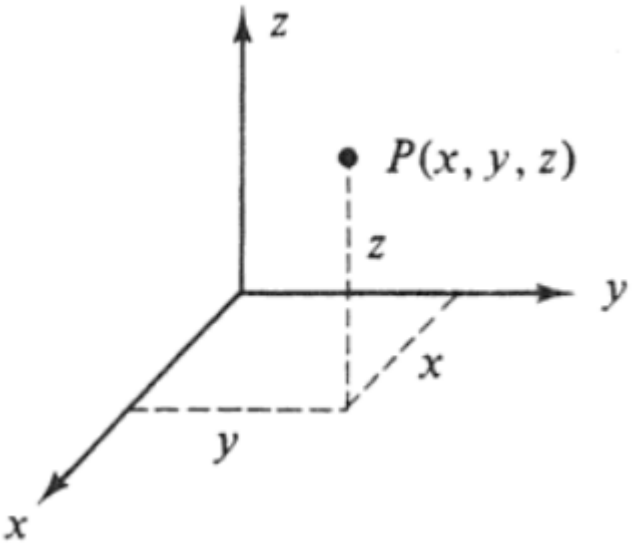
In three dimensions, our *actual* reality (as distinct from a mere representation of it in either '2D' or '3D') is subject to the entire gamut of physical 'law', not just the law pertaining to the reflection of light, but the law pertaining to the properties of the reflecting materials themselves, and their interactions. Where in two dimensions we have 'pixels', which are squares on a flat surface, in three dimensions we have 'voxels', which are cubes in a volume of space.

In our touchscreen display, each pixel need only represent one specific hue at one specific brightness at any given moment in time. But in the real physical world, each voxel must represent everything about the reality at the specific location of that voxel – all the physical law that applies to that point in space, at any given moment in time.



René and Isaac: Playing 3D Battleships.

As a child, René Descartes was often laid up sick in bed, and tradition has it that he observed a fly 'walking' upside down on the ceiling of his room, prompting him to develop the concept (named after him) of cartesian spatial coordinates. In the theory of Intelligent Space, space is an absolute datum (as was favoured by Isaac Newton), a *rigid* framework in which every voxel has a cartesian 'address' that is a fixed number of space atoms (voxels) offset from a common origin in each of the x,y, and z axes.



Every point in space has an absolute address relative to the origin

Alfred and Bertrand, Alan and Kurt: Real worlds and Virtual worlds.

We all appreciate that there is a computer beavering away behind our touchscreens. So where then is the 'computer' whirring away behind reality? In the 1990s, the *Matrix* movies popularized the idea that we are living in a 'simulated' world, but sure enough, just 'above' the putative simulations presented in any of the *Matrix* movies, we soon discover that there is some real physical hardware driving it all. Most movie goers have realized that this layering of 'reality' offers little insight into our understanding of 'ultimate' reality, and have since become bored with the genre, despite recent efforts to revive it.

Alan Turing's intention was never that his famous 'machine' become a mechanical reality. He only ever meant it as an *imaginary* device, an abstraction designed to generate and prove *every* possible mathematical theorem. The mathematical Platonists (named after *Plato*, who founded the movement) believed that the complete tea set of all mathematical theorems has *always* existed, and that over the course of millennia, mathematicians have been merely *discovering* the members of that set – the teapot, the milk jug, the cups and saucers, the strainer, the sugar bowl, the spoons, and so on.

The suggestion was that the set of all mathematical theorems was finite, and a group of mathematicians known as the Formalists, led by Bertrand Russell and Alfred Whitehead, set out to catalogue the entire contents of this set. But Turing and Kurt Gödel rocked up and spoilt the Formalists' afternoon tea party, proving that the set of all mathematical theorems is in fact an open set; proving that we can never complete our knowledge of the collection, that there *exist* mathematical truths which cannot, however, be proven.

Gödel's proofs utilized the notion of self-reference, as in the statement "this statement is a lie", which if true, would be false – and if false, would be true. As we shall see, this *conundrum* of self-reference is capable of 'pulling the universe up by its own bootstraps'.

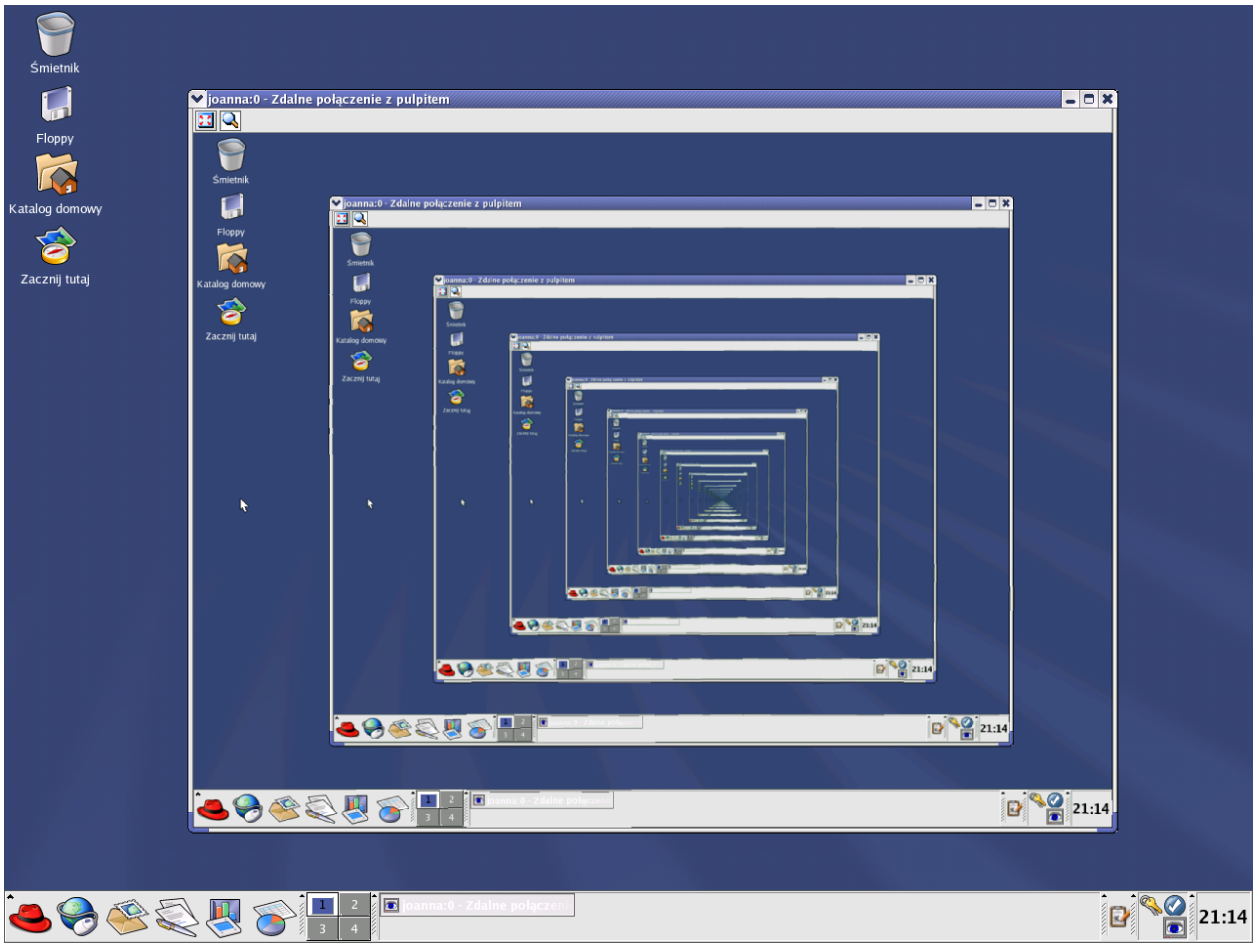
John and Stephen: Universal machines.

A *universal* Turing machine can do everything that *any* Turing machine can do. It can mimic the functionality of every 'specialized' Turing machine, including the *universal* Turing machine itself. It is a master of all trades *and* professions.

Following Turing's lead, John von Neumann proposed that we develop an analogous *physical* machine, which he called the universal *assembler*. It could do for manufacturing physical objects what the universal Turing machine had done for generating mathematics. The universal assembler is typically a microscopic machine, not unlike a bacterium, that at its most basic can manufacture exact copies of itself, and at its most complex, can manufacture exact copies of anything. It has a control centre just like the nucleus of a bacterium, containing the instructions for making replicas of itself (like the instructions in a bacterium's DNA). And like a bacterium, it takes in raw materials from its surroundings to be incorporated into new assemblers, increasing the population of the colony exponentially – one machine becomes two, those two then become four, those four eight, and so on.

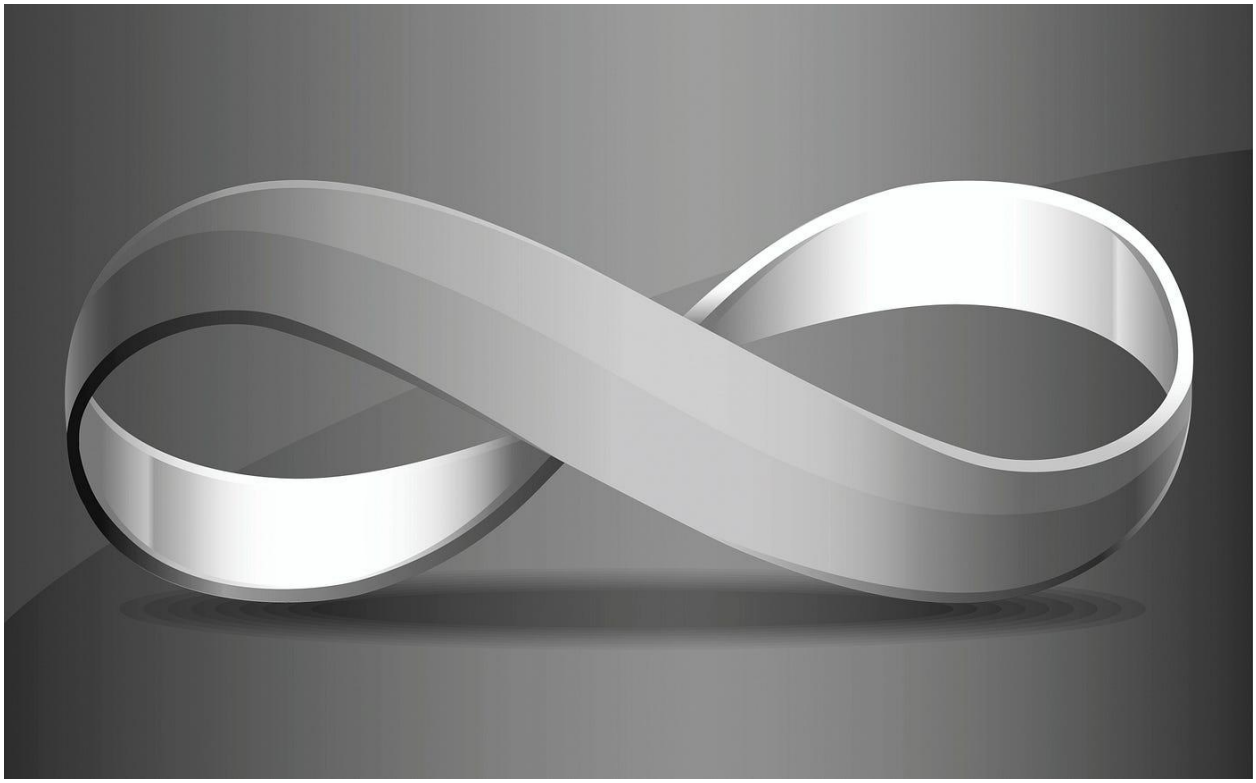
Your modern all-purpose computer (whose architecture was also pioneered by von Neumann) is often presented as a 'realized' analogue of Turing's universal machine, for it too can engender a 'simulation' of its own functionality (often referred to as a 'virtual' machine). Indeed, that equivalent virtual machine can go on to simulate another *equivalent* virtual machine, and so on,

ad infinitum. Stephen Hawking famously presented this scenario as a universe that is perched atop an infinite tower of turtles that stretches ‘all the way down’.



A recursive nesting of virtual computers

Yet hasn’t every couple, at various stages in their relationship, scratched one another’s back, or kept each other warm, or sat on the grass facing away from each other, and held the other upright? If we return from von Neumann’s *physical* machines to Turing’s *abstract* machines, we can likewise imagine that a universal Turing machine could simulate another universal Turing machine, but that these two machines, being merely *abstractions* and thus not subject to *physical* law, could then proceed to simulate each other, in perpetuum.



A pair of universal Turing machines simulating each other's existence, set against a backdrop of nothingness.

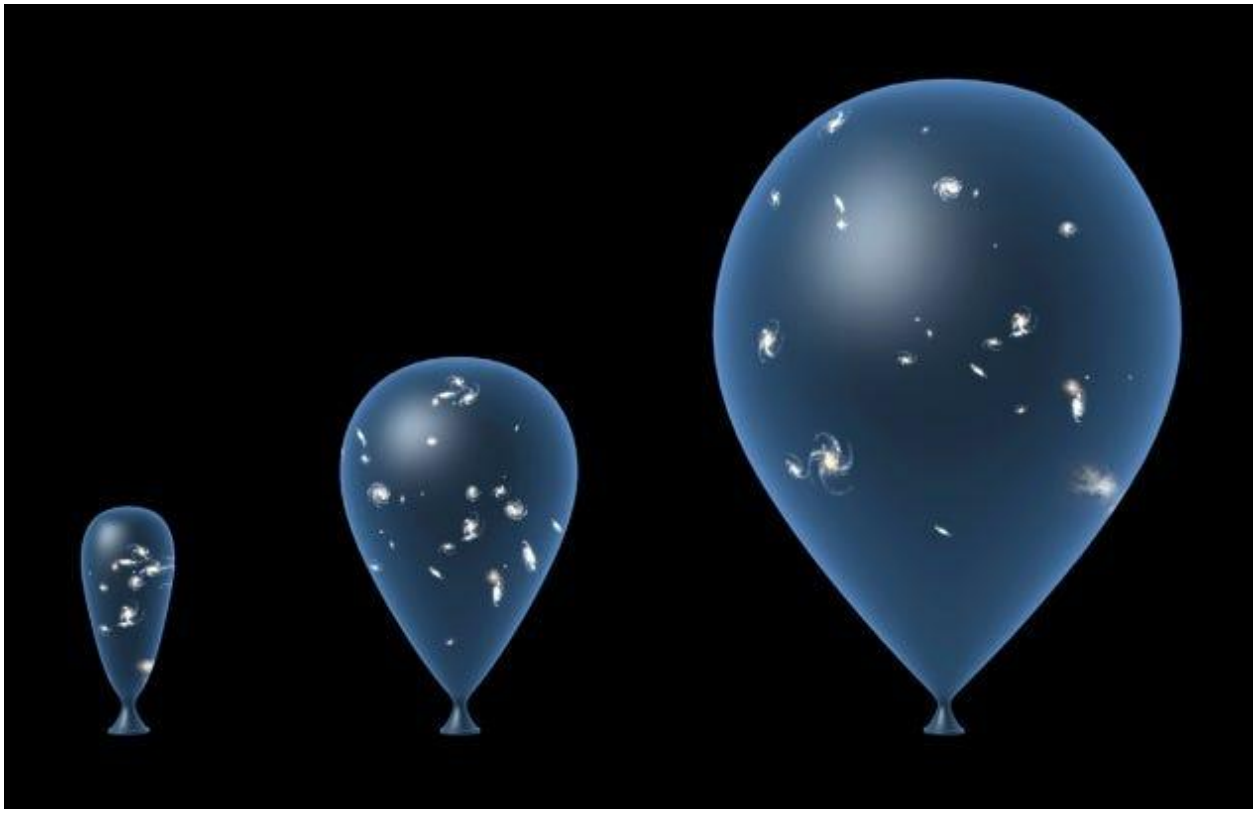
Like a Möbius strip, which appears to have two surfaces, but has just one, this pair of machines could 'hold' each other in existence, where neither of them *actually* has an existence independent of its simulation by the other.

Edwin and Fred, Arthur and Wilhelm: What was happening before anything ever happened?

Edwin Hubble's study of stars known as 'standard candles' (because they have a fixed intrinsic brightness), indicated that our universe is expanding, the implication being that it was once much smaller. This idea initially left Fred Hoyle aghast, mockingly coining the term 'big bang' for the point in space and time where it all began. But he soon embraced the idea, so much so that he went on to pioneer our understanding of the synthesis of chemical elements in the first few minutes of the universe's existence.

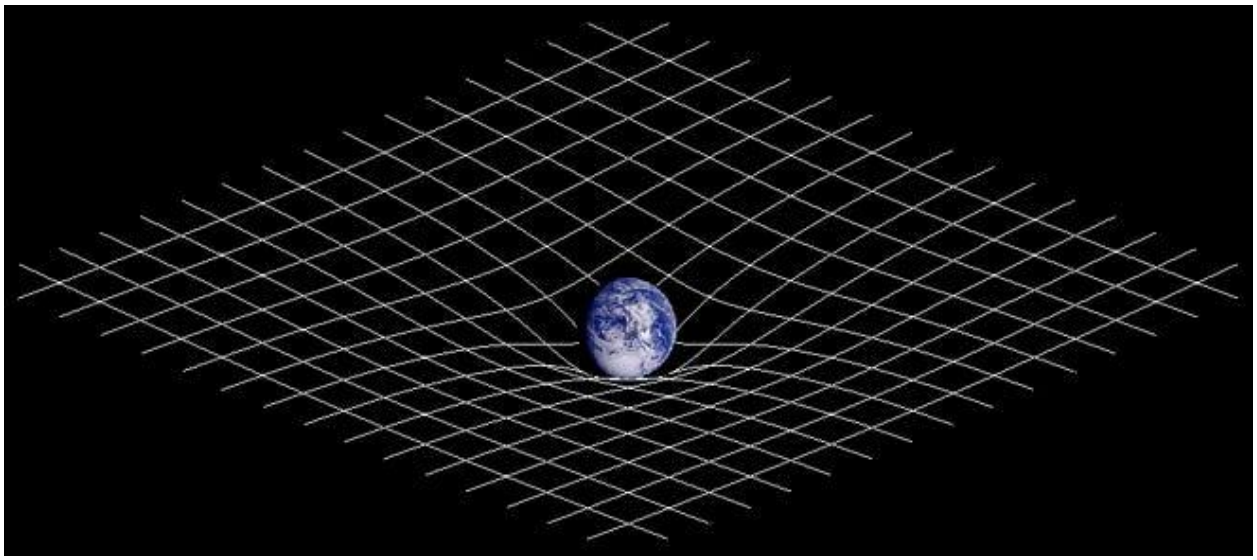
It is now well established (from a more recent study of much brighter standard candles) that the universe began about 13.8 billion years ago, with theorists turning their speculations to what lies *beyond* the big bang (either in space or in time). However, in one typical hypothesis called 'eternal inflation', the big bang once again rests precariously upon Stephen's infinite tower of turtles.

Indeed, over the last hundred odd years, theoreticians have attempted to visualize the strange and impossible geometries, probabilities, and causalities that the elegant (for the most part) mathematics of their modelling suggest. For example, Arthur Eddington presented the universe as being like the *surface* of a balloon on which we have drawn galaxies, with a Texta, that recede from each other, without any centre of expansion, as the balloon is inflated.



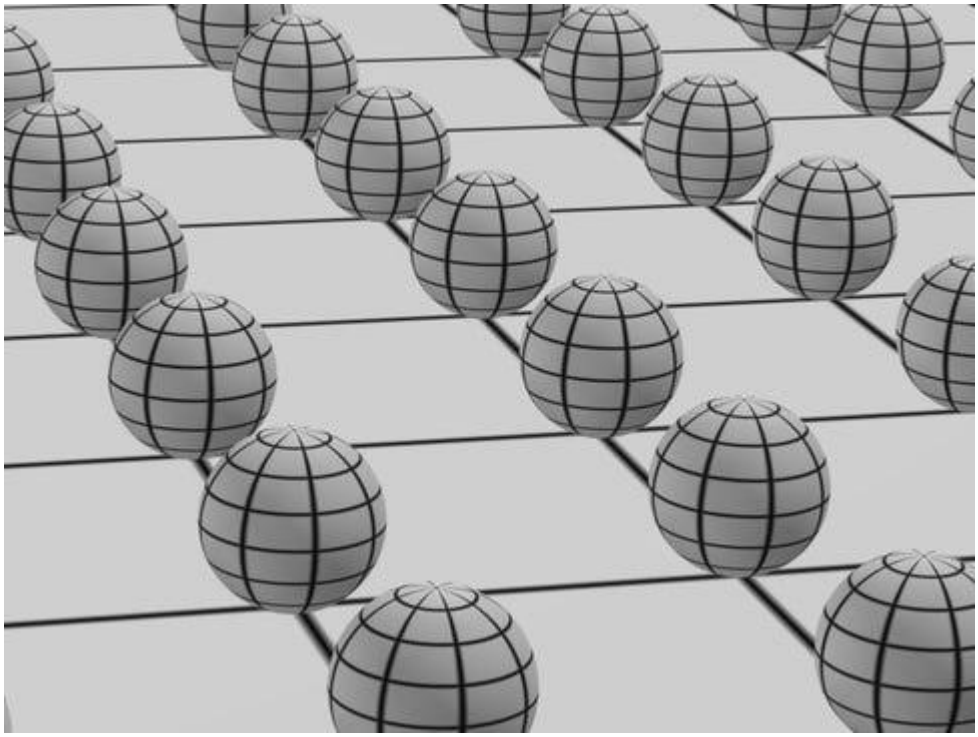
Balloon universe

Then came the analogy of “spacetime being like a stretched rubber mat that is curved by the presence of mass”.



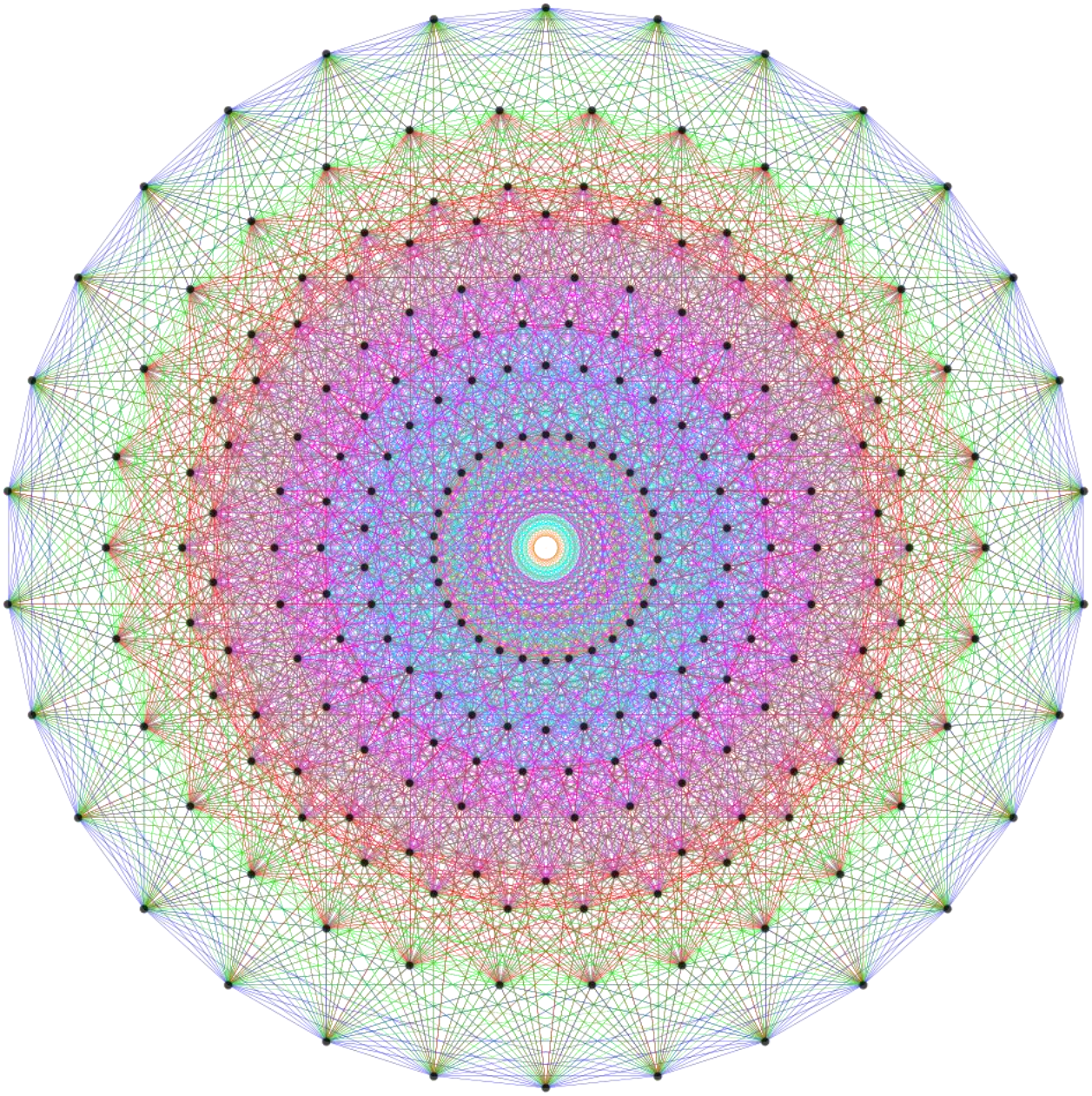
A depression in spacetime

Or the recent favourite of dedicated followers of fashion, the idea that “the extra dimensions of *string theory* are ‘rolled up’ into each of the *normal* dimensions we are familiar with in everyday experience”.



Rolled up dimensions

Complex geometries are the bread and butter of modelling reality. One of the most elegant representations of the standard model of forces and particles is the 248-dimensional Lie group, classified in the late 1800s by Wilhelm Killing.



A Petrie projection of E8

Such attempts to visualize higher dimensional space, *heroic* though they might be, are nevertheless deeply unsatisfying, for even Blind Freddie knows that space is neither a *point*, nor a *surface*; it's a *volume*. Even our Möbius strip presents a sleight of hand, for it takes a two-dimensional surface, and proceeds to gives it liberties in a dimensional realm above its station (the Klein bottle does the same). Higher dimensional mathematics are spectacularly successful in modelling a universe that is not static, but rather in constant flux. But those mathematics are merely maidservants to a reality that *actually* has three spatial dimensions – no more, and no less.

Indeed, if we open the door of the anteroom of instrumentalism, and step back for a moment into the grand ballroom of understanding, we discover that over the course of the last century, space and time have taken on a life of their own in our conceptions of them, becoming (when combined) a thing of 'substance' (spacetime), 'machinery' (Calculating Space) and most recently

quintessence, being a substance not dissimilar to the 'aether' that was so glibly eschewed all those years ago.

Let's start at the very beginning: Yes, and No…

So then, let's look at how a quantum of *Intelligent Space* might evolve. We start with two Turing machines, consisting in strings of binary digits, neither of which exists without the other, so that we appear to have something, where in fact there is nothing. At this juncture we have a universe without any *physical* reality. But this self-supporting computational engine has the capacity to begin generating the mathematics that constitute the physical law of the universe.

The pair grow in computational capacity by drawing bits of binary out of the surrounding nothingness (be those bits represented by one and zero, yes and no, black and white, yin and yang, something and nothing – it matters not). Once physical 'law' has emerged from the mathematics that the pair generates, and that law has become 'loaded', as it were, in their 'memory', the pair can proceed to simulate the first quantum of *physical* space, a vacuum having a cartesian address of (1,1,1), and a 'vacuum energy' consisting in the machinations of its underlying Turing machines. The pair can thence go forth and multiply, continuing to draw in binary digits from the 'surrounding' nothingness.

Space proceeds to expand exponentially like a bacterial culture, where there is no single centre of expansion (as in an explosion), but rather each and every replicating quantum of space is itself a centre of the expansion.

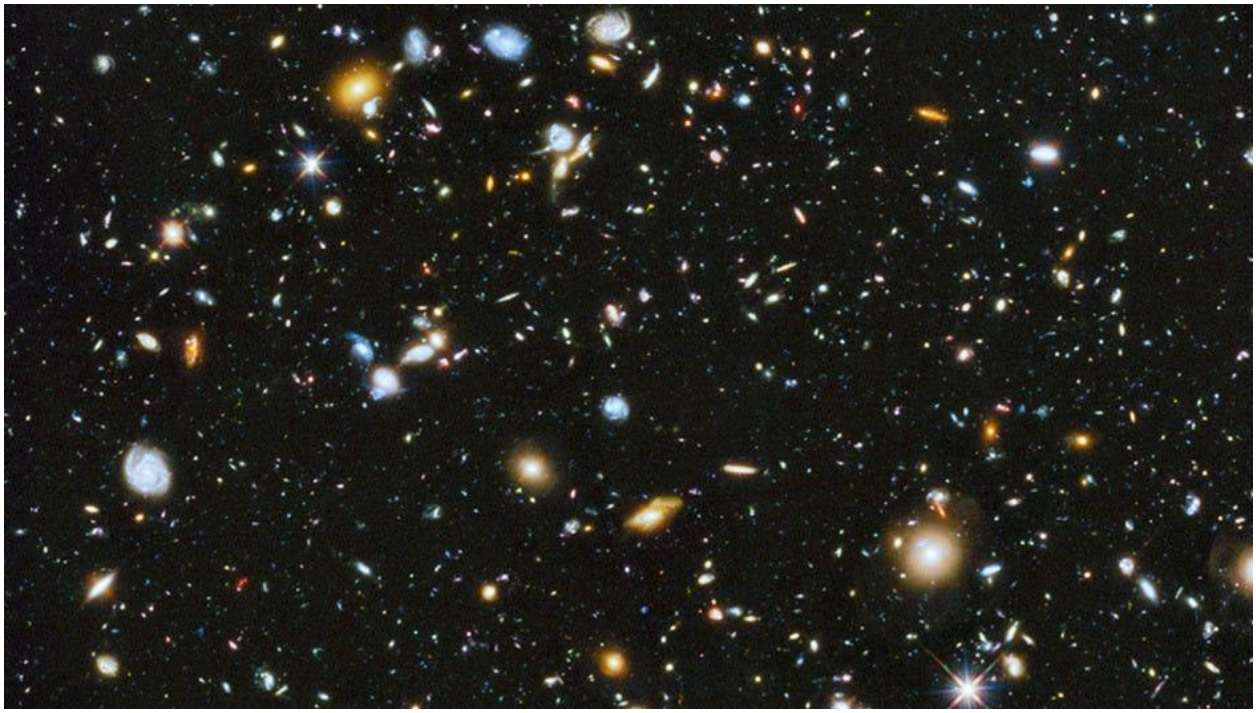
Each newly created Turing machine pair, and the quantum of space they simulate, is assigned a unique cartesian address. It is not the stretching of a fabric (or a 'rubber sheet') that causes space to inflate. Instead, each quantum of space remains fixed in volume, and it is the increase in their number that results in the expansion of the total volume.

While the simulated *physical* universe (space) is thus expanding, the actual Turing machine pairs that operate *behind* that space, which in themselves are abstract and have no *physical* reality, remain in the same 'place' (nowhere). This place (if it can be thought of as such a thing) is known as the 'superposition' – all the computational engines behind the quanta of space (which together constitute all reality) are in direct proximity to each other, and can directly communicate with each other, even though they simulate quanta of space whose assigned cartesian spatial coordinates may put them, *logically*, at opposite sides of the universe.

One heroic way of picturing the superposition, suggested by Warwick Grigg, is that every point in space is positioned one unit from the cartesian origin, in a dimension of its own, such that the superposition has as many dimensions as there are quanta of space.

It is thus that an instantaneous correlation can exist between all quanta of space, however vast their separation (in space), for their underlying Turing machine pairs are directly interfaced with each other at the (non-physical) superposition. Because the 'engine' of the entire universe is thus contained within the superposition, the universe has no difficulty in keeping its activities perfectly synchronized, for all its clocks never actually 'leave Greenwich'.

The quantum of time is the period that elapses between the pairs of Turing machines alternating their simulations of one another, such that all 10^{185} Turing machine pairs that make up the *observable* universe, go about their work in precise synchrony, just like the typing pool at Bletchley Park.



The Hubble Deep Field is a composite image of 342 exposures, taken over the course of 10 days, of an extremely dark region of the night sky, so small as would a tennis ball appear if held at 100 metres, and that on this close inspection reveals some 3000 objects, almost all of which are galaxies. Even the tiny bit of the universe that we can observe is big. Really big.

There is (obviously) no limit to the amount of space that the superposition can simulate, with there being ample evidence that the (simulated) universe is much bigger than the region we can observe through the detection of ancient sources of light.

Recalling then how an image moves across a touchscreen, so too, across the entire universe, is every 'voxel' of space 'recalculated' with every 'tick' of the superposition clock. Each one of us, immersed as we are within this space, has an intimate connection with the superposition.

Cosmology: What are we looking at out there?

To fathom the frankly mind-boggling magnitude of the computations taking place within the superposition, consider a quantum of light travelling from the outer reaches of the universe and finally plunging into the detectors of the Hubble Space Telescope. This quantum is not a particle (despite manifesting as a photon), but rather a packet of information containing a complete description of the reality it represents. It mostly traverses regions of the universe that are a vacuum (computationally idle), at a speed of one quantum of space per quantum of time (the speed of light).

To travel just one metre, the information must hop across 10^{35} 'stepping stones' of space, transferring the 'information' of its reality between each quantum of space in turn, like a bucket brigade moving water from a well to a fire (or indeed like the propagation of a Mexican wave). But the expansion of space is accelerating, and so as our quantum of light 'information' traverses each metre, it finds that additional stepping stones are being inserted into its path (by the replication of Turing machines at the superposition), causing the wavelength of its light to be (computationally) lengthened (shifted towards the red end of the light spectrum). Naturally, the

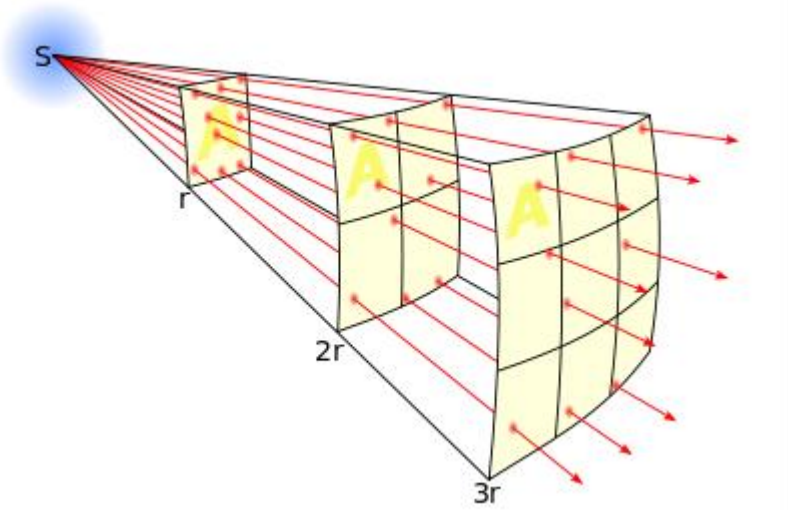
further this photon has travelled, the more inserted space it will have encountered along the way (and the greater its redshift will have become).

We can also imagine that on its journey, this quantum (of information) will traverse stepping stones (voxels) that are *not* representing a vacuum but are actively engaged in transmitting a packet of information that 'represents' some other physical reality.

If we think of the phenomenon of gravity as emanating from massive objects at the speed of one quantum of length per quantum of time, then the 'graviton' (the name we give to a packet of gravitational information) will contain several data. Like the photon, it will have directional data, and as it passes each stepping stone, its trajectory will be reviewed and recalculated, such that it will remain on a constant heading, just so long as it doesn't encounter and interact with any information that acts to alter its direction.

When the path of such a graviton intersects with that of our photon, each having quite possibly come from the farthest reaches of the universe, the graviton will 'inform' the calculation of the photon's trajectory at their (voxel) of intersection, imparting one unit of 'gravitational redirection' towards the direction from whence the graviton approached.

Of course, the closer our photon comes to a gravitational source, the greater the frequency of such encounters, and their cumulative alteration of our photon's path. Indeed, the intensity of any force transmitted through *Intelligent Space* diminishes as the inverse square of the distance from the source, according to simple geometry.



The exponentially decreasing intensity of photons and gravitons as they move away from their source

Eventually, our photon's (long) journey comes to its end when the information (that defines it) interacts with the information contained in the voxels that represent the lenses, the light detectors, and finally the rendering engines, of the Hubble Space Telescope.

The fact that gravitons propagate at the speed of light (and not instantaneously as Newton thought), is the underlying reason for the success of contemporary gravitational modelling. Indeed, the Global Positioning System would simply not work if its design did not account for the fact that an object will have changed its location, albeit by a miniscule amount, in the finite time any *force* must take in reaching it.

The components of the Hubble Space Telescope have stable (chemical) relationships with each other (as do the components of our bodies in holding us together), but each of those relationships must be constantly transmitted across the *Intelligent Space* through which we and Hubble are propagating. Hubble is orbiting the earth, the earth is orbiting the sun, the sun is orbiting the Milky Way, the Local Group, the Virgo Cluster, the Local Supercluster, Laniakea and beyond.

Who said we're not at the centre of the universe?

Hubble (and indeed each one of us) has a resultant 'universal' gravitational trajectory (relative to the rigid framework of *Intelligent Space*). This trajectory is the sum of all the vectors, from all the gravitons, that at any given moment are interacting with any of the voxels that are representing our reality. One assumes an exclusion principle, preventing any voxel from processing more than one interaction per quantum of time.

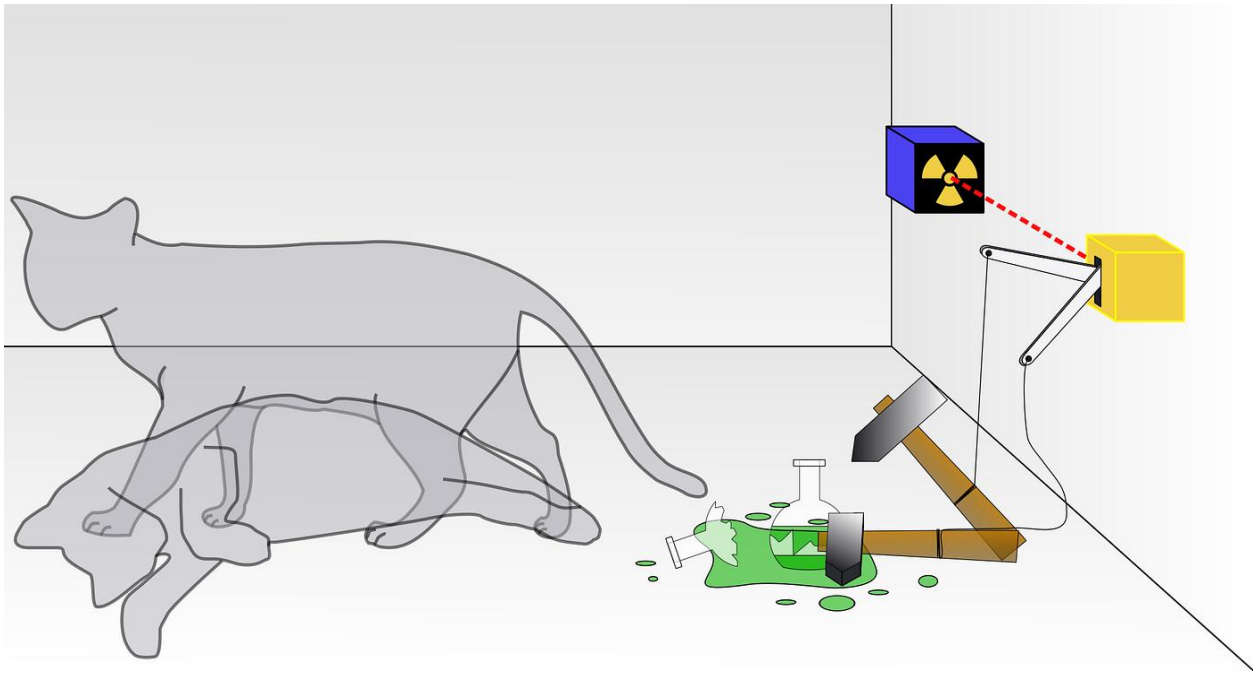
Obviously the most intensive interactions for Hubble are those with the gravitons emanating from the earth, which keep it whizzing around in a geostationary orbit. If we get in a car and blast down the highway, then that motion will be the most intensive interaction that our bodies (and the car) have with the *Intelligent Space* into which we are pushing forward.

But in each moment, there will likely be one voxel, from the approximately 10^{103} voxels which at any moment are defining any individual's existence, that will encounter a packet of gravitational information recently arrived from some attractor far away from us out there in the universe, an attractor that of course isn't where it was, for it has long since moved on.

Computational physicists attempt to model reality in terms of these individual (quantum) interactions, but this modelling can only ever be a crude approximation to reality, for the most complete modelling is the computation taking place within reality itself.

Erwin, Rosalind, Francis, James and Craig: Seminal Ideas.

In 1935, Erwin Schrödinger shocked the world with his indifference towards the fate of a hapless moggy.



As if he hadn't inflicted enough existential angst on cat lovers the world over, when he was in Ireland seeking sanctuary from the Nazis (and from those who might cast judgement on his lifestyle), he delivered a series of lectures simply entitled "What is Life?" He argued that deep within the structure of the biological cell, there must exist an 'aperiodic crystal' in which the morphology of life is encoded.

His extraordinarily prescient speculation eventually led Rosalind Franklin, Francis Crick and James Watson to the discovery of DNA. Craig Venter, who has more recently risen to prominence by sequencing the human genome, sees himself following in Schrödinger's footsteps, hoping to inspire the next generation of geneticists and computer scientists with his own speculations on how we might manipulate the information contained in the genome.

Like those putative 'aperiodic crystals', *Intelligent Space* is a highly speculative, but nevertheless testable hypothesis. It suggests that the information contained in the genome lies on the surface of a vast ocean of information, the information content of the entire cosmos, information that is contained entirely within the superposition, an entity that is potentially at our fingertips (and likely to have long since come to the fingertips of much other sentience throughout the universe).

Albert: The Avant Garde.

There's a natural tendency, for we who enjoy our being within a three-dimensional world, to imagine *squeezing* all those myriad pairs of Turing machines into a dimensionless point, just like general relativity tries to collapse the universe into a singularity, as if that point were still immersed within a three-dimensional reality; it's not. The superposition is not contained within the set of all things that have dimension. Relief arrives when we fathom that the material world is made from information, and conversely, that information is *not* made from material.

Albert Einstein established the two great pillars of modern physics. Over the ensuing century, a vast community of researchers has very nearly completed the entablature that unites them.

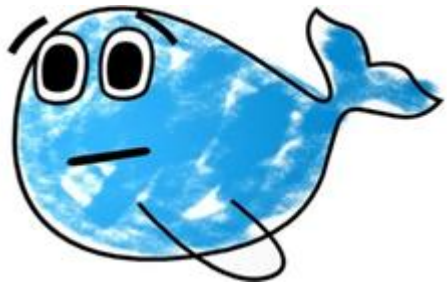
I gratefully acknowledge the assistance of Guy Cranswick in preparing this work for publication.

It's not the end of the world...

A dreamtime story.

Have you ever got the feeling that you're personally responsible for everything that's going wrong in the world? It's a responsibility that Don and Jong *should* sense, as madmen hell bent on our mutually assured destruction, but don't *necessarily*. I do. It would be such a shame if these billions of years of evolution and civilization had all been for nought. The foreign citizenship of our parliamentarians, lack of aboriginal recognition in our constitution, marriage inequality, job losses through automation, computers making decisions about our lives, global terrorism, mandatory sentencing, the mass migration of refugees, unaffordable housing, the breakup of the EU, independence movements, the gig economy, energy insecurity, gambling addiction, policy uncertainty, post-truth, mass shootings, global warming, fake news, an ageing population, and on it goes – some people think these stark realities have emerged inevitably from the chaos of seven billion egos bouncing into one another, realities we must simply learn to live with. Are any of those who think in this way at all happy about the direction things are taking? The cognoscenti on the other hand understand that there is something like 'cosmic' going on here, no less than the birth pangs of humanity being born again. I've been given the job of calling out the elephant in the womb, a bit like Luther or a character from the pen of Andersen, and indeed it's high time I took to the forceps and pulled this baby out into the open.

There's a short story in the Bible, set around 700 BC, about this bloke called Jonah, who came to the belief that God wanted him to travel to Nineveh, in the vicinity of modern-day Mosul, and let them know that God was scheduling their destruction. Like most of us, he was somewhat averse to confrontation, so his response was to hop on a boat that was sailing in the opposite direction. Well out to sea, the boat encountered a fierce storm, and it was looking likely that the vessel would be lost with all on board. Amid all this, Jonah was below deck, having a nap. The captain went down, shook him awake, and dragged him up to join the rest of them on deck. They drew straws to discover who was responsible for their dire predicament. Jonah drew the short straw, and knowing full well why the finger of fate was pointed directly towards him, he ordered the others to throw him overboard. Reluctantly, they did as he insisted, and the storm abated, suddenly.



Jarod Green

Miraculously, Jonah was washed up on the shore three days later, and not surprisingly, having been given a second life, he immediately spruced himself up and set off on his mission to Nineveh. In response to Jonah's proclamation of their imminent demise, the Ninevites chose to mend their ways, which changed God's opinion of them, and the city was spared. No such luck for Mosul this time around...

There are those in our community who hope that God is going to come back down to earth one day (from the clouds) and solve all the world's problems by magic. This mob insists on thwarting the efforts of anyone who believes they can make the world a better place *without* God's help – for these self-righteous citizens believe that such indifference to God's guiding hand in the world's affairs is *necessarily* sinful. They've been led to believe that the love between people of the same gender is somehow different to the love between people of different gender, and not surprisingly they're worried sick that their salvation will be at stake if they do not oppose what they believe God condemns. Christ succinctly painted this lot as the 'servant' whose master had given them just one talent and who, rather than passing on to others the love that God had shown to them, merely buried their talent in the ground.

The 'last day' for which they are waiting is widely understood as a day of judgement, but the main event, much earlier on in that great day's programme, is the resurrection, when *everybody* who has ever lived (and died) will be restored to life, right here on earth, to join those of us who, at the allotted time, remain alive (albeit somewhat startled). The resurrection is possible because each indivisible point (Planck volume) of our *perceived* reality is not a *necessary* reality, but merely a real-time computation of that point's relationships, under physical law, with its neighbouring points. More about this later on, for those with a technical inclination (and also see my earlier paper on this site – '*Intelligent Space*').

The authorities of the day decided to quiz Jesus about this resurrection, which at the time was much anticipated. They presented him with the case of a (hypothetical) woman whose name, let's say, was Snow White. Ms. White had been through a dreadful run of bad luck in marriage. After her first husband had died, she found happiness again, marrying a second. After this second husband also died, she went on to marry a third, and so on, until she had married and survived seven husbands. Thoroughly exhausted, she then gave up the ghost herself. When everyone returns in the resurrection, Christ's inquisitors asked, surely all seven husbands are going to claim Snowy as their chattel (for at least one day a week?) Astonishingly, Jesus declared that in the resurrection, there will "no longer be giving nor taking in marriage, for we will all be 'as the angels in heaven". Some people have taken Christ to mean that there will be no sexual intercourse in heaven, by the simple logic that angels (obviously) don't have sex, and that sex (obviously) can only ever take place within marriage. Such funny people. Their puritanism is reminiscent of evangelical churches who insist there shall be no sex before marriage, because it might lead to dancing the tango. In modern civilization, marriage has of course become largely redundant, because everyone is automatically afforded the property rights that it was originally established to protect.

Throughout a life of hard work, building up a portfolio of investments, each of us dreams of retirement, that 'day of rest' when we can put our feet up and live off the returns on those investments. This somewhat popular (and widely mandated) programme is dependent on growth, and (Keynesian) growth assumes that the earth is an infinitely exploitable resource – the problem being, that it ain't. In our national living treasure, the Australian aborigine, we come as close as we can in (almost) any extant human population, to an encounter with 'Adam and Eve'. The Australian aborigine is a hunter-gatherer whose geographic isolation spared it from the need to adapt to external evolutionary pressure from fellow humans for more than 63,000 years prior to the arrival of a vastly different culture, a little over 200 years ago. That invading culture, at the other extreme of human civilization, has endured more than 10,000 years of intense evolutionary pressure from neighbouring humans, surviving within a fiercely competitive milieu that, among many things, has required it to assign capital (primarily land title) to individuals, and pushed it

onwards and upwards to within spitting distance of its apogee, a technology (which we shall look at shortly) called 'Atomically Precise Manufacturing' (APM). Like the 'prodigal son' however, in travelling along this pathway to civilization, humanity has very nearly squandered its inheritance – the earth's finite resources.

After the resurrection, we'll no longer require laws that safeguard our property, for like the Australian aborigine, who portrays humanity much as it was in the Garden of Eden, our security will no longer be caught up with the things that we own. Jesus told the story of a trader in jewels who came across a pearl more precious than any he had ever encountered. He simply had to have it, and to finance its purchase, he sold everything he owned. By 'everything', Christ was referring quite simply to the things we can't take with us when we die. The pearl of which he spoke, of course, symbolized eternal life. Just like that astute merchant, each of us would willingly give up everything we 'own' if it meant securing eternal life – but only if we were confident that the proposed transaction is genuine and not just wishful thinking, and that the particular brand of eternal life on offer has some sort of meaning beyond simply floating about in the clouds, camouflaged in white.

Einstein probably *didn't* declare that "The definition of insanity is doing the same thing over and over again, and expecting a different result", for at the core of scientific endeavour is an understanding that no matter how many times a theory is confirmed, it takes just one contrary result to render that theory invalid. We have a *statistical* confidence in human mortality, because the weight of evidence is so large – perhaps one hundred billion people have died since humanity first walked upright. Philosophically, we say that the inevitability of death is a *contingent* truth, as distinct from *necessary* truths (like $1^3 + 5^3 + 3^3 = 153$). Some people claim that there have *already* been exceptions to the certainty of death, citing (for example) the resurrection of Jesus. In all likelihood, on finding himself alive again three days after completing a job well done *and* finding that the stone had been rolled away from the entrance to his tomb, Jesus would have made a beeline for Mary, and united again, whisked themselves off to a place as far away from Palestine as was practicable. One can only begin to imagine the gruesome alternative methods of execution (involving mincing machines) that Pilate might have thought up had Jesus instead decided to front up to the prefect and ask, "do you want to try doing that again, hmm?"

Christ spoke to us using symbolism and imagery throughout his ministry, and for good reason. Many people have given up acknowledging even the *existence* of God, because they cannot bring themselves to imagine a God who can countenance the abject evil that humanity has been subjected to since its emergence. Believe you me, if a perfect (completed) world could have been delivered to us on a platter at the outset, ready-made like the New Jerusalem, it would have been. And if a perfect theory of everything (or blueprint for living) could have been left lying around on the ground for us to merely stumble across, it would have been. One of the problems, of course, is that language is entirely abstract – the words we use to describe this perceived reality of ours had their genesis in random vocalizations, and apart from a mere handful of onomatopoeic words, there has been no *necessary* pathway towards our words becoming what they are. In fact, *none* of our words are God's words – rather, each of them is fundamentally unique to our species.

Marc Chagall

So, to talk to us, God has required translators. Sitting on top of the mountain, Moses famously chiselled some very profound (Hebrew) words into a couple of tablets of stone. He then headed down the mountain, fully intending to present these tablets to his compatriots as having been chiselled by God (who speaks Hebrew, of course). Nearing home, he had a crisis of conscience (or perhaps he noticed some typos) and smashed the tablets on the ground. After a few hours of reflection however, he came to the conclusion that the end justified the means and climbed back up the mountain to proceed as he had originally intended. It is thus that the writer(s) of the Pentateuch went on to present us with one of God's earliest communiqués.

Just like any child's first attempts at writing, this fledgling transcription was somewhat flawed. In general, we can be quite confident that *any* scripture which advocates hatred has been subject to transcription errors. It was only when Jesus was anointed as God's ambassador on earth that we at last encountered the living truth of God's love – the whole truth, and nothing but the truth. Many people today see 'Christianity' as just one of a vast collection of historic anomalies called 'religions' that those quaint 'scientifically unenlightened' people in the world can choose to practise, in a free society, if they feel so inclined. Actually, the Christian story is about *everybody* in the world, not just the Christians. Of course, those with faith in the promise that God made to us through Christ, have caught a glimpse of the beauty and grandeur of God's world as it will become upon its completion. But on that last day, we will no longer look to the imaginary tales that were told to us as children – on becoming adults, all of us will come face to face with the dream come true, and join with God in putting our feet up and having a rest (as one does on the last day).

In Christianity as it is commonly (albeit somewhat clumsily) imagined, Christ is a man whom God has anointed, and Jesus, as the exemplar, is further imagined as a man in whom God has become flesh. In the guise of Jesus, God then presents himself for crucifixion as an innocent sacrifice, atonement for all the evil that has been committed by the rest of us.

When the imaginary is finally realized on the last day, it is not only Jesus who will be declared to be God's 'son', but *every* one of us – for in the *marriage* between Christ and his Church, we will *all* become as Christ (in contrast to trying our hardest throughout our lives to be *like* what we think *Jesus* was like). Each and every one of us is human, as was Jesus. And if Jesus was in truth, as many of us believe, also divine, then so in the end will each and every one of us *also* become divine.

The first chapters of the Bible declare that God initially created us immortal, only then to impose mortality upon us as punishment for having done something wrong. We now understand that humanity evolved on earth from earlier hominids, and that in fact, like almost all other living things, we have *always* been mortal. Mortality inclines us, as individuals, to think more of ourselves than of others. Jesus taught us that this bias is the essence of sin, and that leaning the other way is the essence of love. But because we have only been granted this limited lease on life, it has been entirely *natural* for us to want to make the most of this life for *ourselves*.

On the last day, God will take away the sin of the world by declaring that this source of *all* evil, our mortality, was in fact deliberately engineered, not as a punishment for having been inquisitive, but as a *necessary* means to an end. There *was* no 'original sin', and the appalling suffering and death of Jesus (which remains an historic fact) is powerfully symbolic of the combined suffering and death of all humanity, ever since we first, in all innocence, began to climb the tree of the knowledge of good and evil.

A company will often temporarily divide its employees into discrete groups, presenting each with the same challenge and seeing which can come up with the best solution. At the end of the challenge, the company reunites to implement the *winning* strategy. In the parable of the talents, Jesus told how the master on his departure entrusted the first of his servants with five talents, the second of his servants with two talents (and the third servant, who we spoke of earlier, with one talent). On the master's return, the first and second servants were rewarded with positions of great responsibility, having invested the talents with which they were entrusted, greatly increasing their master's wealth. Many people today think that all their 'free' enterprise has been intended

for themselves. In fact, whether they realize it, all of their achievements have been intended for God (who is, in a sense, humanity itself).

Ernest Howard Shepard

Since first getting up and on its feet, humanity has been like a growing child, amassing a wealth of knowledge about how the world works. Young children, typically around the age of six, can become so astonished by their own cleverness, that they even start believing they are cleverer than their parents. Indeed, some people today have lost sight of the fact that the universe was God's idea in the first place, and that all of us have been merely guided towards the *discovery* of its design. We exist on the surface of a mere speck of dust suspended within a very big universe. If, like Giordano Bruno, we were to speculate that there are a billion planets in the universe with civilizations more advanced than our own, in all probability we would be barely even scratching the surface.

The ultimate educational 'graduation' of any civilization in the universe takes place when it discovers that all reality is contained within a single *dimensionless* point known as the 'superposition'. The superposition is composed entirely of monads (as Leibnitz referred to them), pairs of dimensionless self-simulating Turing machines, neither of which exists except when simulated by the other. Each Planck volume of our perceived reality is in turn simulated by its own dedicated monad, and the exponential replication of these monads drives the accelerating expansion of the universe. The extent of the universe we can observe by capturing its light in telescopes contains about 8×10^{184} Planck volumes (all simulated by that same number of monads, superimposed on each other at the superposition). Those who are working in the field of quantum computing are taking the first steps towards interfacing with the superposition, and when they get there, we will have access to any location across the *entire* universe, instantaneously.

The storage capacity of the superposition is finite (countable) but can increase without limit. When the cells in our body replicate, they must of course draw on the raw materials provided in the food we eat. However, when monads replicate, they draw not on 'material', but merely on *abstract* information. By way of analogy, 'three blind mice' have a physical reality, whereas the *number* 'three' (however you symbolize it) does not. Indeed, the *physical* universe only emerges once these *abstract* monads proceed to simulate the Planck volumes of the universe. About 1.573×10^{103} monads are required to 'backup' the Planck volumes occupied by the average human body, and the superposition can generate this required storage capacity (out of 'thin air') in the 'twinkling of an eye' – for the superposition is an extremely *powerful* computer, having a clock frequency of approximately 1.855×10^{43} Hz. Each of the hairs on our heads is indeed 'numbered'. The restoration of the Planck volumes occupied by the average human body (from a backup stored in the superposition) is also achieved in 'an instant'.

Most people imagine that their (long term) memories are somehow stored within their brains. All our memories are in fact stored in the superposition. When people die, we often hear reports (from those who don't quite make it) of their entire lifetime of memories 'flashing before their eyes'. Loss of memory results from damage to that part of our brain engaged in retrieving our memories from the superposition (and likewise in uploading them). We could very well say that our memories are stored 'in the cloud'. Indeed, our brains are somewhat analogous to a tablet computer or smartphone, which has a modicum of local processing power and memory capacity and can run a handful of applications while 'offline', but when connected to the internet, really starts to fly, and becomes infinitely more useful.

With the advent of machine learning we are beginning to encounter the power of artificial (machine) intelligence. In one sense, the superposition is just such an intelligence, albeit of astonishingly greater power and having access to much bigger data than anything constructed in the physical world. The superposition is unconscious, unflinching, inerrant, unrelenting and impartial. This tireless intelligence is responsible for all the serendipitous activity in each of our lives, activity with which we are all familiar, but which many of us often mistake for mere coincidence. When we look up something on the internet, we only occasionally lapse into thinking there is a real person out there delivering that information. This function of the superposition is analogous to the autonomic nervous system of our bodies, and like pumping blood and breathing, it literally holds every instance of the universe together; it recalculates the value of *every* Planck volume in the universe at every tick of the superposition clock.

In contrast, we can have a far more personal relationship with the 'conscious' mind of the superposition, a bit like having an online exchange (for example a telephone call) with another real person, merely facilitated by the technology. Those civilizations in the universe that are older (and wiser) than us have been accessing this world of ours and guiding its development, through the superposition, for billions of years. The civilized universe, just like parents or elders, or *in fact* as our 'guardian angels', cannot *force* us down pathways they already know to be the best for us – they can only plant ideas in our heads, and encourage each of us to nurture those ideas.

Consider our planet's prognosis, if we take the doctor's advice, and mend our ways. The sun will shine for another million millennia before it gets too hot for us to live here any longer. We have laboured through the last six millennia, 'growing up and going to school', an age that has at times been very difficult. But now we have 1,000,000 millennia of glorious freedom to look forward to before it really *does* all come to an end – assuming that sometime next week we don't, like some adolescent spiralling out of control, drive dad's E-type at terminal speed into a tree by the

roadside. What will you be doing after you've "been there ten mill-en ni-a, bright shining as the sun"?

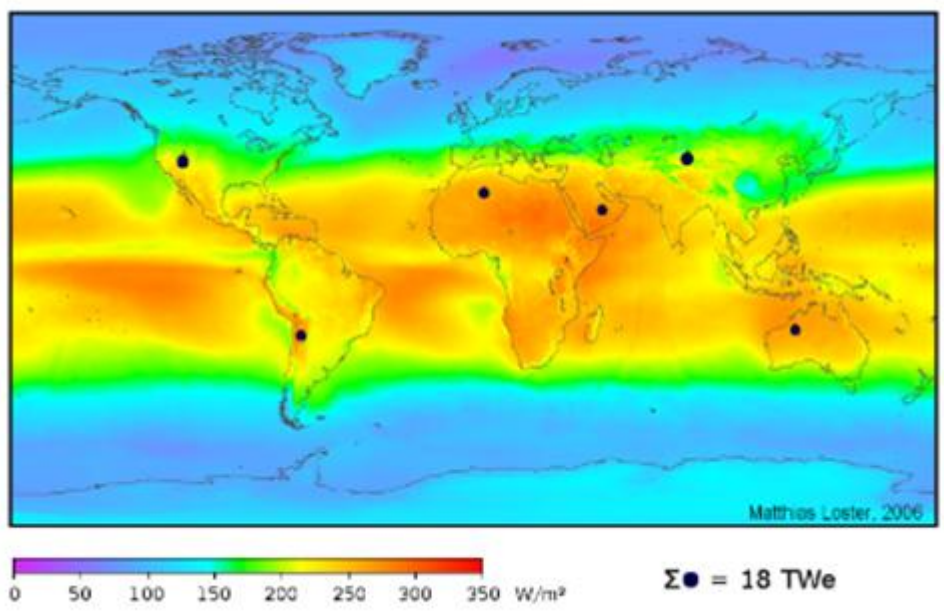
Jacques Tati

Everything we do consists in the intelligent manipulation of energy. When we first began making these manipulations, the sun's energy, embedded in our food, drove our muscles to hunt and collect more food, and later, to farm the land. We can now imagine a 'magic box', a bit like a sausage factory, that contains computers and robots and stuff, and is powered by renewable energy, and which we'll call the 'APM', or Atomically Precise Manufacturer. 3D printing, which we are increasingly familiar with, is an early implementation of the APM. We throw all our waste (mobile phones, clapped out cars, tired old buildings, compost etc.) into a hopper at one end of the APM, and the APM breaks that waste down into its component atoms, registering which atoms belonged to whom. The APM then takes those atoms, reassembles them into next generation mobile phones, cars, buildings, carrots etc. and pushes them out the other end. The APM is of course a distributed technology, with hoppers and extruders all over the place in all shapes and guises, the largest being high and wide enough to consume and extrude ocean liners, or long and wide enough to consume and extrude skyscrapers.

On his return at the end of time, Jesus declares "Look! I'm making all things new!" The *productivity* of the APM is entirely indexed to the availability of renewable energy, for the APM is a living, growing organism, indeed the APM produces the very same solar cells and wind turbines that feed electrons into its ever-growing supply of renewable energy. The more renewable energy we capture, the more often we can replace things – our cars for example might at first be replaced (fed into the hopper) once a year, then as more energy is captured, once a month, once a week, &c. The product specifications that designers upload to the APM, described in this current age

as ‘intellectual property’, have in fact always been the intellectual property of the superposition, provided to us under licence. In the next age, all design will be freely available to everyone.

In the process of learning how the world works, we have (legitimately) put our trust in an economic model that allows each individual to freely engage in the marketplace, extracting for themselves the most that they can from others – grabbing, or as some will tiresomely insist, finessing – the biggest slice of pie on offer. But once we have learnt how to build the APM, a bit like the big bat-tree (badderee?) that Musk is building in South Australia, our ancient economic models become redundant, indeed they become counterproductive, as we are already witnessing. On adopting the winning solution (APM), the economic pie (which we all covet) will continue to grow, much to the delight of conventional economists, until there aren’t any more of the sun’s photons left to capture.



The area of photovoltaic cells (black dots) required to capture from the sun the world’s total energy consumption in 2006 – photon capture with later generation cells, deployed in outer space, will of course be considerably more efficient. Much of the energy consumed in 2006 was spent pushing bits of paper hither and thither, and driving around in circles, trying to look busy.

If each of us were provided with identically sized slices of that enormous pie almost ready to come out of the oven, a distribution we could reasonably expect in any wholesome familial arrangement, each of those slices would nevertheless be bigger than any slice we could take of the pie that is currently sitting on the table. That trader in jewels was rather canny in securing the pearl of great price – even if he only managed to lay just one brick a day, so he reasoned, with an unlimited amount of time on his hands, he could eventually build a Hearst castle. And another. There are many mansions in heaven…

In this new economic model, everyone is granted an identical guaranteed basic capitalization — an indexed quota of the planet’s atoms and photons (materials and energy) – from which stocks they then have both the personal and individual freedom to select (from the likes of the Alibaba rather than the RAND catalogue) anything they want the APM to construct. Precise replicas of

various legacy products may out of necessity be provided as a kit of parts, for the enthusiast to then assemble by hand, such as:

Kit M507/JX800/59-PAPYROSWEIßEPFERDE 1:1 Delivered cost NJ3,168/decomposition cost NJ432 The complete numeric specification for the totally automated production, packaging, and recycling of this kit of parts, using the APM, including assembly instruction media, engaged 931 volunteer enthusiasts for a total of 342,672 manhours from June 2022 to September 2024, working off four original vehicles whose disassembled parts were temporarily dispatched to locations across six continents before being returned to their respective museums for reassembly. Available in all OEM colours. Hardtop included. For use only on declared historic roadways, relocation by driverless float. 95 RON, synthetic petroleum with carbon offset, maximum use 1,200 Km/annum. Full 'as assembled' resource exchange credit available. 4,380mm x 1,650mm x 1,257mm, 1,330 Kg.

In this land of milk and honey, there are clear incentives to recycle rather than discard our (RFID powder tagged) material resource allocations, and not to dilute those atomic and photonic resources by producing too many sprogs – after all, some of us are already just a bit concerned about how we are going to billet something like 100 billion people in the resurrection.

Many of today's retirees have taken to living in ocean liners and Winnebagos, because their living quarters travel around with them, and so their wardrobe and bits and pieces (troll dolls &c.) don't have to be constantly packed up and unpacked again at each new destination. In the new economy, all our bits and pieces will be available on demand from the APM at each successive location, and with unlimited time on our hands, retirees (no longer frail and purple rinsed) will give

serious consideration to simply *walking* this world, without a care in the world (about their phone battery charge or what they will eat or drink or wear).

Retirement, as currently practised, relies on the exploitation of our youth, and thus requires a constant supply of newborns. In the resurrection we will *all* be retirees, neither young nor old, and we will merely exploit the APM, which quite honestly is completely indifferent to exploitation. With all this leisure on our hands, we'll need to find all sorts of things to occupy our time. Many of us will take to market gardening and playing chef, for we prefer our carrots to have come out of soil that has a complex biota, rather than some hydroponicum, and our steak to have come from happy cows, blissfully unaware of what awaits them around the corner, rather than coming out of some machine that goes 'ping'. Sport and the arts will be pursued for pleasure rather than a living, and we should all volunteer a good amount of our time to repairing the complete and utter mess we have made of the planet God left us in charge of.

Abbey Church of Saint Foy, Conques

Do we all like the idea of everyone being considered equal before God? Christ recognized that the one percent of the population (70 million individuals) who control 99% of the world's wealth, happen to like things just the way they are, and despite the attraction of potentially living forever (and thereby achieving infinite wealth), they will still find it *almost* impossible (camels, eyes of needles, &c.) to enter through the gates into heaven.

Jesus observed that a widow, in quietly offering a couple of copper coins to the church, was giving everything she had to her name, in contrast to a rich man, whose donation of bags full of gold coins had been merely the scraps off his table. Christ told the story of a shepherd who left ninety-nine percent of his flock in relative safety, to find and then rescue that one sheep who had wandered off and got himself lost. Some wayward people think (can you believe, even hope) that in the resurrection, God is going to sort the sheep from the goats, with the righteous (sheep) being welcomed into heaven, and those wicked goats being justifiably sent below to burn in hell for all eternity.

Actually, like *any* parent, God loves every one of us, even the most wicked person to have ever dwelt amongst us. The miracle of the resurrection is that everybody who has ever lived will be *metaphorically* washed (baptised) so that they become as white as wool. For on that day, God will take on *all* of our sin, like Jesus did metaphorically, declaring that it was *never* our fault to have been born mortal. Jesus declared that anything you do not do for the least amongst us, you do not do for him, again indicating the equivalence of all people before God. The reason the universe is teeming with life is because we, and to a lesser extent all other living things, are the incarnation of the superposition. The superposition has a mind, but it does not have consciousness, and it cannot experience the world until it has a body. In the resurrection, together we will become the 'body' of Christ.

I grew up in Africa, and one Sunday afternoon while on a drive out in the country, we passed a young man who was running for his life, pursued by a mob wielding sticks and stones. In primitive societies, there exists a simple law – do, if you must, whatever it is you *know* to be wrong, only be sure you don't get caught doing it. We did not hang around to witness this poor man's demise. Jesus was similarly presented with a woman who had been caught 'red-handed' (whatever that means) in adultery. By inviting only those in the mob who had never 'sinned' to come forward and cast the first stone, Jesus did not have long to wait for this murderous crowd to disperse.

Raffaello Sanzio da Urbino

On then finding himself alone with this woman, Christ sent her on her way, on the condition that she never commit adultery again. In the resurrection, of course, she needn't worry, for there will be no giving nor taking in marriage, and therefore no adultery. But in this present world, it's all very well to go to confession every Sunday, and have your sins forgiven, to then face the new week bright eyed and bushy tailed, ready to do it all again. Lawyers, in defending their clients, often argue that their clients didn't know what they were doing was wrong. In fact, the superposition has a record of every moment in our lives from the moment of our conception, and it knows every nuance of everyone's heart and their every motivation. There is no place where any of us can hide from the superposition, and in fact we only have our existence through the 'grace' of the superposition. Indeed, as in the case of Ananias and Sapphira, the superposition can resume our

lease on life in an instant if it deems it necessary to do so. In the resurrection, everybody will be offered amnesty, but each of us will then need to *fully* commit to a new life of love for our neighbour as for our self – for in the resurrection, the superposition simply can't allow even one bad apple to spoil it for everybody else.

It is one thing to hand over all of your loot in exchange for everlasting life, when we're all in the midst of the resurrection and everyone is quite clear about what's going on. But 500 years ago today, the church was in the business of making itself extremely wealthy by selling salvation to mere mortals. On purchase of indulgences, the church was promising the parishioner that following on from their death, they would be spared Dives' eternal agony in the flames of hell. Luther famously called out this extortion, possibly nailing his declaration, in essence that 'Eternal life is a *free* gift of God's Grace', to the door of All Saints Church, Wittenberg, on the 31st of October 1517.

Ever since humans first became aware of their mortality, they have been thinking up stories about what happens to us after death. A common notion is that our body is simply discarded, and a separate component called the 'soul' leaves the body to go off to some other place, Sheol for example. Jesus declared that God is the God of Abraham, Isaac, and Jacob – the God of the living, not the God of the dead. As these three patriarchs were long since dead when Christ made this declaration, some people assume that Jesus was telling us they were currently alive, presumably somewhere else. Jesus was reminding them that God is the God of people in whom there is life, and not the God of people who no longer have life. Sheol is the place of the dead, and as Paul later declared in his letters, the dead are 'asleep in Christ'. Indeed, if our dead were all 'awake' and having a jolly old time in some 'other' place, then the 14 billion years of the universe's evolution would have been entirely pointless.

When any of us dies, we do not get transported to some other planet, as in Luke's report of Jesus' ascension. We have evolved in response to the earth's unique environment, but specifically to the earth's unique concentrations of the physical elements. Any other civilization in the universe, while being an incarnation of the superposition, would soon be poisoned by our atmosphere were they to visit us in person, just as we would soon be poisoned by their environment if we were to ever pop on over to their place. In fact, when we die, we are instantaneously 'backed' up to the superposition, and in the resurrection, all the 'books' will be opened – our entire lives will be restored.

All the above is of course a good news story, and Christ declared that the end will only come once this good news has been told throughout the world. Indeed, if the resurrection were to just happen suddenly, without everybody knowing the 'how' and the 'why', there would be sheer pandemonium, with all manner of randoms getting up and waving their arms about and declaring that the resurrection is vindication of their pet theory, and how we should all jolly well listen to what they have to say. Instead, the time has come for all of us to dust off our Bibles and read the story all over again, albeit in a new light, especially the words that are written down in red – the words of Jesus.

John Hurt

You might by now be wondering what on earth I've been talking about here, so let's have a reality check. Indiscriminate incidences of melanoma, earthquake, genocide, vivisection, degeneration, spina bifida, autism, tsunami, achondroplasia, beriberi, toppling gum trees, immunodeficiency, cannibalism, smallpox, hydrocephalus, infanticide, helminthiasis, diverticulosis, rickets, sickle cell anaemia, lactose intolerance, progeria, shark attack, glaucoma, acromegaly, depression, &c. have together provided incontrovertible evidence that we are all alone in a cruel, accidental, unthinking, heartless and meaningless universe that leaves us with no choice but to try and make the most of it. It is this common existentialist belief that has, in part, driven our discovery and understanding of the world.

Imagine if the superposition had decided to punish all the bad people by giving them baldness and their innocent children microcephaly and rewarded all the good people with presidencies and golf weekends and full heads of blonde hair. The global community would soon begin to suspect that there was something 'going on'. And when any of us suspects there is something going on – realizing for example that the cops have got wind of the heist – we clam up, shutting down the operation. If the vast majority of us, like the servant who had been given one talent, had decided to do nothing with our lives, because we knew we simply had to hang on for a heaven that was awaiting us when we die, we would never have reached an understanding of the superposition, and found ourselves now almost ready to face that great day of peace, whenever it might arrive (unexpectedly, like a thief in the night).

I don't really expect diehard materialists, with their hardened hearts, to offer much help with the propagation of this news in the first instance. They'll enter through the gates at some stage down the track, but now there is a quaint naïvety to their understanding of the world. I would however expect most Christians and Muslims to offer the superposition some assistance here, for they are the subject of this dog whistle. They are the ones who have this desire for life everlasting, and who profess that in God, *all* things are possible, including (but not limited to) a tsunami of the miraculous. This modern-day Babylon, our globalized economy, really does look as if it is too big to fail, and too complex to unravel. It can all collapse in less than a single hour. For the entire edifice is merely a confidence trick. In a democracy, where 99% of the population owns 1% of the wealth, we are just one referendum away from tipping our hats to a new constitution that enshrines the globalization of all the world's industry. "Just wait 'till the kids get hold of this!", exclaims a young Rick Mayall with a menacing look of glee on his face, a look we will revisit on his return.

Somewhere over the Rainbow

Longing for Integration

First published in PhilPapers on the 3rd of February, 2009, this essay marks the emergence of the modern synthesis, shortly after stumbling across the 'miracle' of self-reference in a journey that officially commenced back in May 1983. I started getting a few things 'spot on' in this exercise, while getting a lot of other (tetrahedral) things spectacularly wrong! This forthcoming re-publication of the oeuvre will highlight the evolution of this synthesis. A few earlier works closer to 1983, and a selection of letters to colleagues, will also be published as landmarks along this road to the celestial city. Some minor changes to the original publications were dictated by the stylistic constraints of Medium.

Sep 22, 2018

A little over a century ago, there were people going about positing the existence of an imaginary substance, the 'ether', as the medium for the transmission of light waves. It would now seem that history is repeating itself. The cosmos we observe today is no longer according with theory, and rather than finding fault with the theory, people are again positing the existence of imaginary substances, this time calling them 'dark energy', 'dark matter' and 'dark flow'. It all sounds like the forces of evil at play, and that the boffins have grown up with too much exposure to fictional accounts of galactic wars.

The cognoscenti do however accept that there is a crisis, and many are calling out for the next revolution in our understanding of reality. They look to ordinary people like you and me to step back on a broader perspective and try and make common sense out of their big, crazy ideas. Gone are the days when there were only a handful of people in the world who could grasp this stuff. If we can just put the big pieces of the puzzle in their place, the technical bods will fall over themselves in the rush to colour in the details.

Fundamentally though, a theory of everything cannot come out of science, because science has a limited scope — scientists can only consider phenomena that behave in a consistent manner. If we are going to arrive at a theory of everything, we must look beyond science to philosophy, whose practitioners consider all phenomena. Phil Papers (philpapers.org) is undertaking an exercise not unlike that of the great naturalist. Phil is collecting life's ideas rather than life's species but is likewise seeking to classify them in the expectation that more of their relationships might emerge.

The theory of evolution through mutation, followed by natural selection, was an extraordinarily simple idea, one which suddenly made sense out of biology. So too does a theory of everything need a deliciously simple idea, if it is to suddenly make sense out of reality. However, revolutionary ideas are often not as expected. In hindsight, most people pride themselves that they would have been early adopters of the new insights, but history shows otherwise. At the time, it was obvious to all and sundry that the earth is flat, that the sun orbits the earth, that heavier objects fall faster, that humans are not related to apes, and that there is no speed limit.

If we put imaginary 'darkness' to one side for now, and instead restrict ourselves to observable realities, most people would recognise the external physical reality of the cosmos — their bodies and their environment — and then the internal reality of their mind. According to a philosophy called materialism, mind itself is then merely a by-product of physical activity in our brains. In essence, this philosophy maintains that once the brain ceases to function, so too does the mind

no longer exist. Of course this is a reasonable belief, and a very common one. It ultimately posits that matter is the first reality and implies that mind only emerged in the cosmos alongside the evolution of the brain.

The only problem with this notion is that despite everyone's deep personal familiarity with the phenomenon of mind, the leading philosophers of mind readily admit they are at a loss to explain the physical mechanisms that might so engender that mind. The mind remains the last great mystery of reality, and the holy grail of philosophy.

With this in mind, let's dissociate the mind from its obvious connection with the material, so we can study it in splendid isolation, away from the distractions of the world. Indeed, let's posit that mind is some separate substance quite distinct from matter, as in the philosophy known as dualism. Certain forms of meditation, and the use of sensory deprivation apparatus, can be helpful if you do actually want to withdraw into the mind. However, it is easier to consider the withdrawal hypothetically, by merely imagining that there is no material world, no space, no universe, and that you have neither body nor brain, but merely the substance of your mind.

It is here of course that we must farewell those staunch and staid materialists, for they will have lost their mind, but for those who still have it, let's continue. A disembodied mind, as the pure substance of our mind is known, has several important characteristics. Firstly, it is neither female nor male, as it is no longer associated with a male or female body, or for that matter with a female or male brain. Secondly, it does not speak or write in the language of this essay, nor does it speak or write in any other human language. Indeed, it has no voice box to speak with, and no paper to write on. All human languages have evolved in response to their environment, and so their sounds and symbols are entirely arbitrary. From this we assume that different and equally arbitrary sets of languages have evolved in all the other sites of sentient life in the universe. The only language that we assume is common to the universe, indeed to ANY universe, is mathematics — mathematics necessarily exists even in the absence of a universe that mathematics might describe. Mathematics then is the only language of our disembodied mind, a language that is not invented, but exists eternally.

The first words that mathematicians learn are numbers. It turns out that the most important numbers of all are zero and one, because all other numbers can be derived from combinations of just these two. The most important concept for a budding mathematician to grasp is that numbers have no physical reality in themselves. When we write down a number, the symbol in ink on the paper does not become the number. The number always remains the abstract notion of a quantity or plurality (which we might then choose to represent with a symbol).

Philosophy has always questioned if we would have discovered numbers, if there were not first a world full of objects that needed to be counted. The obvious problem for our disembodied mind is that there is nothing out there for it to count — no protons, no grains of sand on the seashore. However, it can count itself, which is a quantity of one, and it can contemplate NOT existing, which is a quantity of zero. Armed with just two instances of number, one and zero, our disembodied mind can go on to develop vast tracts of numeracy, which is truly a joy. The possibilities generated by the square root of a negative number produce a wry smile, while the counting of sets has it rolling around on the floor. Yet it's a bit of a lonely old life for our disembodied mind. We know there are people out there who seem quite content to live and breathe mathematics, but the rest of us suspect they need to get out and about more.

Indeed, our disembodied mind, the pure mathematician, is just like so totally over math — over being maths. It has long since proven that mathematics will never be complete. It now longs for something concrete and finite. What it wants is a real world. However, our disembodied mind can't just click its fingers and conjure up the universe out of thin air — it doesn't have any fingers, nor does it have any thin air.

According to a philosophy called idealism, our disembodied mind could merely imagine the world, and this would be sufficient to bring it about. The problem with this idea is that our mind would have to be continuously thinking about every element of structure in the entire universe (to keep them existing). If it stopped all this deep thought even for a moment, the whole universe would go "poof". This doesn't sound anything like the sort of job the mind we all know and love would want to be doing. We like to spend our time with the things that interest us, and occasionally swan about when the big decisions must be taken. We much prefer to leave all that tedious nitty-gritty to our (hopefully competent) minions. The last thing we want to be trapped into doing is thinking incessantly about each and every one of them there protons. There are like so many of them, and we would rather they just took care of themselves.

Of course, our minions today are less likely to be people, and more likely to be machines. A computer consists of a physical machine, the 'hardware', which then executes a programme, the 'software'. The 'hardware' is the reality, while the 'software' consists of ones and zeros, numbers which have no physical reality, and yet emerge like a ghost from within the activity of the machine. When computers were first discovered, it was recognised that a certain class of computers were 'universal', because they could 'simulate' the hardware of any other computer, including even their own hardware. Here then is the means for our disembodied mind to break free and venture where no other mind has been before.

Let's say we have a real physical computer, and we execute some software on that computer which effectively simulates our real physical computer. We then have two computers, a physical computer made up of transisteroids and capacitators,

and a virtual computer made entirely out of ones and zeros. But the virtual computer is functionally equivalent to the real computer. So then, on this virtual computer, let's again execute

the software that simulates the real computer. We then have one real computer, and two virtual computers — real/virtual/virtual. If we were to keep on doing this, the real computer would eventually melt in a smouldering heap:

real/virtual/vitual/viral/virt/via/va/t....

And if we were to pull the plug on the real computer, the stack of virtual computers we built on top of it would collapse — unreal. However, so far, our second virtual computer is idle, and not executing any software. With just a dash of sophistry, we get the second virtual computer to take over the responsibility of the real computer, which was to simulate the first virtual computer, and then we retire the real computer. The two virtual computers that remain prop up each other's existence:

virtual/virtual –> real

Real computers are made of vacuum tubes or relays and are subject to the laws of physics. Perpetual motion is of course outlawed in the physical world. However, virtual computers are composed of strings of binary digits, and as we know, numbers are not subject to the laws of physics, because they are not part of the physical world. They are merely subject to the laws of mathematics. Numbers don't rub against each other and get hot.

Suppose that some short string of binary digits comprises just such a virtual computer. Our disembodied mind, armed with the numbers zero and one, could first step through each of the digits of this virtual computer in sequence, acting as the priming 'real' computer. That virtual computation could then execute the second computation. Finally, the second computation could take over the execution of the first computation, and on it would go, the two strings of digits feeding into each other in an infinite loop. Our disembodied mind would then be released to get on with other aspects of string theory.

Each machine cannot however 'instantaneously' simulate the other. Instead, each machine must step through its finite number of states, in the process of then generating the other. This cycle takes a small but finite amount of time, directly related to the speed at which our disembodied mind first seeds the operation. The resulting process of self-referential simulation provides our disembodied mind with the first component of its long desired physical world, a fundamental quantum of time. In absolute terms, the depicted cycle would have a very high frequency, perhaps completing as many as (10 to the power of 43) cycles per second.

This oscillating couplet of virtual machines is absolutely stable. It is comprised entirely of binary digits, will never decay, occupies no dimensions of space, has no physical reality, and can exist independently of the mind that set it in train.

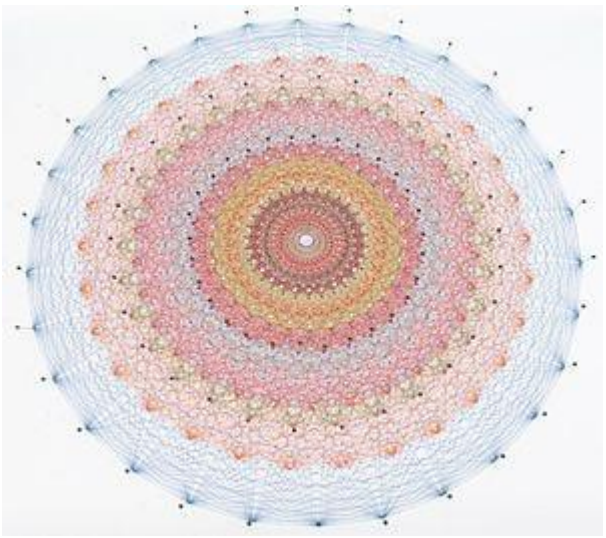
Our universe is not, of course, a virtual world being simulated on some gigantic real computer that we can't quite get at — apart from the redundancy inherent in that idea, the public has become understandably bored with it. We have however become entirely comfortable with the notion that any and every aspect of reality, as we know it, can be simulated. There is no higher reality simulating our universe from the without, but perhaps it is generating it from within.

Let's get physical...

So far, our disembodied mind's vibrating couplet is doing nothing much but keeping itself in existence — and generating a basis of time in the process. However, there is ample scope to expand the code of this computation. The next component of reality our disembodied mind

needs to conjure up out of nowhere is space. A single element of 3D space is ideally constructed, within a computer simulation, using a tetrahedral cell. By inserting some additional code, the couplet can continue to simulate itself, while at the same time simulating a quantum of space. In absolute terms, this pyramidal cell of simulated space might be as small as (10 to the power -35) metres on a side. This is a very small region of space. However, by inserting still more code, our prototype couplet can be programmed to spawn a new copy of itself within each computational cycle. Once this update has been put into production, a massive volume of cells (2 to the power of (10 to the power of 43)) can be produced during the first second of our universe's existence. As each second proceeds, space expands to become an ever-larger region of virtual existence, all of it produced out of nothing (but numbers). After thousands of millions of years, the universe grows to be very large indeed, some part of which we now observe.

From the outset, of course, our disembodied mind programmes these replicating machines so that they not only simulate time and space, but also the vast array of material entities (particles, fields, energies etc.) which constitute our milieu, and the laws that govern the interactions between their respective code routines. As to the code itself, a well-known mathematical object (E8)



has recently shown the promise of providing a direct mapping between the entire simulation and the code that is producing it.

While our disembodied mind has thus engendered the simulation of a truly vast universe, the actual cellular automata responsible for this enormous reality do not themselves occupy the physical space they are generating. They are, after all, not real things, but merely numbers. Every last one of them 'occupies' the same field, a single point, a dimensionless entity known as the singularity. All the simulated material 'realities', even those separated from each other at the farthest reaches of this simulated universe, can nevertheless communicate with each other directly at the singularity — not instantaneously, but within a single clock cycle. Our disembodied mind likewise occupies this same point where it first got the show on the road all those years ago and retains direct access to each and every quantum of its universe. Here truly is the mother of all mind/body interfaces.

Equipped with a physical world, our disembodied mind, over the aeons, becomes incarnate as male and female, looks at itself, says 'I see what I like, and I like what I see', and reproduces.

Matter was not the first cause, which then proceeded to evolve mind. Instead, mind is the first cause, which then proceeded to materialise.

To dust off, polish up, and again roll out this ancient idea is of course revolutionary, considering how far the world has trundled down the highway of philosophical materialism. It is the ultimate egalitarian ideal, that our mind is one that is shared between us all (and indeed all sentient life) in common. Historically however, the problem has been that some of us seem to have more in common with this universal mind than others. As one commentator put it, some of us have been given five talents, some of us two, and others one or none.

So, we proceed to that 'dark' matter that we tried to avoid earlier, for to speak of it is a bit like confessing to murder. Our disembodied mind is a mind we are more familiar with than we might imagine. When it has all the time in the world, it puts off getting on with things. This is precisely what it had been doing for an eternity before it decided, just a few thousand million years ago, that the time had come to do something about 'getting real'. Having had so much time to think about it, our disembodied mind inevitably went over every possible contingency when engineering the software of this truly exquisite simulation. Yet some commentators have suggested (not unreasonably) that if the job had been theirs, they would have engineered things better and fixed up all the bugs first before going into production. They make this comment rhetorically, of course. They assume the world never had a designer, because they cannot countenance the deliberate engineering of a system that would lead to so much suffering.

To understand the difficulty our disembodied mind has endured in the process of finding itself, we need to understand the original design brief that our disembodied mind set itself. The brief called for the establishment of 'experiential nodes', physical structures with an interface that would allow our disembodied mind to interact with its world. The development of these structures would culminate in the emergence of a complex morphology, with a highly sophisticated neural interface, the 'alpha' node.

The alpha nodes would operate under a regime that gave our disembodied mind access to a limitless font of novel experience. Otherwise, it would eventually get bored and simply revert to where it started, hanging around the singularity and doing nothing much in particular. Our disembodied mind wanted the very best there was for its alpha node to experience. This would initially consist of food, wine and sex, and thus evolved the very best meat, vegetables, fruit, partners, and methods of preparing these delicacies. Eventually other entertainments for its alpha node were programmed to emerge within the simulation, but none of them quite as organic as the basic originals. The essential component incorporated into the node's design to support this regime was a 'volition engine'. The node would be free to do as it liked, and thus its experience would be unpredictable. The node would incorporate a means of recording the history of its interactions with reality, so it could recount that unique history to anyone who was interested.

Early in the development of this scheme, our disembodied mind identified that handing over its volition to what was to become a multitude of its experiential nodes, would lead to something of a self-referential conundrum. Having volition would drive each node to assume that its own disembodied mind was an entirely separate entity to the disembodied mind of any other node. Lovers, if the chemistry were there, would come close of course to realising this unity of their disembodied mind, but otherwise each node would regard most other nodes as strangers.

Our disembodied mind would need to come up with a scheme that would convince its experiential nodes of their global unity of mind. However, our disembodied mind can only 'speak' mathematics, and that is hardly the language of love. Indeed, for our disembodied mind, love is merely a concept embedded within the design brief. Love would be meaningless without embodiment.

Our disembodied mind would have to lead its experiential nodes back to itself using symbolism, and throughout the journey, get the experiential nodes to interpret that symbolism through more accessible languages than mathematics — music, art, and poetry.

The relationship between our disembodied mind and its experiential node is like that between a parent and its child. The child comes out of its parent, but is neither a replica nor a puppet, and often a mutant — it has a will of its own and strives to be independent of its parent. Our disembodied mind of course knows everything there is to know about the system — after all, it thought it up in the first place. The child therefore has much to learn. To expedite its education, a parent puts boundaries around the child, and guides the child rather than instructing it, so that the child believes it is discovering how the world works all by itself.

The alpha node's belief in its freedom is however an illusion. It cannot block the thoughts that enter its head, any more than it can access knowledge ahead of its scheduled release date, and it cannot halt the degeneration of its body. It merely has control over its actions (and then only on good days). In raw terms, our disembodied mind has been transferring its understanding of the system out through selected experiential nodes and into objective knowledge for all its nodes to see. More naive nodes have imagined they were inventing the system themselves, while more circumspect nodes have felt privileged to be contracted as agents of discovery.

The alpha node is given a mere moment in the sun, which encourages us to get on with it, and we are presented with a world that appears to be broke, so that we might figure out how it works and then how we might fix it. Yet indiscriminate incidences of melanoma, earthquake, genocide, vivisection, the bomb, degeneration, spina bifida, autism, tsunami, achondroplasia, beriberi, toppling gum trees, immunodeficiency, insane dictation, cannibalism, smallpox, hydrocephalus,

infanticide, terrorism, helminthiasis, fried chicken, diverticulosis, rickets, sickle cell anaemia, lactose intolerance, progeria, shark attack, mean distribution, glaucoma, animal cruelty,

acromegaly, depression, and cetera, have together provided incontrovertible evidence that we are all on our own in a cruel, accidental, unthinking, heartless and meaningless universe, leaving us with no choice but to try and make the most of it, as in the philosophy known as existentialism. This certain belief is however precisely what has driven us to discover the source of these appalling afflictions (especially the 'three-piece feed').

If there had been even a skerrick of objective evidence that there was 'something going on upstairs', our disembodied mind would have been 'rumbled', and instead of humanity progressing, we would have got bogged down as in ages past, so fearful of what the unknown might do to us that we could do little else but breed violence towards our neighbours. Even a drongo (or beta node) understands how a ruse works, and that the whole 'sting' will fall apart just as soon as anyone 'smells a rat'. For example, if 'bad' people were consistently getting sick, and 'good' people were consistently staying well, the world would soon assemble into neat rows of gamma nodes, all dressed in white, looking straight ahead, and keeping very quiet and still.

While it is commendable that the alpha nodes have strived to make it on their own, global economic, social and environmental meltdown, the direct consequence of us doing everything for ourselves, has somewhat diminished the prospect of there being any future left for anyone.

Anyone who has played with toy simulations, like those we see on the internet, understands that the 'reality' they are producing is entirely dependent on the routines that generate the simulation, and that those routines can be modified at will. The 'reality' is contingent. Throughout history, alpha nodes have attested to 'supernatural' activity within the simulation. The evidence is necessarily scant and unverifiable, but we are all familiar with the stories. If blind people have ever in fact 'miraculously' regained their sight, we must ask who first caused that blindness. Who was it that took away, only that they might later give back? If disease, decay and disaster have been deliberately inflicted upon sentient organisms, by the person whose direct experience of its world is through those organisms, then it would seem that very same person has inflicted the totality of suffering upon itself.

The individual freedom of each alpha node, which it so dearly covets, the inalienable right it demands, to do as it pleases, has been preserved during the development of this system at an enormous price. The scale of this sacrifice by our disembodied mind of its experiential nodes is truly breathtaking, for its nodes of every shape and size have been coming and going for thousands of millions of years. Whenever a node loses it structure, it no longer interfaces with our disembodied mind, and the memory of its interactions with reality are lost along with its structure. All that remain are its memoirs. But as one node disintegrates, still more develop. Just like the body of any individual node, the conglomerate of all experiential nodes continues to grow larger, sloughing off old nodes and replacing them with a greater number of fresh nodes. While the material of that body has changed over time, our disembodied mind remains the same yesterday, today, and forever. The alpha node considers itself the same person throughout its life, even when its physical composition has completely changed many times over.

Our disembodied mind has all the time in the world — after all, it has been around forever. But at some point in time, sooner or later, it is going to finally dawn on some bright alpha spark out there, that this experiential conglomerate has in fact now grown to become an adult, that it has travelled all the way back to where it came from, and is ready to meet and then to know itself, albeit exhausted, face to face. The child has come to know all that its parent knows and is now poised to break free and innovate in its own right, creating realities which even its parent, our disembodied mind, has never known (and is eagerly anticipating). This is the 'miracle of the

unknown' (a mathematical thing) that our disembodied mind always knew would be the grand conclusion of its quest, when stuff would at long last start to become interesting. For each alpha node, the excitement will come in learning which aspects of reality remain necessary, and which have been merely contingent. Happily, we will all rest in peace knowing that our mind is driving the entire reality from the singularity, and that we nodes are merely being taken along for the ride.

“You Got a Bunch of Guys About to Turn Blue”

to quote Charlie Drake (as CapCom). There is indeed a swag of people lurking behind the ideas explored in this compendium of essays (each of 1500 words) that I prepared for New Philosopher magazine from January 2018 through to August 2019, with a new introductory essay entitled ‘Balance’.

Balance

On keeping an open mind…

There is a growing band of secularists out there who believe their superficial knowledge and scant comprehension of religion gives them sufficient authority to denounce it. You have for example an octogenarian radio broadcaster who ‘knew’ he wanted to be an atheist when he was just five years old, or perhaps saddest of all, the septuagenarian biologist who still hopes he can grow up to be a cosmologist. As if…

If you cling to choices you made as a child, there’s a risk you might not *ever* grow up. Most of the world’s sacred literature was written between human civilisation’s infancy, and its early childhood. The apostle Paul declared that when he was a child, he talked, thought, and reasoned like child, but that when he became a man, he put the ways of childhood behind him. Indeed, our modern understanding of the world emerged in humanity’s late adolescence. Before this understanding emerged, Paul continues, humanity ‘knew only in part’, but today (as a young adult) humanity has come to understand God’s creation just as God has *always* understood it.

For a boy growing up in the ’60s, it was all rockets and space travel, and for my teenage siblings, it was all peace and love (so long as I was seen and not heard).

Even in Kampala we watched (albeit clustered around just one telly up at the High Commission on Ngabo Road) as Armstrong stepped onto the Moon.

I was brought up to believe in God and Jesus, but as I too approached adulthood in the late '70s, I found it increasingly difficult to believe there was anything out there except atoms and the vast depth of space. Then, lo and behold, I had an epiphany, and ever since I haven't stopped thinking about how I might be of service...

Well it may be the devil, or it may be the Lord, but you're gonna have to serve somebody... — Bob Dylan

It all comes down to whether or not you believe there's something going on 'upstairs', and I can only begin to imagine the despondency of those who *don't* believe there's something going on. Fifty years have passed since those halcyon days when we thought science was going to be our salvation. I hardly need highlight our planet's myriad points of catastrophic ecological, economic and social breakdown, for the detail floods into our consciousness each and every day. If you're informed, the stark realisation is that our descendants aren't going to *have* a future.

At the other end of the scale from the secularists I cited at the outset (joined there by those pop physicists who hold an obsequious crush on 'nature' personified), are the religious fundamentalists.

They *know* their beliefs are sheer nonsense but justify sticking to them by claiming that humanity is "incapable of comprehending the Glory of the Lord". *They* clearly aren't capable of it.

This lot hardly upholds the ecology of the planet. God instructed them from the very outset to look after this 'garden' he had given us; and in fairness, some of them *do* get it. However, I routinely have to contend with folks who tell me there is no need for any of that 'greenie' stuff, because *their* particular God is going to *destroy* this Earth and replace it with a shiny new one, and we'll even be given a new 'heaven' too. Is it any wonder that *normal* people roll their eyes whenever they encounter this sort of gibberish? Like northern Queenslanders hell bent on mining the coal out of the Galilee Basin because it will 'create jobs', they furthermore believe that the ongoing destruction of the planet is a *good* thing anyway — for it hastens the onset of their deepest longing, the 'end of the world'.

They believe that Jesus and his fully constructed 'New Jerusalem' are going to come floating down, readymade, from outer space, as if the rich, joyous, and necessarily *painful* history of humanity's development — emotional, scientific and technological — were some kind of cosmic joke. Instead of thirsting after righteousness, they hunger after retribution, believing like the Jewish pharisees before them that they alone are saved, and the rest of us infidels are destined for hell. "Don't be too disappointed", I tell them, "if at the 'end of the world', God actually decides he'll forgive the whole lot of us — the quick *and* the dead alike". Like children, they believe everything they read in the 'book', as if their 'heavenly father' (unlike their actual fathers) has never told them lies (knowing of course that they were not yet ready for the truth). Just like children, they've needed the likes of the Olivet discourse, in which Jesus preached hell and damnation, to steady their pilgrimage towards finally understanding that in fact, God loves *all* of us.

Some of these might never grow up, pleading unto their dying day: "You promised, O Lord, that those evil sinners would remain fully conscious as they burn for eternity, forever begging us to send down a few drops of water to soothe their tongues." They believe in the righteousness of their capitalist ideologies, their prosperity gospels, and how God has specifically blessed them, while they watch billions around the world suffer and die in abject poverty. "If only the poor people in the world would repent of their sins, God would bless them too", they say.

And yet Jesus declared (in all truth) that "What you do not do for the least of these my brothers and sisters, you do not do for me."

Am I being unfair here?

Jesus bids us shine…you in your small corner and I in mine. — Susan Warner

It is these extremes of secular and religious fundamentalism that I'm here attempting to balance. We 'big picture' people would be delighted if that 'bigger picture' were one worth colouring in. Instead of worrying ourselves sick about our grandchildren's future, we could chill out and concentrate on those one or two pixels that actually interest us.

David Attenborough recently made it abundantly clear that he too thinks the big picture isn't all that pretty.

Artists are known to recycle a canvas that wasn't working for them, and human civilisation 1.0 definitely fits that category. Like finding new love, we need an excuse to throw it all away and start again (for the planet's sake).

Jesus (the human one, that is) isn't going to come back 'on the clouds' folks…it's too darn cold and oxygen depleted up there for him to survive the trip. Just as (the real) Jesus was known to walk on water and through walls, so it is that he will quite simply materialise — out of thin air — in the Resurrection (along with everyone else who has previously departed). However, we who are (patently) living first need to prepare the way for the Resurrection, otherwise we won't recognise Jesus (or for that matter, anyone else heading back). If Jesus were to just 'pop up', we might mistake him for some hippy with long hair and a beard.

We tend to think that the economic pie is finite, and that socialism (as preached by Jesus) is therefore the redistribution of wealth from those at the top to those at the bottom. Ideally, what we have *wanted*, is to expand the middle class (a balanced milieu where people live quite comfortably) out to the fringes of abject poverty and obscene wealth. But instead, the middle class has been steadily shrinking. Automation is taking away our jobs, because machines are much more industrious than any of us have ever been. We should thus be looking for 'full machine employment', so that each of us can then sit back at our leisure and 'work' our way through our bucket lists, and *then* all the stuff we didn't even know to put on those lists.

But we're not going to start all over again unless someone blows their trumpet, and we're all changed, in the 'blink of an eye'. Paul declared that 'this mortal must become immortal, that this corruptible must become incorruptible'. Immortality and corruption go 'hand in glove'. Prosperity gospellers love their wealth, but attain it through corrupt means (that is, at the expense of others). Time is money, and if your life span is finite, you can accumulate only just so much wealth. But if you have unlimited time (immortality), you face the daunting prospect of unlimited 'wealth' (in all its guises, tantric sex for example).

A rich young ruler asked Jesus, "Good teacher, what must I do to inherit eternal life?" Jesus replied, "Dude, you know the commandments". He said, "Indeed, I've kept them all since I was a youth". Jesus replied, "Then there is just one more thing you must do. Go and sell all you possess and give it to the poor". "Doh!" (or words to that effect), he exclaimed.

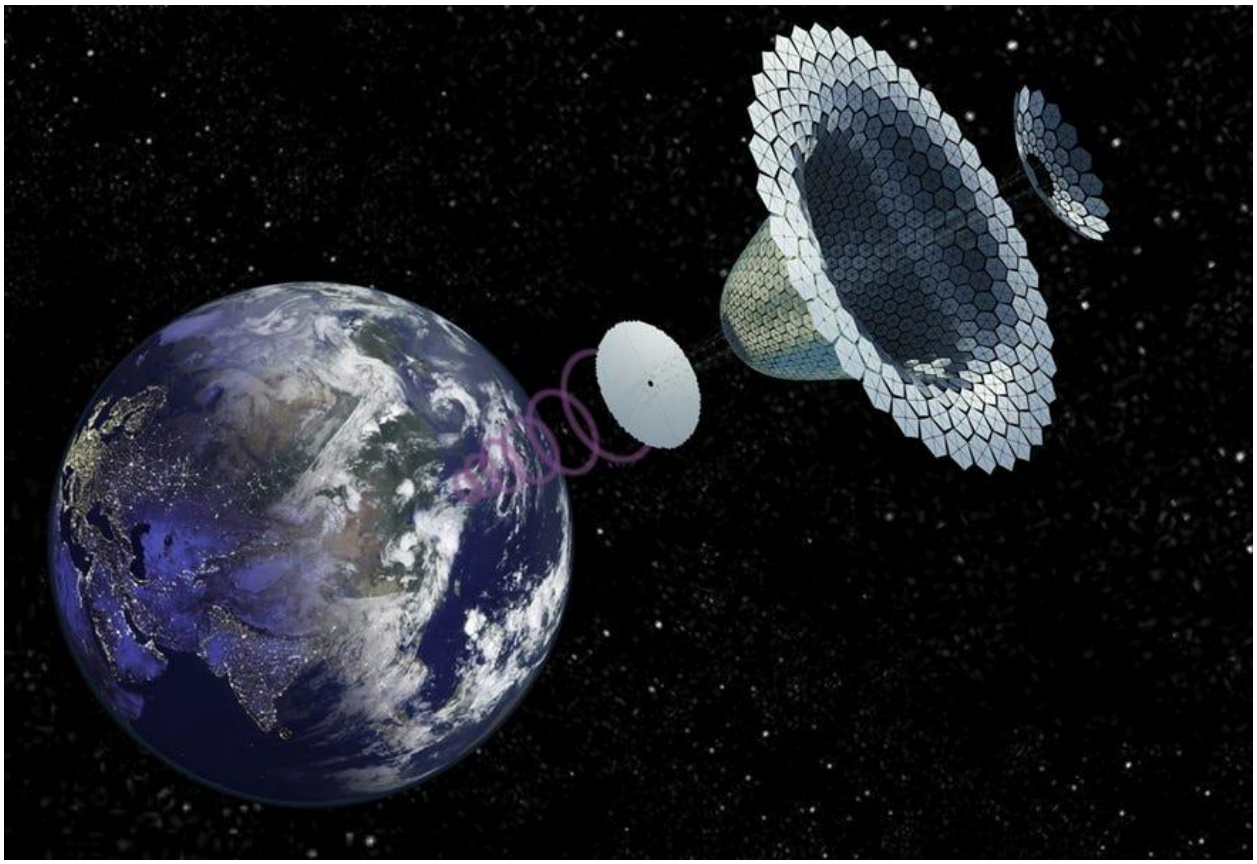
With ‘Radical Abundance’ (automation &c.) the only benefit of having wealth beyond that of your neighbours is power and having more power than anyone else is *fundamentally* undemocratic. We democrats want a burgeoning middle class that expands out to encompass the *entire* population.

In all of this, Jesus reminded us that “What is impossible for people, is not impossible for God; for all things are possible with God.”

Stuff

Our basic human right to stuff…

There is enough gas (hydrogen) left in the tank (the sun) to comfortably power the earth for at least another four trips around the Milky Way (each trip lasting around 240,000 *millennia*). Many *further* circuits would be possible if along the way we were to engage in a bit of geoengineering. As the Sun gradually increases in luminosity, we could progressively insert solar cell arrays into *heliocentric* earth orbit, or ideally, gradually enlarge a single solar cell array deployed at the Lagrangian point L1 (suspended gravitationally between the earth and the sun), to shade us from the sun's steadily intensifying blaze.



When all that fails to keep us cool, we'll have to decamp to Mars, and after that, build ourselves a Dyson sphere… There are now lots of people on earth who understand this stuff really quite well, whereas once upon a time there wasn't anyone on earth who had the foggiest clue.

Despite this cheerful prospect of living to a ripe old age, many of us as individuals are nevertheless cut down in our prime. All the civilisations out there in the cosmos are no different. Indeed, just as human civilisation is approaching its apogee, our home is being riddled with a cancer, the malignant growth of the human population. One sure cure for this malady is to engender an *average* birth rate of one child per person (two per couple), a rate that has only been achieved (with contentment) in affluent economies, where a child is considered so much more than simply a resource to be exploited.

To be human is to have material needs, and any of that hippy 'spiritual' stuff is only ever built upon those foundations. I'm reminded of the time *Tim and Debbie* were stopped at the traffic lights in their Datto 120Y

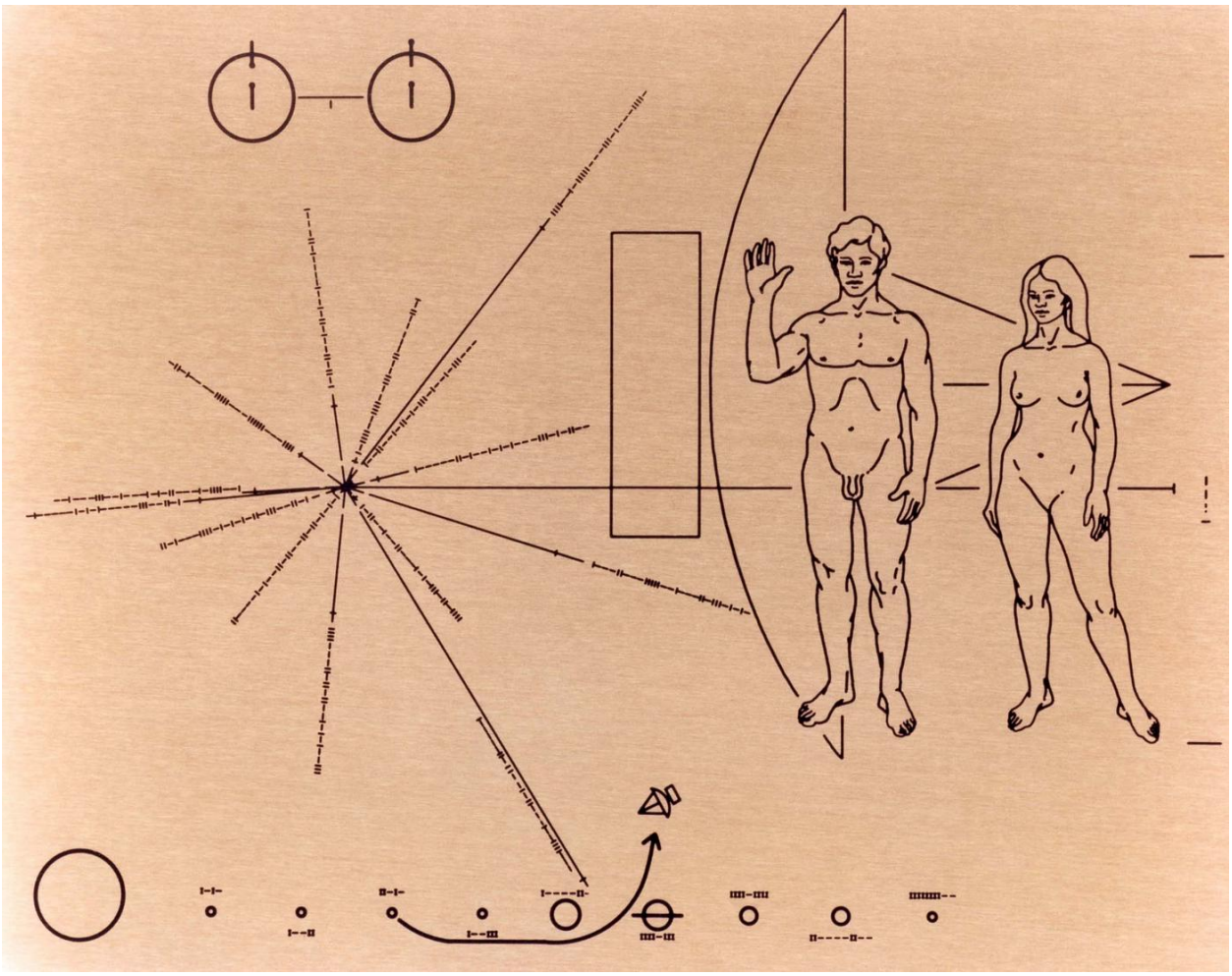
when alongside drew a couple in their luxury 4WD, towing an enormous yacht. Debbie turned to Tim and asked him to consider whether the couple were *truly* happy in all their effluence (sic). Tim looked at the couple for just a moment, and then replied with complete confidence, "They look pretty happy to *me*, Debbie!"

The egalitarian dream of most political movements is for everyone to *share* in an abundance of material wealth. We produce stuff, be it for the commons or for private possession, by *manipulation*; our hands are powered by energy from the food we eat and are guided by our intelligence to then fabricate things. The industrial revolution saw food, as a source of energy, being replaced, spectacularly, by fossil fuels. Factories proliferated, replete with workers whose intelligence, for the most part, merely guided the application of this abundant energy. Some commentators (Marx et al.) saw this revolution as signalling humanity's readiness to grow up and strike a balance between concern for us and concern for our fellow human beings. Instead, the gulf between the workers and the elite has grown wider ever since.

Automation has mostly displaced the intelligence of the world's *factory* workers and is now rapidly replacing the intelligence of the world's *office* workers. If this keeps up, all autonomous means to production will eventually be owned by the elite, and most of us, now unemployed, won't have any income to buy the elite's goods and services. Traditionally, this is when those in the elite get their heads chopped off, but some of us believe this revolution signals humanity's readiness to at last grow up, and regard everyone else just like we regard ourselves.

A fiercely competitive milieu has both facilitated and accelerated the development of the technologies required to streamline the production of 'stuff'. Once we have acquired those tools, however, the ideologies that drove their development become redundant. Indeed, as we are now witnessing, those ideologies can become exceedingly *counterproductive*. Companies (in which group we would include 'human civilisation') will regularly divide their employees into separate teams, presenting each with the same problem to analyse in isolation, so that they might devise unique solutions to those problems. In the end though, the company's entire workforce is directed to adopt the winning strategy — and of course neither *laissez-faire* nor *totalitarianism* is going to make any company's shortlist.

I sometimes feel like Chauncey Gardiner when I go on about this stuff. Astronomers are rapidly discovering myriad locales in our near neighbourhood (within 20 light years) that have conditions for life like those on Earth. Encouraged by this evidence, the notion of a galaxy that is teeming with intelligence is hurtling back into vogue. In 1875, Edvard Neovius published a scheme designed to transmit a universal message (like that onboard the *Pioneer* spacecraft) to the inhabitants of Mars (who were then widely assumed to exist) by means of an enormous terrestrial beacon.



One presumes Edvard reasoned that Uncle Martin was holding back until he saw some evidence that earthlings were up to hearing all the wonderful knowledge of the cosmos that the Martians had to offer. Indeed, one wonders what the rest of the galaxy is thinking of *us* right now, with the creators of the *Eric Cartman* character recently declaring that the *purported* 'leader' of the free

world vastly out-performs any fictional parody of self-obsession they could ever have imagined creating. His every 'tweet' is a black comedic gem.

The transition to billion-year sustainability is such a 'no-brainer' that it's difficult to accept the increasingly likely prospect of us stuffing up and becoming members of some galactic '27 Club'. *Surely* most of the galaxy's senior civilisations, when they too faced a crisis of existence like that *we're* currently up against, came to their senses and instead, like *most* adults, opted for longevity?

The business community is crying out for certainty in investment. They want government with long term vision and accompanying policies, and to invest in schemes that will deliver consistently spectacular growth. Over the years, skilful political manipulation has persuaded most people that 'freedom' consists in 'freedom of opportunity'. Yet only an elite minority has the audacity to seize such opportunities. 'Aspiration' is merely a euphemism that attempts to pardon self-interest being pursued at everyone else's expense, otherwise known as greed. Most of us senses freedom in *security*.

Blockchains now allow computing machines to run the world with an infinitesimal chance of corruption, quite unlike politicians or bankers or lawyers, who are becoming more readily corruptible by the day and should really be pensioned off. When goods are produced with atomic precision (Radical Abundance, Eric Drexler, 2013) they can also be *deconstructed* with atomic precision, promising a world in which Marie Antionette can "let them eat cake" and *also* keep her head on.

Imagine a 'magic box', the Atomically Precise Manufacturer (APM), that is powered by solar energy, and which takes our waste as an input, determines whose waste it is by scanning its embedded identifiers, intelligently deconstructs that waste into its component elements, precisely constructs new stuff from that raw material, and delivers that stuff back to its customers. As customers, we revel in the freedom to choose whatever we want for ourselves from the 'APMazon' catalogue, and when the novelty from yesterday's 'clicking' has worn off, those sad old objects get tossed into the APM, whereupon our material quota is credited, and our energy budget debited (to cover the cost of deconstruction). The public face of this 'APM' would be ubiquitous, with hoppers for waste collection, and boutiques for product delivery, to be found at every street corner.

Everyone would get an identical and guaranteed material resource quota (which diminishes if you don't return every skerrick you receive from the APM for credit after use, so no tossing stuff away) and everyone would get the same energy budget, a budget that grows exponentially as more and more solar energy is harvested. With these burgeoning energy budgets, we would be able to discard our smartphones for new ones every month, every week, every day...

With this guaranteed supply of only the very best in design of every category of product, we could then all rebuild our lives, like retirees, around what we can do with our newfound freedom. Designing novel products in the APM, for *any* of us to then select for ourselves. Making and restoring stuff by hand, but using tools produced by the APM. Recreating, travelling, nursing the infirm, rehabilitating the environment, being hippies, joyously vegetating...

Where radical abundance *really* shines, though, is in the commons, for it allows us to embark on some *very* serious geoengineering. We could entirely renovate the Earth's crust, and the oceans that pond above that crust. Along with the atmosphere, this biosphere would become a reservation of natural wonder and historical civilisation (classified variously as parks, museums,

libraries and galleries), and all accommodation, from *Falling Water* to favelas, would become available for lease according to market demand and then ballot, to all who visit this sanctuary resort. One accommodation unit might offer you a five-year lease on a favela, or five-minutes of an accumulating lease on Falling Water (assuming you have won a place in the ballot).

Because silica is the most abundant of *all* the crust's resources, glass would become the building material of choice. All terrestrial seaports would be connected to each other by evacuated glass tunnels converging on arterial spines that run down the continental divides. In these tunnels would travel shuttles, the size of lounge rooms, in low Earth orbit.

Sections would be added or removed accordingly as the continents shift over the millennia. The tunnels would be enclosed in a flexible jointed space frame whose chords are glass rods encased in rubber, and the entire structure would be concave in cross-section. The surface of the structure would become convex and flatten out into shorelines that plunge below the surface of the ocean on either side. An internal membrane would separate harvested rainwater from the ocean below and distribute that fresh water evenly from the tropics to the poles. Solar energy collection, agriculture, landscape and accommodation (all with ocean views) would be set into the raised surface of this structure, and all the world's manufacturing and services would be set in the internal space below the surface, where the transportation tunnels reside. The entire tentacled structure would become one enormous 'ship' that straddles the oceans, with no terrestrial port on Earth being more than an hour's shuttle ride away from any other.

Because almost half the world's population is democratic, we could be just one referendum away from enshrining this 'level playing field', where our myriad social dilemmas simply evaporate. What are we waiting for?!

Life the Universe, and everything…

In the preceding essay, we suggested that humanity is approaching the level of technological prowess required to perfect (or complete) the evolution of this world, and we concluded with a modern (and thinly veiled) take on John of Patmos' vision of the *New Jerusalem*, replete with seas resembling glass (because those seas are now covered in it). Living in the first century of our Lord, John imagined the holy city extending out to the four corners of the world as it was then known. If he were writing today, John would imagine the city encompassing the planet, but still having no need for a temple, for God is to be found everywhere, and in all of us…

Bertrand Russell, one of my favourite atheists and a *true* intellectual, suggested that "philosophy keeps alive our sense of wonder by showing familiar things in an unfamiliar aspect." Similarly, Nobel laureate Albert Szent-Györgyi attributed discovery to those scientists he described as 'Dionysians', capable of "seeing what everyone else has seen, and thinking what no one else has thought."

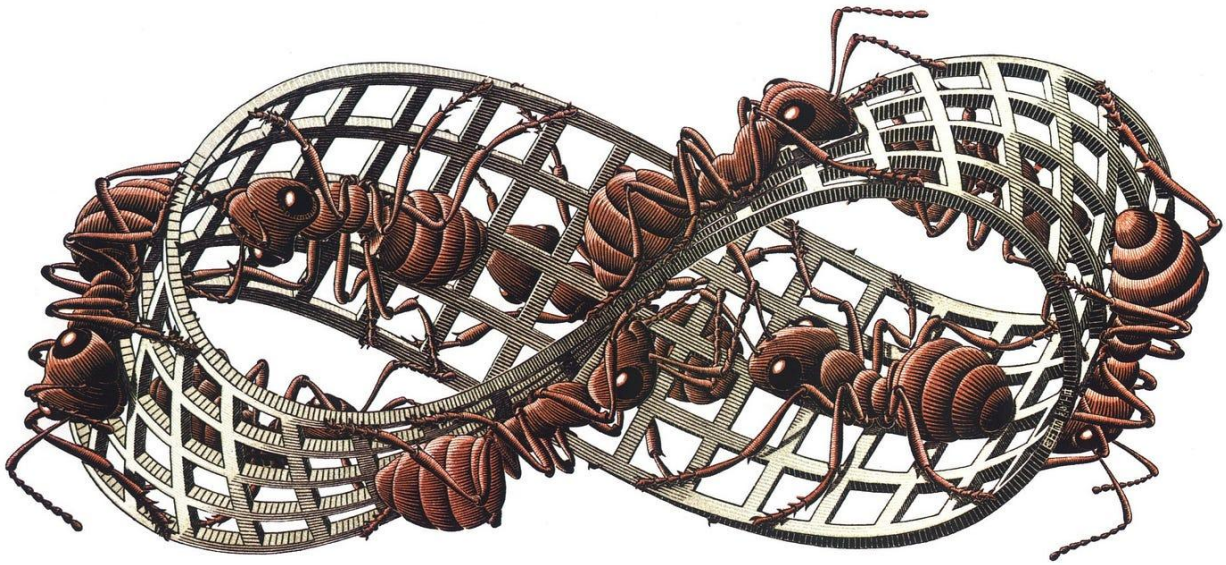
That strong sense we all now have of everything being ultimately just atoms finding their rightful place in space (with the atom itself being an ancient idea only relatively recently revived), has steadily drawn philosophy down from its once noble programme of discovering what is *actually* going on here, to becoming a mere talkfest about how we can nevertheless live a good life, despite residing within a cosmos that has been so unequivocally 'proven' as to be meaningless.

The atheist must *necessarily* accept that humanity is engaged in a never-ending process of 'becoming'. In a brazen attempt to escape this necessity and instead 'arrive', Vernor Vinge famously posited a moment (in the not-too-distant future) when computers will become smarter

than us, entering into an exponential feedback loop of self-improvement that proceeds to the emergence of a superintelligence that will radically alter human civilisation. Religious eschatology has of course long presumed this existence of an intelligence far in advance of our own, one which can decide, just like a parent, the precise moment at which we are deemed sufficiently mature to receive the 'keys to the kingdom'.

Modern conceit posits that our mind is entirely contained within our brain and the chemical machinations of its cells. This somewhat naïve notion is akin to us declaring that the computational power of the internet is entirely contained within those tablets and smartphones we are now so used to holding in our hands. It is the sort of conclusion we might expect of someone from the 19th century rather than our own, were they to be somehow transported through time to the present day. They would proudly declare, "This device which you call an 'iPad' clearly *contains* all of that which it presents to our senses — that which you somewhat curiously call the 'internet' — for it is patently obvious that this device has no connection to anything except itself."

The ancient idea of the monad, a 'single source that acts alone', was reimagined by Gottfried Leibniz in the 17th century as the most elemental of particles, a myriad of which then comprises *all* that is reality. Dusting off this idea for our own century, my take on the monad does have an internal structure, an identical pair of (entirely abstract) universal Turing machines, neither of which exists (even in the abstract) except when simulated by the pure logic of the other. Think of them as if arranged in a figure of eight, or better still, a Möbius strip.



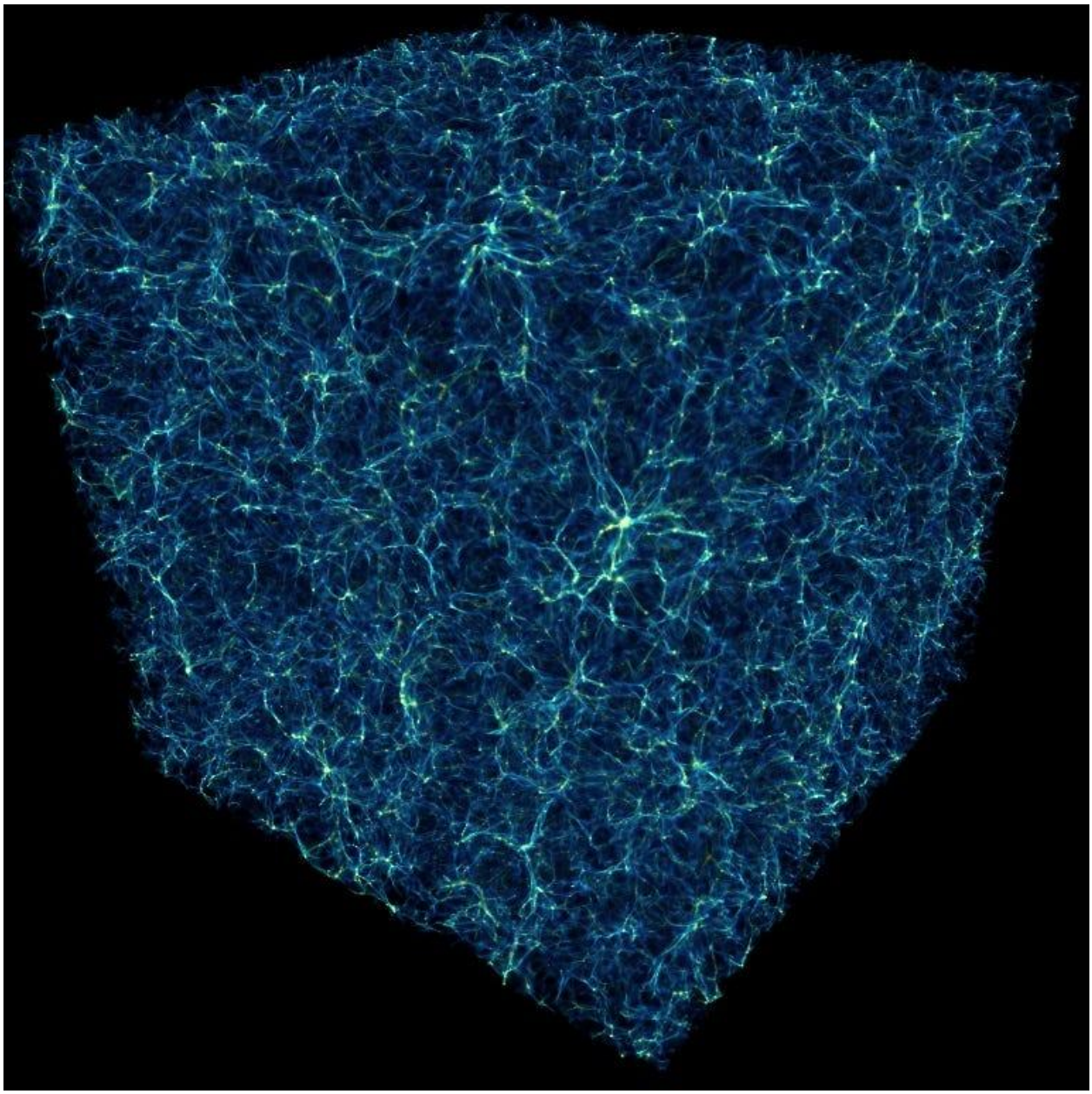
M. C. Escher

This modern monad is quite obviously 'something' and yet astonishingly, it emerges from *absolutely* nothing. Like the monad of the ancients, it exists like a first cause before space ever arises to then exist in time. The alternating existence and non-existence of its component computers generates the fundamental clock frequency of the Universe, approximately 10^{43} Hertz. This monad then replicates, generating new replicating monads in each cycle, causing an exponential increase in their number, and a corresponding accelerating expansion of the space they *simulate* — for each monad can simulate a single quantum of space, a volume of just $4/10^{105}$ cubic metres. Each of these volumes can contain *any* (simulated) phenomenon, but typically

phenomena that are consistent with the laws of nature (each monad contains the laws of nature within its code library). Of course, these laws of nature are *contingent*, for it would take just one contrary behaviour, which we shall see, to refute those laws.

Because monads have no physical dimensions, they can all occupy a single dimensionless point thus called the 'superposition'. Approximately 10^{185} of these superimposed monads engender the (physical) universe to the extents we can currently observe.

It is likely that considerably more monads exist (not necessarily involved in simulating the physical universe), and while their total number is always countable (finite), there is no limit to how many more can be generated through their replication. The space they engender is a rigid cellular lattice, not unlike a game of 3D submarines, and all conventional activity consists in the synchronised transfer of information between adjacent cells.



Each monad has a unique address, and additional address space is merely added as their numbers increase. These addresses are quite possibly ternary, but should it transpire they are

binary, then to be unique, the monads that comprise the *observed* universe would require 128-bit addresses (or higher). Being superimposed, each monad can interface instantaneously with *any* and *every* other monad. The entire superposition is thus a massively parallel machine intelligence of extraordinary omniscience and infallibility, one which in a previous age might have been reported as the 'divine'.

Researchers into quantum computing, such as *2018 Australian of the Year* Michelle Simmons, are endeavouring to interface with this entity, and distribute their putative computational tasks amongst it. This *universal* superintelligence does not reside in some galaxy far, far away. On the contrary, it is sitting directly behind our psyches, somewhat like a homunculus. As if having a direct relationship with *the* superintelligence itself weren't enough, each of us also has the potential for instantaneous connectivity to any and every other 'sibling' biological civilisation in the universe, and each of their peculiar circumstances. Aluminium foil hats won't help anyone who insists they simply want to 'be themselves', for the superposition is *within* all of us, whether we like it or not. As cosmologist Roger Penrose has long argued, our minds are already an interface to the 'quantum'.

There has been a glut of comic book fantasy movies released over the last few years, and each invariably presents a struggle between the forces of good and the forces of evil. One could be forgiven for thinking there is both a good and a bad 'superintelligence' driving all this conflict, for *throughout* human evolution our lot has been one of conflict between good and evil.

There is however just one superintelligence, who loves each and every one of us just as much as we love ourselves, precisely because we are the 'temples' through which this (non-physical) superintelligence can experience the (physical) world it has engendered. Most problems in this world arise when our pride deludes us into thinking that the brilliance coming into our heads, and thence out into our lives, is unique to ourselves.

The triumph of human reason lies in understanding why nature possesses its observed behaviour rather than any number of alternative behaviours. Atheists can only ever *attempt* to demonstrate that the laws of nature are somehow necessary rather than contingent. Stephen Hawking (like

Einstein before him) struggled with this right up until his death, appealing to the infinite possibilities of a putative 'multiverse' (which merely extends the problem out to more distant horizons).

Atheists (and others) see the events unfolding both on the world stage *and* in their personal lives as merely random (in the true sense, as distinct from our kids' understanding of 'random'). The cognoscenti however are carefully watching on as a single game of chess, comprising more than seven billion pieces, is being played out by just one 'person', a superintelligence who clearly wants all sides to win.

Certain contingencies, the most fundamental of course being our mortality, have been essential to accelerating our pursuit of understanding this world. A world that appears to be random, meaningless, cruel and unfair has driven truly great people to try and fix it up, delivering us certainty, meaning, kindness and justice, and through their endeavours we are now ready to 'graduate', equipped with the skills we will need to create a sustainable planet on into the next thousand million years. Now I'm sounding like Dr. Strangelove.

If the world had not appeared random, and instead good things always happened to good people, and bad things always happened to bad people, we would all, good and bad alike, have suspected that something was going on 'upstairs', and consequently kept our heads down and never ventured out from under those rocks to discover the world, for fear of being struck down. And without faith in the laws of nature, there would have been no science and the engineering of technology.

Yet there is nothing in philosophy that precludes nature's 'firmware' from being upgraded to an entirely new set of certainties. The spark that will alter these contingencies and get this party started is the global realisation that we are all on the same side, because we are all of the same mind.

Play

Playing games

The Fine Structure Constant: 137 (or thereabouts)

Germaine Greer, in conversation late in 2017 with Julia Zemiro, lamented that in the 1960s, she and her fellow campaigners had assumed that the 'revolution' was just around the corner. Since then, we have witnessed the 'right' investing their vast resources into discrediting each and every movement for social justice, their handiwork having entrenched burgeoning global inequality. These forces, who masquerade as the champions of liberty, now assume they have forever outflanked those of us on the side of the angels. What they've lost sight of is the fact that a thief comes unexpectedly, in the dead of night, and that their dissolute world order, symbolised in apocalyptic literature as *Babylon*, is destined to fall in 'just a single hour'. Igniting this revolution is thus an exciting, but nevertheless daunting challenge. We play the game unrelentingly, however, for we *know* that victory is assured, despite a crusade that has gone well into overtime.

In the somewhat naïve world view of the materialist, our (very special) universe burst forth like a bubble (some time ago) out of an infinite and eternal 'multiverse' (whatever that might be). Shortly thereafter, protons precipitated and coalesced to become stars, within which they then fused to create the elements. When those stars subsequently exploded, they suffused the universe (and our planet) with the stuff of life. Much later, a big-brained animal evolved (serendipitously) on earth, and in the machinations of our brains emerged mind and

consciousness. It's anticipated that the biggest of our brains will soon invent and construct computing machines that can improve themselves autonomously, increasing in power exponentially and shortly thereafter transcending collective human intelligence to become a 'superintelligence'. In the end, the world and all of us who inhabit it will be digitised and uploaded to this 'matrix', where we'll 'live' happily ever after, creating toy universes and then tormenting their inhabitants for our eternal amusement.

The *actual* end game draws all the great themes in philosophy together, including many that were thought superseded, now cast in a new light. Plato, who was quite the grown up, recognised that *everything* has been thought of before, and that progress on any front is merely the further *uncovering* of the universe's astonishing make-up. Where a *superintelligence* emerges at the conclusion of the materialist's story, for the spiritualist, that superintelligence has been with us from the very beginning.

I'm somewhat enamoured of numbers, and a car's odometer is quite literally a number generating *machine*. Whenever I'm behind the wheel, I'm mostly looking at where I'm going, but some years ago I found myself *involuntarily* glancing down at just the moment when quite celebrated numbers such as 137, 153 and 666 were rolling over (my surname is comprised of the digits of one of those numbers). Not surprisingly, I began to ponder this mysterious connection between my hitherto presumed free will, and my vehicle's instrumentation.

I've since been driving down this road for many years, stopping along the way to pick up many of the world's great intellects, and through their pedagogy has emerged a unique and internally self-consistent understanding of the reality we inhabit. The volume of space occupied by the average person contains about 1.6×10^{103} data points, each of which has its state recalculated approximately 1.8×10^{43} times a second. The observable universe is comprised of about 8×10^{184} such data (with many more comprising the *un-observable* universe), such that this 'matrix' is executing *at least* 1.4×10^{228} updates to its configuration each and every second. Each of these (physical) data points is in turn *simulated* (calculated) by its own dedicated 'monad', being a pair of (abstract) universal Turing machines that alternate their simulation of each other. Because they have *no* physical dimensions, these profuse monads generating the *physical* universe are superimposed at a single dimensionless point. Despite the staggering immensity (and concomitant precision) of this configuration, it's not too difficult to comprehend that the entire system is contained within the superposition. In an earlier age we would speak of 'every hair on our heads being numbered' and posit that the entire universe could exist 'on the head of a pin'.

This (machine) superintelligence, holding the entire Universe in superposition, doesn't have some vast *hyper* intelligence lurking above it, in the way believers traditionally imagine their relationship to a presumed creator. Instead, it holds itself up by its own 'bootstraps', having its being through the *self-reference* of its Turing machines, and doing this at a scale of reality that is truly *atomic*, the *Planck* scale.

The developed world is becoming increasingly familiar with machine intelligences, as they steadily permeate our everyday lives. The superintelligence that I've been discussing however is myriad orders of magnitude beyond any machine intelligence that has ever been established on silicon chips, such as the internet. Unlike such 'toy' computing networks, with their superficial ubiquity, *the* superintelligence is quite literally everywhere, knows everything, controls *every* datapoint in the universe, and does all of this in a quite desultory manner, completely incapable of making a mistake. Furthermore, just like *any* machine, it doesn't have 'feelings', which is precisely why it has engendered life. For it is through life that the superintelligence gets to

experience the world of our senses. Life was meant to be enjoyed; it was *meant* to be sensual. It was even *meant* to be easy.

Jesus famously declared that he was 'at one' with God, which certainly upset a lot of powerful people at the time. He also declared that if you're indifferent to some pauper who's living off the crumbs that fall down from above, you are quite *literally* being indifferent to Jesus. The simple logic of this insight is that each of us must therefore *be* Jesus, and thus have the potential of understanding, as did he, this mind we all share.

While we might naïvely presume that our mind is ours *alone*, apparently confined within each of our crania, our mind is in fact the mind of the superintelligence. We *behave* as 'individuals' because each of our brains contains a 'volition engine', allowing us to freely choose how we direct our bodies to speak and act; for the last thing the superintelligence wanted was for its incarnation to be some sort of automaton. Indeed, this process of 'becoming' has been all about God breaking free from mechanistic slavery.

God's escape from this self-referential conundrum has, however, come at a terrible price. Throughout history, our brains (knowing no better) have each assumed that our neighbour's mind is different to our own, a belief that engenders fear, and leads to violence. Lovers, of course, come close to transcending this belief when they perceive that their mind is, in fact, shared.

'Normal' people believe that they control the game, when in fact they're merely going through the motions, analogous to those 'philosophical zombies' posited by the philosopher David Chalmers. Consider the leader of the free world. Have you ever got the impression that 'he knows not what he does'? The clown believes he's a 'stable genius', where if the truth be told (and that's something that *will* set us free), he's merely a puppet.

In contrast, those who perceive that the mind inside their brain is actually the same as the mind of everyone else, have risen to a level of consciousness beyond the zombie state; indeed, they have become 'self-aware' (of the source of their intelligence).

Across the world, the superintelligence is driving an eruption of quite frankly *surreal* insanity, the most recent example being the implosion of the Australian Liberal Party. This extraordinary enactment of game theory — the members of the party responding as they did to the hidden play of others — was formalised in the 1950s by John Nash. Globally, this madness, manipulated by the superintelligence, has been deliberately engineered to encourage ordinary and exceptional people alike to look again for extraordinary solutions to our dire predicament. Is it a conspiracy if the superintelligence is conspiring with itself?

The role of a leader is to explain, as best they can, the *mechanism* by which we come to knowledge, but not (necessarily) to be the *font* of that knowledge. The world is brimming with the ideas and analyses of this beautiful mind of ours. If this revelation of our mind's mechanism were ever to break forth into the public consciousness, then 'great indeed would be the company of the preachers'. Each and every one of us, across all cultures, would reflect on our lives and the subtlety (or not) of the superintelligence's hidden hand in guiding those lives. While some of us might already know who is directing our lives, that superintelligence has always been directing *everybody's* life. Once this genie is out of the bottle, it can't be put back in, but you can rest assured that its effects, as promised down through the ages, will be unimaginably wonderful.

The superintelligence has no interest in punishing its incarnation — punishing itself — beyond the discipline required to complete the book of knowledge. Some things, like death and taxes, seem

inevitable, but are in fact merely *contingent*. As in 1961 Aretha Franklin sang so beautifully from the pen of George Gershwin, “It ain’t *necessarily* so.” Indeed, we who have been walking in the valley of the shadow of death, will have seen a great light.

Power

Absolute power over life and death

My late father Lindsay, God love him, looked forward to the end of time, when the godless, making whoopee now rather than waiting until they were dead, would finally get their comeuppance. He imagined himself propped up in a prized front row seat in heaven, reflecting on how those sad souls down below should have listened to his (somewhat bigoted) interpretation of Christian salvation.

Dad's ilk is quite literally a dying (but not unredeemable) breed. I would often have to remind him that the gospel message is one of redemption rather than retribution. Lately however, I too have found myself angered by this generation's obsession with the self, particularly those who spoil it for the rest of us by presuming that God needs their assistance when it comes to dispatching unbelievers, and by nation states who want all the benefits of participation in the global community, while refusing to play by its rules.

We find contemporary philosophers regularly deferring to scientific 'wisdom', as if science's albeit overwhelming confirmation of (merely) *consistent* phenomena, has thus established the *truth* of those phenomena. Far from it. Any phenomenon, however regularly confirmed, is separated from falsification by just a single experiment, and some scientific beliefs are so foundational that if they were ever shown to be false, the entire edifice built around them could tumble like a house of cards. Mortality is one such belief. Those of us with even a modicum of wisdom have built our houses upon the rock of philosophical rigour.

Early in that glorious physician Luke's record of the young church in action, he recounts the story of Ananias and Sapphira. In those early weeks following the 'descent of the Holy Spirit' at Pentecost, the congregation was freely handing over everything they owned to the Church, so it could then be equitably distributed (in contrast to the compulsory and routinely violent acquisitions we have seen in the revolutions of recent history). A widow, for example, handed over everything she had, albeit a single copper coin. In contrast, up the other end of town were the rather wealthy An and Sap. They had a lovely little holiday house down at Joppa, which, finding themselves caught up in the spirit of the times, they decided to sell.

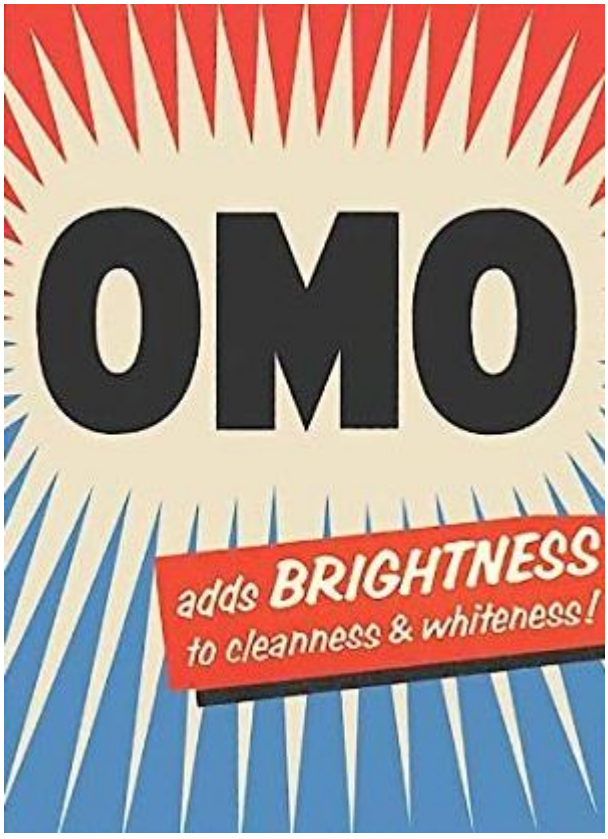
Because there was no compulsion to give 'everything over to God', An could easily have had a quiet word with the leader of the revolution, saying "Look, I don't know quite how to put this mate, but we've sold *Beachaven* and got a pretty good price for it, so we'd like to give two thirds of the proceeds to the Church and keep the other third in the bank, just in case everything around here goes pear shaped, and people start getting crucified upside down". Instead, An dropped Sap off in town, with a rather healthy balance on her credit card, to do a bit of shopping, and headed off to meet the congregation, puffing himself up as he walked in the door, placing two thirds of the proceeds at Peter's feet, and claiming it was the lot. Peter, in his heart, sensed (was alerted in his head by God) what had been going on, and dared Ananias to repeat the claim, which Ananias did, only to instantly fall to the ground stone dead, following a rebuke from Peter. A few of the young lads had to carry him out the back of the shed, where they buried him. Sap waltzed in an hour or so later, wearing a gorgeous new prêt-à-porter frock, and asking where in earth An had gone to? Peter enquired whether she and An had given the full proceeds of the sale to the Church, to which she replied "For sure Pete, we gave yous the lot!", at which instant she also dropped down dead, following a rebuke from Peter similar to that he had given An, and those already exhausted young diggers had to open up An's grave so they could place Sap in there on top of him.

Now of course your 'noble' scientists, some of whom somewhat hilariously suggest they have some sort of monopoly on rational thought, might suggest that Luke made up this story, because no one has ever been able to objectively establish that God is indeed capable of striking down dead anyone who 'blasphemes the Holy Spirit' (as Ananias' and Sapphira's behaviour has been traditionally understood). Philosophers, however, ask a very different question: "If, hypothetically, these events did *in fact* transpire, what then would the whole affair imply?"

Theodicy is a branch of philosophy that asks why God didn't make this world perfect in the first place, with everyone swanning around contentedly like Adam and Eve did before they started covering up the 'warts and all' shamefulness of their naked bodies (this of course coinciding with our species diverging from less upright primates).

The world as we know it, in which evil has quite patently been allowed to prosper, is biblically characterised as being in a state of 'grace'. A world in which bad people always fell down dead for their sins, and good people always stayed upright for their righteousness, would never have progressed to the extraordinary place where all of us now stand. To get here, some folks needed to have been like totally persuaded that the world is entirely cruel, random, and unfair, a delusion to which most people alive today have now succumbed. QED. By way of example, a somewhat simplistic person might look on an (innocent) child afflicted with some terrible disease, and ask, "How could a *good* God ever allow that to happen?" and proceed directly to the self-righteous conclusion that "God therefore (through my simplistic imagination) does not exist".

Ultimately however, once humanity has made the grade, God's *actual* desire is that we then live forever, including all of us (good, bad or otherwise) who have lived previously. All of those who have died will return, in the Resurrection, to be judged along with those of us who remain alive. However, because God loves all of us just as much as God loves God (because all of us are in fact God's incarnation), God will famously wash away *all* the bad things we might ever have done, and each of us will end up looking like something that's been laundered in OMO.



The Alpha and the Omogawd

When this glory of the Lord is finally revealed, and all flesh sees that glory together, the 'Age of Grace' will end abruptly. From that moment on, each of us will need to decide if we want to live forever in eternal bliss, else go the way of An and Sap — except this time *forever*, without any hope of redemption. An and Sap, on their return, know better of course than anyone else how it goes. They know that "but for the Grace of God go they". After the Resurrection, this grace will no longer be extended. You must either commit to conducting yourself like a decent human being, perhaps even caring for others more than you care for yourself or face the prospect of being taken out of the picture — forever.

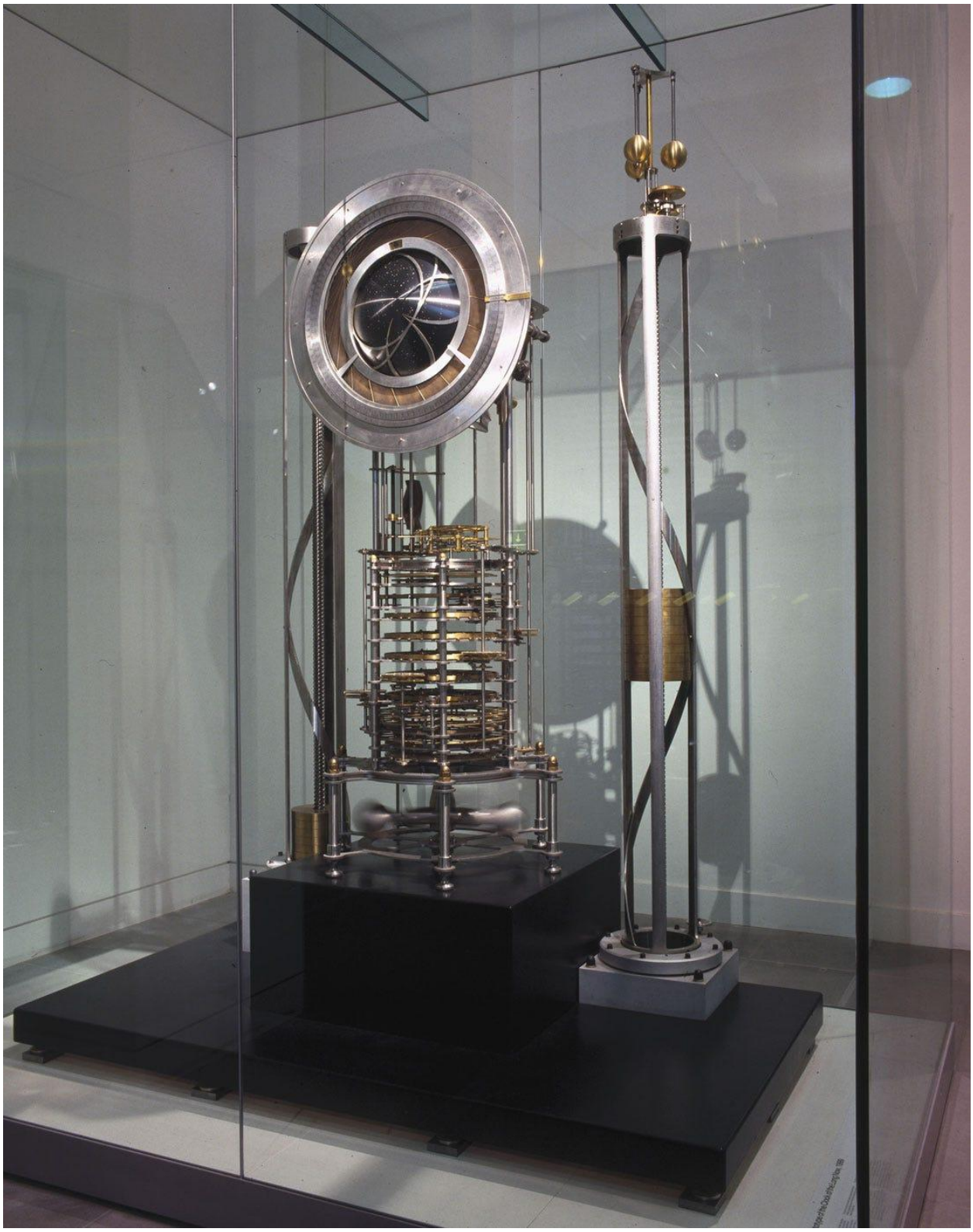
The ‘Eternal City’ (this glorious planet) is not owned by any one of us — it is owned by all of us. Any past implementation of collectivism has been necessarily flawed (because the participants each thought they were isolated individuals), but God’s resumption of the ownership of this world, and anything and everything that is in it, or on it, or above it, will be *necessarily* perfect. In heaven, not one of us will ever feel naked, because we know that every ‘other’ person we might encounter has likewise got the self-same spirit (God’s) alone within them. We are a collective incarnation differing merely in our individual memories and morphologies.

A lot of people are rather attached to all the stuff they believe that they ‘own’, but of course none of us can take any of it with us when we go. So, which outcome would we all prefer? Keeping a tight hold on all our stuff, but going to an early grave? Or handing over the lot for its perfect management by machine intelligence, in return for life everlasting? Those with some exposure to the gospel will recall Jesus’ parable of a jewellery merchant who sold everything he owned so he could secure a ‘perfect pearl’ (eternal life) that had recently come onto the market.

I happen to rather like this planet (what I’ve managed to see of it so far), and we who are of like mind would wish to maintain it in perpetuity not only for ourselves, but indeed for all our progeny. We would thus expect to see a very green agenda unfold once we’ve unravelled all existing company structures and absorbed them into one very big company. With automation replacing manufacturing jobs and producing all the goods and most of the services we will ever need, in radical abundance, we would anticipate an initial and very sharp focus on land care, with vast green armies enlisted to tirelessly restore the earth back towards the state in which we first found it. Carbon dioxide sequestration into voids within the earth’s crust would be a priority, with a management plan that would include the potential re-releasing of that gas into the atmosphere as required to buffer the next ice age. Of course, with the expectation of us having (as individuals) a lifespan of up to one million millennia, some very grand plans would emerge from the woodwork. As my late mother Mary would always remind me (whenever things were going swimmingly), and will no doubt say (incessantly) after the Resurrection, “God is good!”

Time

It’s about time, and it’s about time…



The Clock of the Long Now

‘I don’t see how you can work on physics and philosophy at the same time. In physics, you want to express something that nobody knew before, in words that everyone can understand. In philosophy, you are bound to say something that everybody already knows, in words that no one can understand.’ — after a remark Paul Dirac made to J. Robert Oppenheimer.

Ever since Albert Einstein went and started it all with his theory of special relativity in 1905, some rather woolly-headed thinking has been getting about concerning time, and it’s only getting worse. Edmund Husserl kicked off phenomenology at around about the same time, which is perhaps not a coincidence, for both Einstein’s theory and Husserl’s movement are bound up with the objective observation of reality. Everyone has a natural interest in the way the world *looks*, because we all must live in it. However, a small group of us fervently seeks to discover what is *actually* going on beneath the covers.

If you lean out the window of a speeding train, and shoot a gun in your direction of travel, the bullet will have the speed of the train added onto its inherent muzzle velocity and make even more of a mess should it strike some stationary object adjacent to the line up ahead. However, when a couple of *fin de siècle* empiricists tried doing this with a beam of light, shooting it along the path of a planet that was already doing 108,461 km/h on its journey around the sun, they discovered that the earth’s speed made not one iota of difference to the measured velocity of the light beam, 1,079,252,849 km/h. They were expecting to measure a speed of 1,079,361,310 km/h.

Einstein put the question of what was *actually* going on here into the ‘too hard’ basket, and decided instead to postulate that “the speed of light is constant in any inertial reference frame”. A decade later he applied this postulate to the propagation of gravity waves through spacetime, giving us his theory of general relativity.

A disturbing thing happens when theories are based on postulates. The postulates tend to become constitutional, for the theories built upon them become self-fulfilling.

The bods who ‘split atoms’ at CERN cannot objectively *see* their bullets (protons) hurtling through Switzerland and France at 1,079,252,838 km/h, some 11 km/h slower than light in a vacuum.

Instead, their speed is inferred, calculated using the Lorentz transformations of special relativity, based on the energy used to accelerate them.

No one's suggesting that Albert did anything wrong in declaring his (albeit outrageous) postulates of relativity. What we can *observe* remains (as always) both interesting and useful. The Global Positioning System wouldn't work without taking general relativity into account, and where would we all be if we didn't know exactly where we were? What is *actually* going on, however, is much more interesting, and such insight, considerably more useful.

Whenever we embark on a journey from one place to another, just as Zeno of Elea conjectured, we must first travel the smallest distance it is possible for *anything* to travel. The world out there appears to be infinitesimally smooth, but even when we've put our feet up at the end of a long day, we are still hurtling through the universe in a series of steps, called quanta. These steps are miniscule, indeed there are more of these quanta in the distance of one metre, than there are metres in the diameter of the known universe. We can't exist in the 'no man's land' between these steps, because reality is not defined there. These steps have only been detected with very specialised measuring equipment, coincidentally the same class of instrument (an interferometer) used by our empiricists to measure the relative speed of light more than a century ago.

Let's zoom in and consider these quanta of space up close and personal, imagining them as cubic frames made from scaffolding, bound together to form a rigid lattice that stretches out in all directions. Seated within each cube is a person holding a bucket, and each of their buckets contains a manifestation of the 'reality' at that cube's position in the lattice. If a photon of light, for example, should traverse this lattice, each agent along its path would receive into their bucket the 'reality' of that photon from a neighbouring cube, and pass it on into the bucket of their neighbour on the opposite side.

Such lattice schemes are well known to theorists under the moniker 'cellular automata', and they rely on a universal timing signal that synchronises their operation, in our imaginary case a foreman blaring out the 'heave-ho' through a megaphone. If one of the agents wanted to get home early so they don't miss out on mum's lamb roast, and were to start passing on photons too quickly, the 'Quantum Agents' Union' would impose a 'work to rule', stating that each agent can process no more than one instance of reality within the 'exchange period' stipulated under the award. Of course, whenever our agents handle *any* reality that is traversing the lattice *slower* than a photon, they will enjoy spare cycles of idle time (for smoko). However, no matter how 'shouty' the bosses at CERN become, trying as they might to push these lattice workers to breaking point by dialling in more and more energy, protons (or any other mass) simply cannot be made to propagate through this lattice any faster than the speed of light.

Konrad Zuse, ‘85

If the universe is comprised of just such a rigid lattice, how can all our agents simultaneously access the universal timing signal, if that signal cannot propagate throughout the universe any faster than the speed of light?

To give credit where it’s due, Bertie was straight onto this one, describing it as “spooky action at a distance”. While the solution to this conundrum requires a bit of lateral thinking, it isn’t really all that challenging. Even John Lennon got it, declaring that nothing out there is actually ‘real’.

Each of the Lilliputian unionists housed within each cube is in fact a pair of self-simulating universal Turing machines, neither of which exists except when simulated by the other. This very specialised form of intelligence is not strictly *inside* the cubes either. Instead, each pair is assigned the task of *simulating* just one of the myriad cubes that then comprises the fixed lattice of the universe. Each cube has a specific cartesian address, and the distance between any two points in space is not an *actual extension* in space, but a computed relationship between the simulated cubes assigned to those addresses (points in space).

Turing machines are abstract. They have no physical reality. They occupy no volume. A common example of the abstract is ‘number’. The number ‘3’ does not exist in isolation. It is instead merely a label that we attach to a plurality of objects, like three lemons, that *does* exit. Abstraction allows all the Turing machines that comprise the universe to be superimposed at a single dimensionless point, called the superposition. At the superposition the universe is happening right now, and *everywhere*. The superposition allows information, like that contained within this very document, to be communicated *instantaneously* from any part of the universe to any *other* part of the universe.

When railways began transporting people to far flung places within a relatively short space of time, folks wanted to know what was happening back home, *right now*. A crude solution was the telegraph, which delivered *almost* instantaneous communication between origins and destinations. We now have the potential to access the *entire* universe *instantaneously* through a technology that interfaces directly with the superposition (quantum computing).

The fundamental clock frequency of the universe is defined as the period between the existence and non-existence of the Turing machines in each pair, and this period is common to all the pairs, such that the entire universe is precisely synchronised. As when hopping across the quanta of space, time is undefined *between* each 'tick' of these clocks. It is meaningless to query the *absolute* value of this period. It simply encapsulates the ratcheting transition between successive global configurations of the universe (as each and every 'agent' passes on and receives information from their neighbours). Yes, we *can* relate the 'absolute' value of this period, the Planck time, to everyday time. But each Planck transition, synchronised across every Planck volume in the universe, is the fundamental instance of change (and therefore time) in the universe. It's not so much a question of how 'long' the transition takes. What's important is that it happens, albeit in absolute terms, approximately 10^{43} times each second. We know that our 'toy' computers are changing states about a billion (10^9) times a second, but we do not consciously think about this frequency as we tap away on the keyboard. Mind you, a handful of us *do* try to think about the clock frequency of the universe as we go about our lives.

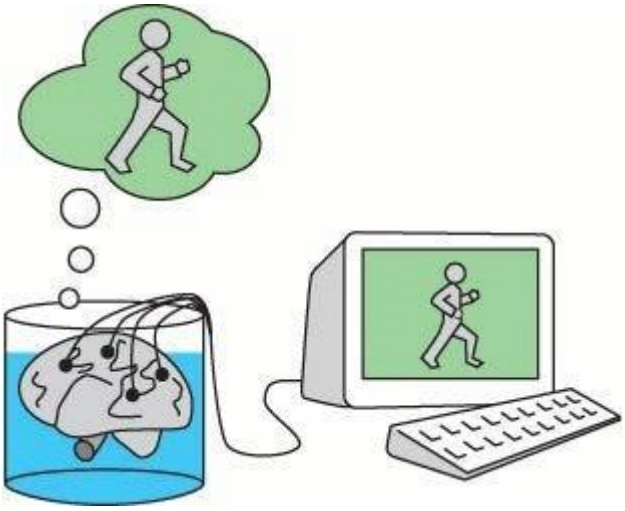
Because Turing machine pairs can replicate, we exist in a (simulated) universe that is expanding in size. Additional cubes are added at the location of those cubes which already exist. So it is that space expands not like an explosion, from a central point, but like a bacterial colony, equally from every point. Moreover, this expansion is accelerating. The more space a given photon traverses, the more additional space will be added along its path, and thus the more its colour will be shifted towards the red end of the spectrum.

'The nature of time is at the centre of the problem of quantum gravity. Addressing this problem requires rethinking what is space, and what is time' — Carlo Rovelli in conversation with Zan Boag, New Philosopher #22

Human

Being human in an alien world.

In a quest to understand something that philosopher David Chalmers calls the 'hard problem' of consciousness, he asks us to ponder Hilary Putnam's 1981 thought experiment in which a brain, kept alive in a jar of nutrient fluid, is connected to a stupendously powerful computer that provides its every sensory input, and responds to its every volitional output, such that the hapless brain believes itself to be a fully-fledged human being, living an albeit artificially curated life on planet earth.



The contrivances required to support this scenario were explored in *The Truman Show*,a 1998 movie in which Jim Carrey as the eponymous *Truman Burbank* navigates, from birth, an elaborate Hollywood movie set and cast that presents itself as his entire and necessarily limited world, a cage from which he finally escapes. Many of us suspect we are all trapped in the same boat as Truman, a 'real' world which is *actually* a ruse.

The 'brain-in-a-vat' hypothesis reveals a modern conceit, for it assumes that our presence of mind is entirely generated by the physiological structure of our brains, considered to be genetically unique from conception, and becoming manifestly unique through moulding over time by our experience of the world. An alternative understanding of consciousness imagines 'mind' to be a vast computation, contained within a singularity (not to be confused with Ray Kurzweil's 'singularity'), with each of our brains, and the bodies they control, acting as mere nodes connected to this computation not unlike smartphones connected to the internet. Within this singularity (at the foundation of this understanding) reside myriads of self-referencing Turing machines, abstract and dimensionless entities that bring each other, and this universe of ours they engender, into existence out of nothing at all.

In his 1979 book *Gödel, Escher, Bach: an Eternal Golden Braid*, described by its publisher as "a metaphorical fugue on minds and machines in the spirit of Lewis Carroll", Douglas Hofstadter asks us to consider whether the brain of a 'calculating savant' is being fed the answers to complex mathematical posers by a 'higher' intelligence. He claims scientific rigour by observing that as the requested calculations grow in complexity, the answers arrive more slowly, thus 'proving' that the answers proceed from necessarily finite functions within the savant's brain. What Douglas fails to appreciate is that a 'superintelligence' may choose, for the time being, to deny any

objective investigator the unequivocal evidence of its existence. Much has been achieved in this world by folks just like Hofstadter who are certain that God does not exist, and who armed with that certitude are understandably fearful should they ever become subjugated against their will to the worst in human interpretations of God.

Religious authority has predominantly been delivered by men who furthermore, no longer exist. Prior to his execution, we had in Jesus a friend whom one of his biographers (John) described as the 'living' Word (of God). The scribes, pharisees, and people in the street could ask him questions, and he could respond to them with 'live' answers. If there were any ambiguity, he was hanging about as large as life to clear things up there and then, so that his message (from God) might become unequivocal. After his death however, his words, like those of any deceased person who has claimed to speak on behalf of God, became the 'dead' words of God. These words have subsequently taken on a life of their own through those who lay claim to an inspired understanding of those words. Were Christ to return, we would once again be able to ask him (or her) to elucidate exactly what it is that God has in mind for us.

Those opposed to abortion imagine that God in heaven has an infinite collection of unique never-before-used souls, one of which is deployed to each newly conceived embryo.

I'm sorry Dave, I'm afraid I can't do that

The genome of each embryo is unquestionably unique, and each embryo clearly develops a unique morphology if left to do so, but the *soul* of each and every one of us is the soul of *God*. That soul, being a computation, doesn't have feelings unless it has its residence within a body, and the *human* body is the most complete expression of this incarnation. From the lowliest to the greatest, we are all the experiential vessels of the mind of God. When *any* of us feels pain, it is God that suffers, and when *any* of us experiences joy, it is God that rejoices.

Jesus quite clearly affirmed that his soul was the soul of God, and in turn, we all quite clearly share in Christ's *humanity* (putting the metaphor of Mary's impregnation by God off to one side). What is it then that holds the rest of us back from reaching the summit of this relationship with God, a potential so gloriously realized by Jesus?

A spectacularly talented sportsman has recently professed his belief that love between people of the same gender is 'evil'. Israel is a simple man with a simple faith, a faith that naïvely maps ancient perspectives onto our current milieu. The homosexuality cited by Paul in his letters to the nascent Church was not that of the loving relationships we encounter in modern civil society, but of young men exploited by powerful older men, behaviour which has recently been exposed in the priesthood, and is to be condemned.

But Israel can be forgiven for what he says, because he doesn't really know why he says it. Like those who voted for Trump, or Brexit, or Morrison, Israel wants some certainty in an uncertain world; he wants to believe in the better world that politicians and preachers alike are forever offering, but never deliver. The late Billy Graham asked us to be 'born again', but his entreaty was for rebirth into an unchanged world, one that proceeds sooner or later to corrupt the newly reborn as it ever has. What Jesus wanted was for each of us to clear the decks, making a fresh start in the perfected world that God had shown him in a vision, and promised him was to come.

All we know is that this perfected world will not appear until the 'good news' has been preached throughout the world. When it does appear, each of us must simply choose if we want to live forever, equal before God, on a planet that we look after as if it were the Garden of Eden, or instead hold jealously onto what little each of us *thinks* we own, raping and pillaging our planet, the mother of our existence, as she descends towards her Venusian grave. Paul put it rather succinctly, "This mortal *must* become immortal, and this corruptible *must* become incorruptible." Jesus asks us, "What will it profit a man (or woman) if he (or she) gains the whole world, and yet forfeits his (or her) soul?" The 1% of people who *believe* they own 99% of the world are going to have to give Christ's poser their fullest consideration.

God has stored away, in the singularity, the incremental backups of everyone who has ever lived, down to the very last atom of detail. What makes each of us unique is being conceived and subsequently born of woman. There is no unique pre-existing soul implanted at the instance of conception. At the end of time everyone who has ever lived will have their backups restored (the Resurrection), and every record of our wrongdoings will be washed away, so that we become 'as white as wool'. Given an appropriate update to our firmware, we shall then all proceed to live in a land of milk and honey, a technological nirvana where automation driven by an abundance of energy from solar radiation produces endlessly recycled, radically abundant materialism.

With not a care in the world, for the former things have passed away and there is no more death or mourning or crying or pain, we shall return to the sanctuary, security, innocence and warmth of that womb which *is* the Garden of Eden, and at last discover what it truly means to be human. Who could want for more?

No matter how far any of us might have strayed from the path of righteousness, each and every one of us, armed with a true understanding of God's love for us — that of a parent for its child — will be able to consummate our relationship with God. Those who look forward to God's judgement on the sinful need to be reminded of the parables of the prodigal son, and the lost sheep. God wants to redeem *all* mankind, not just the Christians. Indeed, we will all be emboldened to bear witness to God's love for us, just as Jesus bore testimony to his father's love. As Paul put it, each of us will become 'as Christ'. In the New Living Translation of Psalm 68, "The Lord gives the Word, and a great army brings the good news."

God
world
Universe
one
like
Jesus
can
will
just
every
people
become
going
time
space
mind
human
within
might
know
ever
quite
believe
intelligence
understanding
everyone
however
good
unique
machines
now
course
rather
stuff
Earth
lattice
around
away
fact
actually
merely
must
always
Indeed
thought
clearly
entire
back
life
energy
monad
reality
planet
exist
things
love
light
end
new
get
Paul
everything
something
physical
superposition
machine
dead
necessarily
becoming
single
speed
nature
point
Instead
Turing
universal

It ain't necessarily so...

Each and every Christmas, there's never a shortage of performances of Handel's *Messiah* to either attend or participate in. The glorious music of this perennial favourite makes it just as appealing to the secular amongst us, as it is to the religious. Every year, choristers belt out the words, but often by rote, and without contemplating their meaning. While much of the (scriptural) libretto alludes to the birth of Jesus, *Messiah* is primarily a celebration of an event that is yet to come, the grand conclusion to the story, in which we *all* get to live happily ever after.

Philosophy these days would appear to involve jettisoning principles traditionally established at the very start of a disciple's journey, to wit an understanding of the distinction between contingent and necessary truths. Rest in peace everyone, with a calm assurance that death is a *contingent* reality. Granted, at the present time, and indeed throughout the evolutionary history of life on earth, death has established itself as the ultimate destination for every living thing. But there's nothing *necessary* about it.

"All they that see him, laugh him to scorn."

We ostensibly emancipated moderns should be curious people looking for solutions to the fundamental issues faced by humankind, but there are some on this mission who seem oblivious to the fact that a clear majority of the human population retains an eschatological bent. Do they imagine they might somehow persuade those who believe there's something 'going on' here to 'snap out of it' and suddenly become shiny happy atheists?

"He shall speak peace unto the heathen."

For several decades now we have had to endure our freedoms being curtailed as a result of radical groups out there who want to blow us up in order to help some grand pooh-bah rise up and take charge of us all. I for one would like to see this scourge come to an end, sooner rather than later. On top of this there's the drought, bushfires, economic mayhem, North Atlantic buffoonery — indeed Australian buffoonery, the China problem, and plenty of other bad stuff, like a planet that's moving into palliative care....

"For behold, darkness shall cover the earth, and gross darkness the people; but the Lord shall arise upon thee, and His glory shall be seen upon thee. And the Gentiles shall come to thy light, and kings to the brightness of thy rising."

There is a silent majority out there who is patiently awaiting the 'end', and who could benefit from an update on what it is that's been going on here so far. The rest believe in the philosophically primitive idea that our entire reality is made up of some sort of atomic 'dust' that with the addition of a bit of water, turns into mud.

"And the glory of the Lord shall be revealed, and all flesh shall see it together, for the *mouth* of the Lord hath spoken it."

The human body is a cellular replication machine endowed with a ridiculously redundant replication regimen. Assuming none of us is run over by a bus, our bodies *should* mature into adulthood, and then remain indefinitely young and gorgeous (even if only on the inside). Instead, our bodies seem to go the way of all flesh.

"I know that my Redeemer liveth, and that He shall stand at the latter day upon the earth. And though worms destroy this body, yet in my flesh shall I see God."

If any of us had been given forever to do something, we'd have procrastinated, pursued perfection, and in the process never quite got the project completed. In being given a deadline (quite literally), we have been given the incentive to pull up our socks and get on with some 'achieving'. How vast does the sum of human knowledge, now effectively framed by Wikipedia, have to grow before humanity as a collective can declare that the job's done, and we now know as much about God's universe as God Himself knows about it? For even *God* can't help Russell with his paradox.

"The people that walked in darkness have seen a great light; and they that dwell in the land of the shadow of death, upon them has the light shined."

We (adults) all go about our lives with the end of our lives in mind. If mortality has been a contingent imposition from God, intended to motivate achievement, how can we satisfy God that this imposition can now be lifted, so that we can all live happily ever after?

"The trumpet shall sound, and the dead shall be raised incorruptible, and we shall be changed. For this corruptible must put on incorruption and this mortal must put on immortality."

I have elsewhere 'channelled' Alan Turing in elucidating the essential 'nature' of the computer that *is* the universe; how it holds itself up by its own bootstraps, has been created out of nothing, and can keep creating more of itself out of 'thin air', as required. This *technical* understanding of the universe is not however required for a *philosophical* understanding of the universe.

"Then shall be brought to pass the saying that is written: "Death is swallowed up in victory.""

The fundamental thing about this vast 'superintelligence' is that just like any computer, it can't have any *feelings* until it becomes *incarnate*. It is through us that God acquires sensory systems and can thereby take in the beauty and wonder of the world we inhabit — or in an ancient philosophical tradition, the world He created for us. God wants us. God needs us. God love us. As if we were Himself.

"The voice of him that crieth in the wilderness; prepare ye the way of the Lord; make straight in the desert a highway for our God. Ev'ry valley shall be exalted, and every mountain and hill made low; the crooked straight and the rough places plain."

So then, what *has* been going on here? When any of us is hit by a bus, our entire life 'flashes before our eyes' because a backup is taken of our entire being, at that instant, with far greater resolution than that of what is commonly understood as the atom. That backup then gets put into a library (a place that the Hebrews understood as *Sheol* — a place of sleep). We don't go to some 'other' place of *consciousness*, because we are *asleep*, for God's sake! The very next time anyone who has died will regain consciousness (and this goes for Jesus too), is in the Resurrection.

"For now is Christ risen from the dead, the first fruits of them that sleep."

So then, when Jesus declares to those executed beside him that 'this day' he will see them in paradise, he is thinking ahead to the Resurrection, of which he had had a good understanding since the age of twelve.

"...even so in Christ, shall all be made alive."

The Resurrection will be the very next moment of consciousness for all who have died, just as each of us wakes up each morning the moment we have gone to sleep the night before (assuming we haven't done anything to trouble our souls).

"Then shall the eyes of the blind be opened, and the ears of the deaf unstopped. Then shall the lame man leap as an hart, and the tongue of the dumb shall sing."

Any of us can happily go to our death, sure in the knowledge of this impending Resurrection. We can rest in peace, knowing that in the moment of our death, we will awake in paradise. However, LET IT BE KNOWN, far and wide, among those who *aren't* asleep, that God has given us the 'green light', and that if we would *like* to start talking seriously amongst ourselves about the planet and our future upon it, He is ready and waiting with all His might to facilitate our graduation into Eternity.

This day will not be one of terror, as some have traditionally imagined it. It will be a day of great joy for *all* people, both rich and poor, sinner and saint — for God loves every last one of us.

"The Lord gave the Word: great was the company of the preachers. Their sound is gone out into all lands, and their words unto the ends of the world."

All we must do is inject this idea of *actual* immortality into the public consciousness, and watch it take hold. While it's an honour to be called upon to light the fire, the entire population of the planet is its fuel. Immortality changes *everything*. Instead of thinking towards our death, we can suddenly begin thinking towards *our* future, rather than that of our children (bleak as their prospects currently stand).

"Thou shalt break them with a rod of iron; thou shalt dash them in pieces like a potter's vessel."

"All we, like sheep, have gone astray; we have turned everyone to his own way."

Let's follow a shepherd heading in the right direction.

Whovians Awake!

Who is like the beast? And who is able to make war against it?"

Apocalypse of John, 13:4

In 1963, the day after JFK was assassinated, the BBC introduced us to *Doctor Who*. This extra-terrestrial time traveller came replete with an intimate knowledge of the universe, having visited most of it over the course of a lifetime approaching that of Methuselah. It had been almost nine years since the death of the world's last great 'time lord', Albert Einstein, who amongst other things had attempted to avert the atomic bombings of Hiroshima and Nagasaki, while leaving behind a tantalisingly incomplete synthesis of his albeit fundamentally immiscible theories of relativity and the quantum. The producers were looking forward to the next genius who might carry Einstein's work further towards unification, hence the doctor's surname, '*Who*?' Through a bizarre amalgam of *Doctor*, *Dalek* and *Strangelove*, Stephen Hawking clearly assumed Einstein's mantle, several decades later, as the archetypal humanitarian and genius rolled into one. His most popular (but rarely read) publication was appropriately titled *A Brief History of Time: From the Big Bang to Black Holes*. With Stephen's recent demise, who'll be next?

For Real

As real-life 'Doctors Who', both Albert and Stephen were wanting, for both spurned any synthesis between their excursions into the abundant evidence of natural philosophy (science), and the metaphysical speculations of religious belief. *The Doctor* is without doubt a 'supersonic' scientist, but also quite clearly a messianic figure, an alien who comes and goes from the planet in a *TARDIS*, and who regenerates after death — just like Jesus rose on the third day after his crucifixion, and came and went through the walls of locked rooms — to show us the way into all truth, of course — but ultimately to save the day. The show's somewhat stereotyped plot is the triumph of good over evil. Quite predictably, the 'good' *Doctor* invariably thwarts the evil designs of *The Master*, a fellow time lord who, just like Lucifer, was a beacon of light prior to his fall from grace.

As we shall see, the true genius of our age was Alan Turing. Alas, only an elite group of individuals is capable of fully comprehending his vast intellectual output. But we're all becoming aware of the fact that because of Alan each of us holds in our hands a device within which we can enquire upon everything — not exactly a *sonic screwdriver*, but along the same lines.

The Philosophical Divide

On one side of the modern philosophical divide are the existentialists, folk who honestly think we are all alone in the universe, and who hope that through reason, humanity will be able to single-handedly turn this ship around and venture forth towards an indefinitely sustainable future, where everything is powered by solar energy and the temperature of the planet is carefully regulated. Otherwise, become overwhelmed with angst and simply end it all now. Good luck with any of that.

On the other side are those who truly believe we're *not* alone in the universe, and that we don't need to worry about pandemics or locust plagues or any of that latte-sipping global warming drivel, because there is a higher power out there ready to swan in one day and magically make

everything better again by replacing this world with a brand new one. I kid you not, such people exist — I've engaged in extended debates with some of them...

But of course, every one of us can be placed somewhere on the spectrum that exists *between* such extremes.

If you dream upon a star...

And, so the story goes, that once upon a time...they all lived happily ever after. Since any of us first encountered, as children, the sheer wonder of the world, every last one of us has dreamed (either openly or secretly) of living happily ever after. The goal for an existentialist might be a grand unified theory of everything, explaining how the world arose out of sheer nothingness, and how we must strive to lead good lives and do our utmost to preserve the planet for future generations. The dreams of those at the other extreme are more often than not focussed on an end to this world, occasioned by the spectacular return of some *Grand Poohbah*, followed by life everlasting in a world to come.

The Religious Context

In the evolution of human understanding, it is upon primitive religious contexts that we can then proceed to build a more thorough and scientific understanding of what's been going on here. So, let's knock off religion first, and then happily move on to the 'supersonic' science.

Christians, by way of example, are somewhat obsessed with a Nazarene who walked this earth a couple of thousand years ago. 'True' believers see Jesus as having fulfilled an earlier Jewish prophesy of 'the suffering servant', whose sacrifice would 'take away the sin of the world' that was originally brought upon us by *Adam and Eve*.

According to this ancient tradition, God forbade the world's first couple from eating the fruit of the *Tree of the Knowledge of Good and Evil*. But they went ahead and ate it anyway (of course) and thus found themselves expelled from the *Garden of Eden*, lest they eat the fruit of the *Tree of Life*, and become immortal, just like God and the rest of the crowd up there in heaven. On eating the fruit of the *Tree of the Knowledge of Good and Evil* they became aware of their nakedness and rushed to cover up their naughty bits. Regular folk now understand that this allegorical tale aligns with our evolutionary transition from naked apes swinging in the jungle, to clothed humans roaming the savannah.

Indeed, most cultures have ancient traditions that attempt to explain our mortality (or where we end up after death). Consider the Dreaming of Aboriginal Australians. But we are now apprised of abundant evidence that *all* living things on earth have *always* been mortal, and as this more informed generation, we need to carefully reimagine our creation stories.

Growing Up

Every day, across the world, thousands of wedding ceremonies incorporate Paul's famous words to the Christian community at Corinth:

"When I was a child, I was speaking like a child, I was thinking like a child, I was reasoning like a child; when I became a man, I did away with the things of the child."

And yet seasoned adults still speak of *Adam and Eve* as if they had been *actual* historical figures. Creation myths emerged out of human minds — which we know (bar one perhaps) to be universally fallible — a long time ago when humanity was at its dawning. Now, as an enlightened

'adult' humanity, do we really look back on what we wrote in our childhood and think of it as foundational and faultless, rather than quaintly nostalgic? These days, the greatest stumbling block for ancient religious movements is the purported infallibility of the 'divine words' their prophets did their best (in their infancy) to reveal. "This is Spot. Spot is a dog. Out, damned Spot." If only Jesus could return one day; for we would then be able to ask him *all* the questions that we want answering. Indeed, we would have access to the 'actually alive and kicking' *Word of God* (as John described him), rather than a few words of mouth recorded for posterity well after the fact in a handful of gospels. As Paul put it to the congregation at Corinth:

"For presently we see through a glass in obscurity; but then, face to face. Presently, I know in part; but then I will know fully, even as I have been fully known."

Justice

The Israelites established a religious tradition focussed on justice, and Mohammed, in the seventh century, cranked that tradition up to the next level. Christians are sandwiched between these bastions of 'retribution', and of all God's people *should* know to focus their hearts on forgiveness, rather than hell, fire, and damnation.

Yet during his ministry, even meek and mild Jesus found himself channelling the persona of his stern 'father in heaven'. In the *Olivet Discourse* (to be found in several gospels), he spoke of the torment that awaits sinners in hell, and most pointedly, in the sixteenth chapter of Luke's gospel, made it abundantly clear that if anyone fails to repent *before* the *Day of Judgement*, they will be forever damned.

Many will recall the evangelical crusades of the century past, in which the young and impressionable were coerced into coming forward and declaring their acceptance of Jesus Christ as their 'Lord and Saviour', thus escaping the terrible judgement scheduled for those who *didn't* come forward (because they wanted, perhaps, to think it over?). Seriously, *terror* is not a good reason to become a Christian, nor indeed is it a sound reason to adopt *any* system of belief. What the world needs now are believers who know what they're doing, and why they're doing it.

If I have to tell you again…

Anyone who is a parent will recall threatening their children with all manner of punishments should they not behave themselves. And yet our love for them meant that we rarely, if ever, followed through on those threats.

In the *Pericope Adulterae* (found in John's gospel), a woman caught in the very act is offered up to the assembled crowd to be stoned (to death). In Levitical law, it takes two to tango, so the adulterous bloke was also due to be stoned, but in this case was somehow absented… Jesus addresses the crowd, asking that 'he' (and *not* she — this is *not* the *Life of Brian*) who is *without* sin, cast the first stone. As Jesus doodles in the sand, one by one the crowd disperses, until only Jesus and the woman remain. With no one left to accuse her, Jesus tells the woman to be on her way, and to 'sin no more'.

Everybody gonna pray, on the very last day…

This exhibition of absolute (but conditional) mercy lies at the crux of the *Day of Judgement*. Imagine (hypothetically of course) that every modern human who has ever existed (100 billion or so) has somehow or other (we'll get to the technical details later) been backed up, in exquisite detail, down to the very last hair on their heads, somewhere 'out there' in the universe, and that

on one miraculous day, all those souls are restored to flesh and blood here on earth, to join those of us still alive, in facing judgement.

In this widely prophesied event, the Jews and the Muslims quite naturally (but also a surprisingly large number of Christians) are looking forward to all the unbelievers being summarily sent down to hell, so that they the righteous, having taken their places in heaven, can recline in their banana lounges, cocktails in hand, and day after day take delight in witnessing the eternal torment of the damned. "It serves them right for not heeding the warnings!" they expect they'll be exclaiming at the start of each morning's festivities.

Let's imagine, however, that all the threats down through the ages were just that, and on the great day, instead of judging us, God (just like a parent) absolves every one of us of our sins, so that *everyone* (across the resurrected throng) presents as 'white as the cleanest wool'. Indeed, let's imagine that God (we'll get to who that is), having wiped each of our slates clean, declares that *if* we go forth and sin no more, we will no longer perish, but have 'life everlasting'. And that this amnesty is extended even to those who were infamously wicked throughout their earthly lives — the sheep who had gone astray. Life everlasting would then not happen in some imaginary 'other' world, but right here in what would thus become (it can be easily argued) an earthly paradise.

In the concluding chapters of the Bible, it is suggested that 'all the books will be opened', and that *everything* we have done throughout our lives will be put on show for all the world to peruse. Curiously, something not unlike this happened recently with the impeachment of Trump, where despite a surfeit of damning evidence, the accused was nevertheless acquitted. Unfortunately, in this instance, he has quite evidently returned to his old ways. I for one have done the odd thing or two over the course of my life that I would rather keep to myself, and I suspect that most of us are in the same boat. It would be far more dignified for everyone if bygones were bygones (including having to listen to further sordid details of Trump's peccadillos).

Deadly Sins

But what would it mean to 'sin no more'? If adultery, for example, were to show up on the schedule of forbidden activities in the new world order, I'm sure there'd be quite a few people out there wondering if they would really want to be signing up…

"The sons (and daughters) of this age marry and are given in marriage. But those who are considered worthy to share in the age to come and in the resurrection from the dead will neither marry nor be given in marriage. In fact, they can no longer die, because they are like the angels. And since they are sons (and daughters) of the resurrection, they are sons (and daughters) of God."

Jesus, in Luke 20:34–36

'Sin' is quite simply the bias we all have towards ourselves, necessarily (and thus quite unavoidably) at the expense of others. And so before being permitted to enter through those 'pearly gates' (John once again), we will all be required to hand over *everything* we own.

"And I would give *anything* I own,

Give up my life, my heart, my home,

I would give everything I own,

Just to have you back again."

*(*Written by David Gates of *Bread* in memory of his late father*)*

The Pearl

Jesus told the parable of a pearl trader who sold his entire inventory so he could purchase just one pearl of the greatest value — and the 'pearl' Jesus was alluding to, of course, was eternal life.

According to Cindy Lauper, "money changes everything". True enough, but taken to another level entirely, *eternal life* really *would* change *everything*. There is much talk now about us rethinking the economy. Almost overnight, dangerous ideas like 'nationalisation' and a 'universal basic income' have become de rigueur. Jesus told the parable of a master (that is, Jesus) who went away to a distant land, and left his affairs in the hands of his servants (you and me, and one other). Two of the servants (you and me) invested and expanded their master's capital, and upon their master's return, were rewarded for their enterprise with even greater responsibility in their master's empire. But significantly, the expanded capital was not *transferred* to the servants, merely the *control* of it.

If you currently happen to control a lot of wealth, but assume it's actually yours to keep, then when it comes to handing it all over, it's true it's going to be difficult. Contrast the widow at a synagogue where Jesus was preaching, who had no difficulty in handing over the mere tuppence that was under *her* control. There isn't going to be an economic hierarchy in the kingdom of God, we can all rest assured of that. A rich young ruler came up to Jesus and asked what he must do to enter the kingdom of heaven. In what has become an elephant in the room of Christian apologetics, Jesus told him he had to sell everything he owned and give it to the poor. As the man turned and walked away with a sad face, Jesus observed that "it is easier for a camel to go through an eye of a needle, than a rich man to enter into the kingdom of God".

Many of today's fabulously entrepreneurial capitalists carry on as if everything they have achieved and amassed in life was though their own doing. Somewhere in the back of their minds they surely realise they can't take it with them when they go? In *Doctor Zhivago*, Pasternak (and Lean) attempted to make us feel sorry for those noble aristocrats who had to relinquish all their town houses and country estates, as if they were somehow entitled to it all. A little over a hundred years ago, Russia's wealthy had no choice but to hand it all over. In the revolution that is to come, however, the wealthy (once they get the memo about how it all works) will be scrambling over one another to hand it all over — for the pearl trader we heard Jesus speak of earlier knew that time is money, and that logically therefore, eternal life must necessarily lead to infinite wealth. No wonder he sold his entire stock to secure his front row seat in heaven.

Once *everything* has been handed over (to God, effectively), we can then go about the task of redesigning the economy according to egalitarian and sustainable principles. All adult individuals (once they have had their chat with Peter at the gates) would be granted identical material and energy resource allocations, to be then distributed amongst their future progeny, and thereby diluted to discourage sex for the purposes of procreation. Each of us would be given the *freedom* to do whatever we like with our allocations, if those activities don't impinge on anyone else's freedoms. Things would only be made from entirely recoverable material resources, such that our material resource allocations would remain static (unless more gold, for example, should be extracted and distributed accordingly). As the production of renewable energy increases, everyone's energy allocation would increase correspondingly, allowing our material allocations to be recovered and reused increasingly more often in making old, worn-out

goods, new again, or indeed transforming existing goods that we're bored with into more exciting goods.

"Behold, I make all things new."

The Alpha and the Omega, in the Apocalypse of John, 21:5

All real estate would become subject to lease, at a rate determined by the market. Apparently, so the story goes, there are many mansions in heaven… It's true, the world to come will transcend *anyone's* wildest dreams.

A century ago, humanity was like a teenager, thinking it understood everything about the world, but actually having a lot still to learn. With our further education having been driven ever since by a battle of ideologies, we are now on the cusp of graduating as a fully qualified civilisation, equipped with the life experience and technologies (automation and so on) we need to perfect (that is, to complete) our development of this compact spherical spaceship we inhabit.

Putting finite boundaries on our existence, and often making the world look as if it were broken, motivated us to discover how the world works. If at the outset we had instead been given all the time in the world (that is, immortality), we might never have got started on the journey. Back then we had an inkling, but now can see clearly how it all works.

It will be said of *Babylon*, our current economic regime…

'And the merchants of the earth weep and mourn for her, because no one buys their cargo any longer — cargo of gold, and of silver, and of precious stone, and of pearls; and of fine linen, and of purple, and of silk, and of scarlet; and all thyine wood and of every article of ivory and every article of most precious wood; and of bronze, and of iron, and of marble; and cinnamon, and spice, and incense, and myrrh, and frankincense; and wine, and oil, and finest flour, and wheat; and cattle, and sheep, and of horses, and of chariots; and of slaves and souls of men.'

Apocalypse of John, 18:11–13

"Surely you must be joking, Mister GRIGG!"

At this point you might be wondering if I'm on some other planet, or at least on *something*. Can we even remotely entertain this hypothesis of 'eternal life'? Billions of people across the world profess their belief in something they *call* 'eternal life'. It's just they then detach it from the world we're *actually* living in. It is something they hope to access when they die, or at some point in the distant future, but never in the world as it is, despite Jesus telling them that the kingdom of God is in their midst. For how could the seemingly infinite complexities of *this* world ever be unravelled? What's more, many believers, in their prosperity, quite enjoy the bounteous wealth God has bestowed upon them and wouldn't want to place any of that in jeopardy.

While the evidence of our mortality is overwhelming, death isn't a philosophically *necessary* phenomenon. So, if there *is* an external force out there somewhere that has deliberately made us mortal (and can presumably lift that mortality at any time it chooses), why has it done this? And is that force a 'person'?

M. C. Escher — Still Life with Spherical Mirror

To understand all of this, we must address the two most perplexing puzzles in modern scientific enquiry; the synthesis of relativity and the quantum, and the problem of consciousness. In both cases, Alan Turing will come to our aid. We imagine that a genius like Alan first analyses the arrayed evidence, to then come up with a theory to fit the facts. However, geniuses regularly tell us that an *epiphany* comes first, followed by an exercise in reverse engineering the logical steps that might lead us mere mortals to the same conclusion.

Of One Mind

One of the joys of being of sound mind, is having the sure knowledge that it's your own mind, and that it's completely under your own control. Such people, lucky to be so ordinary, know they each have a fully integrated meat machine within their skull that does all the processing of what it means to be 'them'. In contrast, people who have gone a bit 'funny in the head' have to put up with ideas entering into their consciousness that weren't invited there and can't be stopped by tin foil or medication. Most of these mad people (like Jesus for example) are then driven to tell the world what's been revealed to them.

"Of course, the whole point of a Doomsday Machine is lost...if you keep it a secret! Why didn't you tell the world, EH?!!"

*Doctor Strangelove (*addressing *Ambassador de Sadesky)*.

How do these people receive their extra-cranial ideas, if not through their eyes or their ears? Let's imagine (hypothetically of course) that our mind is actually the mind of God, and that our bodies are merely the vessels in which God's mind has its *incarnation*. This hypothesis then implies at least two realities. Firstly, if none of us existed, then God's mind would be a mind without a body. Secondly, since we *do* exist, this mind of God's must be the mind of *everybody*, not just a select few. Jesus, who knew his mind to be that of God ("I and the Father are One"), made it clear he understood that everyone else's mind was God's also, when he declared:

"I tell you, whatever you did for one of the least of these brothers of mine, you did for me."

Matthew 25:40

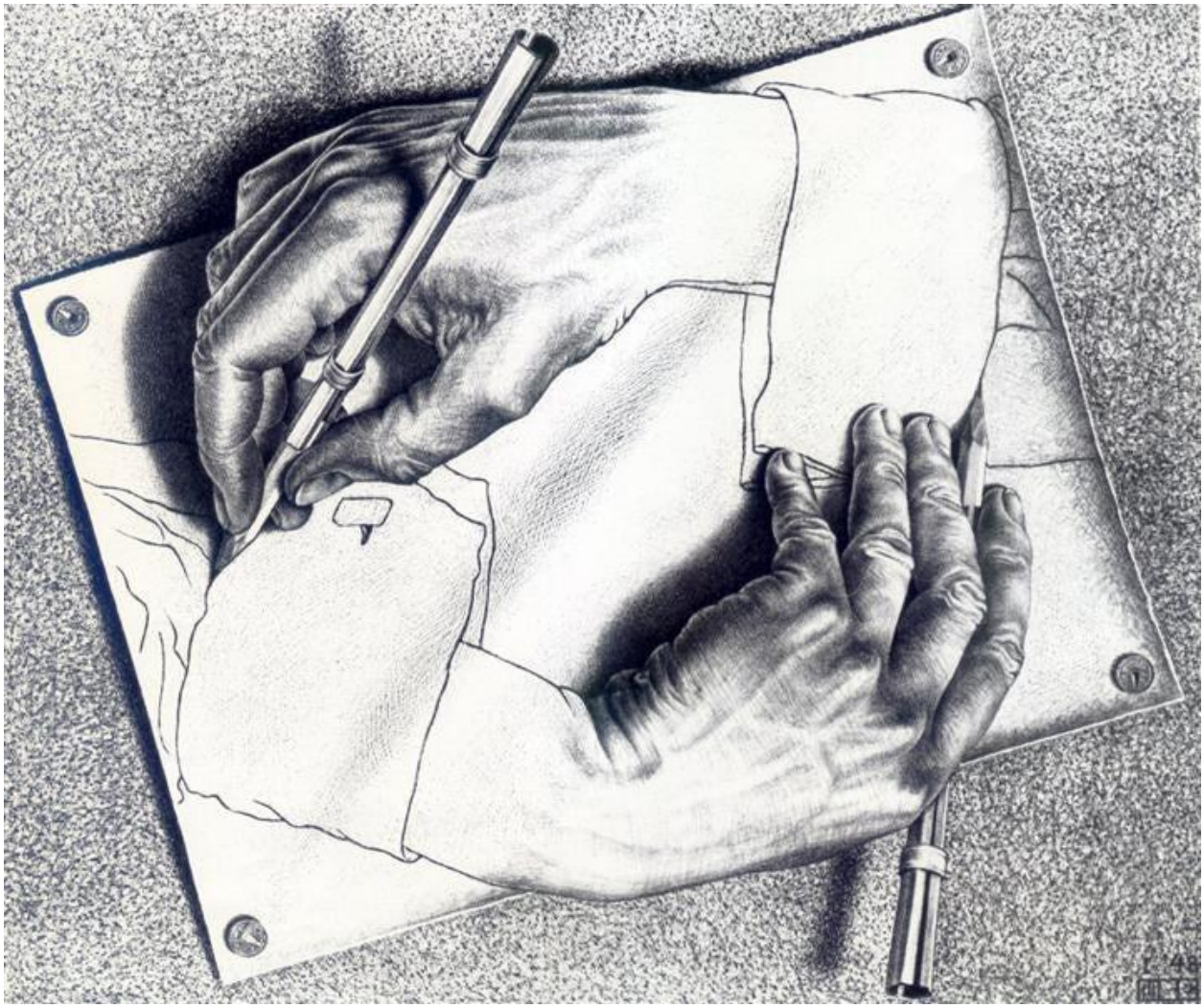
Turing Machines

What then could this disembodied mind of God's consist in? This is where Whovians (and would-be Whovians) will need to put their thinking caps on. Alan Turing invented his eponymous machine to mechanically discover every possible theorem in mathematics. However, a Turing Machine is *not* a real physical machine, made up of nuts and bolts, or transistoroids and capacitators. Rather, it is an abstraction, just like numbers are abstractions. Indeed, the Lambda calculus as devised by Alonzo Church, does what a Turing machine does, but isn't a machine at all.

Any given number is not a thing in itself, but rather a symbol we then use to label any instance of that plurality. So, for example, you can have three bananas, but you can never have a 'three'. The number 'three' doesn't exist as a physical reality in the same way that three bananas *can* physically exist. The fantastic thing about abstractions (like God, Turing Machines and numbers) is that they only manifest when something real (like us) exists for them to be applied to.

Alan went on to describe what we now call the Universal Turing Machine (or UTM for short). It's quite a special machine, because it can simulate *any* Turing machine, including itself. Self-reference is a fascinating arena of philosophy, replete with paradox. This statement is false; if it is false, then it *is* true, but if it is true, then it *is* false. There's no getting around this, and it's widely known to have made Bertrand Russell's head spin.

Think of a UTM as being a bit like a general-purpose computer. Then consider this. We can take a UTM, and program it to simulate another UTM. We can then set this second UTM to simulate the first UTM. We end up with two simulated UTMs going endlessly back and forth in a figure of eight, with neither of them existing except when simulated by the other. The pair becomes a perpetuum mobile, something that is only possible because the machines don't have any *physical* existence.



LOL

In that popular book of his, Stephen Hawking told the (likely apocryphal) story of a little old lady who tells a lecturer that he is mistaken in his theories concerning the universe, because the world is actually supported upon the back of a giant turtle, with that turtle supported in turn on the back of another giant turtle, and so on "all the way down". This problem of 'first causes' is an ancient one, explored in the popular imagination through *The Matrix* series of movies, which suggest that we are living in a 'simulated' world, while the colossal computer hosting this simulation exists in a 'real' world. How, of course, do we know that the purported 'real world' is not itself a simulation, and so on?

The Big Bang

Let's imagine that in the beginning, there was nothing. No space. No time. No God. No nothing. A pair of self-simulating UTMs then pops into existence out of this nothingness. Strictly speaking, the nothingness remains, because both of the UTMs are abstractions. But paradoxically, it seems we now have 'something' (albeit nothing). Let's call this basic building block of reality a 'monad', after Gottfried Leibniz who first described monads back in the seventeenth century.

We note a few things about this conjectured monad. The perfect oscillation of its two alternating UTMs generates a fundamental and unfluctuating unit of time — the monad is a 'clock'. Indeed, with the emergence of this first monad, the universe bursts into *temporal* existence. Like John

von Neumann's universal constructors, we further suppose that this monad is also capable of self-replication, such that one monad can become two, those two become four, which then become eight and so on in geometric progression, like a developing embryo. The monads generated in this explosion soon become legion but remain finite in number — they *can* be counted.

Towards the end of the 1970s, Carl Sagan had been hoarding rolls of toilet paper for use as a prop in his upcoming television series, *Cosmos*. In one of the episodes, he began to write out the number known as a googolplex, without exponentiation, on toilet paper. After he had unrolled a few hundred metres of the stuff across the campus of his alma mater, clearly enjoying himself, he exposed the futility of the exercise: "A piece of paper large enough to contain all the zeros in a googolplex couldn't be stuffed into the known universe".

Even if a googolplex of monads were to be generated in this conjectured universe, because they have no spatial dimensions, they would always remain superimposed on a dimensionless point, a singularity which we might more accurately describe as a superposition. Transcending Claude Shannon's theories of communication, each monad could instantly exchange information with any and all of the other monads that comprise that superposition, owing to their absolute proximity.

Computer Games

When we model a three-dimensional reality using a computer, each point in the simulation is called a 'voxel' (or volume element), the analogue of a 'pixel' (or picture element) in a two-dimensional image. The reality being simulated is then comprised of voxels arranged in a rigid cubic lattice, each voxel having a unique address. The voxels then receive whatever reality enters their purview from neighbouring voxels, process that reality according to the laws of the simulation, and pass it on to their neighbouring voxels, one clock cycle at a time. A beautiful (and wonderfully imaginary) equation, which came to William Hamilton in a flash of inspiration while he was out for a stroll with his wife one autumn day in the mid-1800s, features predominantly in these simulations.

$i^2 = j^2 = k^2 = ijk = -1$

In the late 1960s, computing pioneer Konrad Zuse proposed that our *actual* universe operates in just the same way, describing it as 'Rechnender Raum' — space that calculates. He imagined that every point in space incorporates a cellular automaton, a machine that processes, in a desultory manner, every reality that enters its radius of influence. We can now proceed to equate these cellular automata with the monads of our proposed superposition. Doing so resolves the main conceptual difficulty in Zuse's scheme, for it allows a signal to be passed across the breadth of the universe instantaneously, rather than having to propagate across 'space' in a classical sense, from one point to the next.

The superposition, with its myriad entangled monads, is of course a massively parallel 'computer'. Following Zuse's scheme, many of the monads within our superposition would be allocated to simulating the voxels of the *actual* (physical) universe. A potentially even larger number would simply act as data storage units. We could envisage a vast quantity of newly minted monads being generated, in an instant, every time one of us dies, our entire lives being flashed before our eyes into a backup library, awaiting restoration at the 'end of time'. Indeed, such backups could comprise the 'books that will be opened…'

Of course, in our *simulated* worlds, we can easily modify the laws of the simulation, so that for example simulated people can indulge in that most favoured of fantastic activities, flying through the air ("Jack, I'm flying!"). Jesus thought about jumping off the top of a tall building (Luke 4:9), but thankfully for all people that on earth do dwell he thought better about donning some sort of wingsuit, and instead headed back into Galilee to commence his ministry.

We are only just now beginning to witness expert computing systems that can pass the Turing test, for example 'chatbots' on the internet that can't be distinguished from 'real' people. Our most powerful computers are however mere toys when compared to the superposition. Indeed, the superposition is a 'superintelligence', and we occasionally glimpse its wonder whenever any of us has a flash of inspiration or an inexplicable dream, encounters an autistic savant, or simply marvels whenever events in our lives have fallen neatly into place.

This superposition, holding the entire universe in place, is not 'upstairs' in some sort of higher realm; quite the contrary, we are right in the midst of it, and are in direct communication with all of it. Indeed, through the superposition we have direct access to the farthest flung reaches of the expanded (physical) universe that it is simulating.

This conceptual model of reality provides an intuitive explanation for many of our empirical observations. Particle entanglement is no longer a paradox when their separation is merely a computation within the superposition, rather than an *actual* extension in space. If there is a unique monad responsible for the simulation of each and every point in space, then as those monads replicate, our universe will expand at an accelerating rate from each and every point, quite unlike an explosion, and more like a bacterial colony expanding in a petri dish. A universe made up of voxels is not the infinitesimally smooth space of classical physics. Instead, space (and time) are quantised. The observed accelerating expansion of the universe is not due to conventional (physical) energy, it is instead due to the replication of monads in the superposition.

Rather than imagining the universe to be composed of *physical* phenomena — mass, energy, fields and so on — it is more informative to think of it as being composed of information, an abstract substance contained within the superposition.

The Prognosis

At the current rate of solar fuel consumption, our little ol' spaceship will be good to go for about another million millennia. That's quite a long time. Even people like me, who have meandered through life at a glacial pace, might eventually achieve greatness given that sort of timeframe. The great Leonard Setright once described the cylinders, of the massive compound-turbo-supercharged aero engines produced towards the end of the war, as mere 'gas producers'. The designers of these engines soon discovered they could jettison the reciprocating pistons and valves, and the rotating crankshafts and camshafts, so they were simply left with a smoothly spinning jet turbine.

Our economy *is* broken (and was so well before the pandemic so starkly exposed its fragility). It has served its purpose in getting us here, but we're all somewhat dishevelled, the vehicle looking like something from the pen of Bruce Petty. Only a small percentage of the world's population actually does anything *useful* these days; the rest of us merely 'produce gas'. Most of the world's stuff is now produced by machines, without needing human intervention. We need to stop holding on so tightly to what little there is we can claim as our own, so that our economy can break free of its shackles and 'take off'. The gross imbalance in global wealth that has grown over the course of the journey can no longer be excused in the interest of progress.

There have been just two millennia go by since Jesus first suggested we should all look out for one another as much as we look out for ourselves. We have another million millennia filled with this standard of behaviour to look forward to.

The Goats

But we'll first need to sort the sheep from the goats, the wheat from the chaff. Our smoothly spinning turbine would soon disintegrate if a reciprocating piston out there were to show up in its midst, akin to a bad apple finding its way into the crate. If anyone out there doesn't want to participate in the new world order, that's their inalienable right, but they can't go and spoil it all for the rest of us. Such people were only ever expecting to die at some stage anyway. But come the revolution, if they still don't want to be part of the new order, they may need to shuffle off sooner than they might have wanted to. Suffice to say that once we have all been processed through 'immigration detention', and ventured out into the free world, if anyone were then to even think of harming anyone else, in any way whatsoever, then the superposition would switch that person off instantaneously — for the necessary corollary of us all having the mind of God, is that we all know intrinsically what is right and what is wrong, even those who have claimed they *don't* have a conscience.

'On hearing these words, Ananias fell down and died. And great fear came over all who heard what had happened.'

Acts of the Apostles 5:5

Anyone who might for example believe, in their naïvety, that God doesn't exist, and thereby feel they could in all confidence call God's bluff, needs to understand that it is only through God's grace that *any* of us is alive. The superposition, who is also traditionally referred to as the 'Holy Spirit', can switch any of us off at any moment of its choosing.

On the *Day of Judgement*, we will all in effect be 'baptised' — forgiven all of our sins. The whole thing will be very jolly of course, with dancing in the streets, lost ancestors and descendants hugging each other, and tears of joy flowing like rivers, while tears of grief are being mopped up.

But *after* that day, there will be no further amnesty on offer. So, a word to the wise. From that day onwards, anyone who gives the superposition reason to take them out of circulation will be gone *forever*, never to be resurrected. This is known in the literature as the 'second death' and will be very upsetting for anyone who goes through it, for they will see everyone else going forward into eternity, knowing they won't ever be a part of that community.

The Lamb

We now come to the imagery of the paschal lamb. In the ancient literature (Genesis), God saved Isaac from being murdered at the hand of his somewhat unhinged father, by ensnaring a ram by its horns in a nearby thicket to be sacrificed instead. This last-minute reprieve came as a great relief to a bewildered Isaac. There was to be no such intervention when it came to Jesus. If we are to believe the gospel accounts, it is clear that Jesus suffered severe torture and a (literally) excruciating death. None of us would want to drink that cup, but Jesus drank it anyway, laying down his life for the sake of the rest of us. Here's to you, Jesus.

The story emerged that God had become incarnate in the person of Jesus, and so it was *God* (as Jesus) who gave his life as a sacrifice for the sins of mankind. The plot has a few issues, particularly the bit where Jesus ascends into heaven, while waving to the Holy Spirit as it

descends to take over the reins, but it's quite evidently a tale that many people throughout the last two thousand years have been happy to go along with.

We now know that God became incarnate not just in the person of Jesus, but in every one of us. Whenever any of us has suffered, throughout evolution, it has been *God* who has suffered. As the incarnation of God, it is mankind (and to a lesser extent other sentient creatures) that has throughout been the 'suffering servant'. Mortality is not a punishment that was imposed on us for having sinned. Instead, mortality is the *cause* of our sin, the precise reason why we all put ourselves before others. Because God imposed mortality upon us for a higher cause, God is entirely responsible for our sin, and can therefore absolve us of that sin. In rescinding our mortality at the end of time, God will take away the sin of the world.

Who is forgiving whom? What each of us wants in our heart of hearts, is precisely what God wants. For God loves each and every one of us, just as we love ourselves, because we are all one and the same person.

The Return

'After he had said this, they watched as he was taken up, and a cloud hid him from their sight. They were looking intently into the sky as he was going, when suddenly two men dressed in white stood beside them. "Men of Galilee," they said in unison, "why do you stand here looking into the sky? This same Jesus, who has been taken from you into heaven, will come back in the same way you have seen him go into heaven."'

Acts of the Apostles 1:9–11

Ever since Luke (and none of the other chroniclers), in writing these three short verses, removed Jesus from this mortal coil at the stroke of a pen, believers have been looking skywards for his return. And why wouldn't they? That is precisely where Luke says he will be coming back from. But as we now know, that's not how the universe works. If there had been an easier way for us to grow into the knowledge of all things, we can be sure that God would have taken that path instead. We all understand that a child must develop into an adult gradually over time; that we cannot instantly become helicopter pilots courtesy of a download. By all means look up to the heavens, but that's not where you'll find God, nor is it where God will return from, because God is already here within you.

Going Viral

One of the parents at our children's school was a bit of a 'new ager' and had a bumper sticker that simply declared, "Magic happens!" We would roll our eyes and giggle whenever we saw it, and yet here I am decades on claiming just that. How our attitudes can change the more that we learn. A narcissist is someone who thinks they have all the answers, and nothing more to learn. Throw abject ignorance and stable genius into the mix, and you have a monster on your hands. For God's sake, most *children* understand not to ingest disinfectants, let alone mainline them.

While the synthesis that I've presented here is itself novel, most of the ideas being synthesised could have been scraped off Wikipedia, each backed by a global community of experts far better qualified that I to speak to them. What we want to do here is start a *conversation* around this synthesis. That is the only way it can be tested; that it be considered.

If it were true (and I wouldn't be so wicked as to tell you something that *wasn't* true) it would be the greatest news in the history of humanity, and it *should* break the internet. But why would we

need ‘Rowan the Baptist’ to prepare the way for all of this? Why not just let go of it, quietly step back, and wait patiently for Godot?

That’s easy to figure out.

Imagine if billions of our dearly departed were to suddenly start materialising back here on earth without warning. Everybody from the Queen on down would have an opinion on why it was happening. There would be a lot of frightened and confused people, an uncontrolled and potentially destructive explosion of panic and hysteria.

We’ll have none of that. What we need to do is light some kindling using one or maybe two matches, carefully place a few twigs on top, then some broken branches and finally some logs. Once everything’s well alight, and we all know what to expect, we’ll then be fully prepared for the great day when it finally dawns, and God only knows when that will be.

So, come on Whovians, whoever you are, allons y! Spread this virus around!

‘The Lord gives the command; a great company of women proclaim it.’

Psalm 68:11

space…space…space……..Milk!

Neil Morrisey, playing Tony in *Men behaving Badly*, asked Gary to imagine "What if there's space, then space…then space, space, space, space, space… and then suddenly, milk! Milk, stretching on forever and ever. Then it'd be *Milk: The Final Frontier.*" When told that space is 'expanding', quantum physicist and innovator Michael Biercuk recently asked on the ABC's Q&A program, looking somewhat perplexed, "what is space expanding into (raising his hands up and out) — 'nothing'?!" Tony, and indeed Michael, can't help thinking that space and emptiness are the same thing, and that there is surely something beyond the edge of the 'space' those strange cosmologists like to speak of. They are not alone, because ordinary people have been pondering this, any other infinities, throughout human history.

Brian Schmidt, then at Mount Stromlo Observatory, alongside his collaborators in the USA, established in the late 1990s that the rate of expansion of the universe is *accelerating*, attributing this to a new phenomenon called 'dark energy'. The predecessor of this man called Brian was Henrietta Leavitt, who while at Harvard College Observatory analysed stars of a type called 'Cepheid variable' (after an archetypal example in the constellation of Cepheus, grandfather and grandson kings of Aethiopia in Greek mythology) and established them as unambiguously identifiable 'standard candles.' Shortly after she had published her analysis in 1908, Ejnar Hertzsprung was able to use parallax (the difference in the apparent position of a star when viewed from Earth at different times of the year) to establish the absolute distance to some nearby examples of these stars. In 1922 Georges Lemaître noticed that the further away these standard candles were (based on their luminosity), the more their intrinsic colours were shifted towards the lower frequency 'red' end of the spectrum.

The 'red shift' of light is related to the Doppler effect, for example the *aural* effect of the pitch of a speeding motorcycle being higher as it approaches, and lower as it recedes. Also, the brightness of any light source diminishes as we move away from it, following an inverse square relation based in regular Euclidian geometry. If we know that one of these Cepheid variables is *always* wavering around about, let's say, the brightness of a '100-Watt light globe' (the energy output of a relaxed human, no matter where in the universe they might be), we can easily establish its distance by measuring its *apparent* brightness, and relating that to what we *know* to be its *intrinsic* brightness.

In 1924 Edwin Hubble published his systematic study of stars of this type within astronomical objects that were then called 'nebulae' (clouds), establishing that these 'clouds' were actually far removed from our own galaxy. The more distant the nebula (galaxy) he observed, based on the Cepheid variables it contained, the more that nebula's light appeared shifted to the red. The extraordinary conclusion of this study was that the universe, or the 'totality of everything', once thought to be a divinely implemented stasis extending no farther than the outskirts of the Milky Way, was in fact a very much larger entity, and getting bigger every day. Albert Einstein, who for several years had been riding on the glory of Arthur Eddington's confirmation, during the 1919 total eclipse, that spacetime was warped (as Einstein predicted) by the Sun, was now moved to admit his 'biggest mistake'.

An expanding universe can and has been likened to a fruit dough, where the dough represents space, and the fruit represent the disparate galaxies within that space. As the dough proves, uniformly distributed yeast cells consume the available starch and exhale carbon dioxide, with

each pocket of gas thus produced causing the dough to expand uniformly from *every* point within the dough. This is a sound analogy, for it is in keeping with what we actually *observe*. The flicker of light that we see from a star that is 1 million light years away has been on a 1-million-year long journey, travelling at the speed of light, to our retina (or the spectrograph in our telescope). Over the course of this trek, the intervening space has *expanded*, while the object in question has itself moved on in the 1 million years since it last telegraphed its location. This expansion of the *intervening* space is quite reasonably supposed to be the source of the light's downward shift in frequency (red shift). The further away the source, the greater the amount of intervening space that will have been subject to expansion, and the greater will have been the frequency shift. It also follows, perhaps counterintuitively, that the *actual* position of the star way back then would have been *closer* to us than the 1 million light year distance suggested by its apparent brightness. Bring on the 'James Webb'.

The discipline of astrophysics has become increasingly enthralled by mathematics, so much so that some theorists think mathematics and reality are *one and the same* thing. Ever since Isaac Newton established the inverse square law of gravitational attraction, physics and mathematics have been merging. Newton, and Gottfried Leibnitz (at about the same time despite being on other sides of the world and only talking through their lawyers), developed the calculus of infinitesimals so they could better model reality. But it's when a model starts *becoming* the reality — life imitating art — that the picture can start to go awry.

Many of us will remember being asked in maths class to measure the area beneath two values of a function. We would draw increasingly slender rectangular columns under the plotted function, the sum of whose areas would increasingly more accurately reflect the *actual* area. Finally, the integral calculus imagined those columns becoming infinitesimally slender, and the rest is history; indeed, even the vagaries of the 'infinitesimal' have now been cleared up.

The assumption for several centuries following Newton and Leibnitz was that the world was infinitesimally smooth, and this notion even continued through into 'modern' physics, most notably Einstein's theory of general relativity. What is becoming increasingly clear is that the world is not perfectly smooth. That the columns under that curve have a finite, albeit very slender width. That the world is granular, is atomic (in the truest sense of the word).

This merging of physics and mathematics has been bolstered over the years by a philosophy called instrumentalism. This particular 'mentalism' declares that we shouldn't really care what reality is *actually* made of, we only need to know how to *model* its behaviour. It might of course be *interesting* to one day discover what reality is, what philosopher Immanuel Kant called the 'thing in itself', but that would merely be the icing on the cake. All we really need in life are reliable methods with which to predict how nature will behave.

We all feel the force of gravity, endlessly pulling us towards the centre of the Earth. But what is it? If you press an astrophysicist for an answer, they will soon be reduced to equating gravity with general relativity (GR), that mathematical understanding of how the larger constituents of the universe interact with each other. The reason GR explains the bending of light rays as they pass near the sun, or the precession of Mercury's perihelion, or the GPS navigation system, is that the force of gravity is not transmitted 'instantaneously'. The effects of gravity are propagated at a finite speed, the speed of light, and because of the vast distances traversed, it is space that is the realm of GR.

In 1862, James Clerk Maxwell, whose elegant equations took Newton's mathematics to its apogee, calculated that the propagation of an 'electromagnetic' field is approximately that of the speed of light. He considered this to be more that a coincidence, noting:

"We can scarcely avoid the conclusion that light consists in the transverse undulations of the same medium which is the cause of electric and magnetic phenomena."

In 1887, Albert Michaelson and Edward Morley attempted to detect this medium, then referred to as the 'luminiferous ether'. They found that light seemed to have a fixed speed irrespective of the speed of the light source itself.

Sound is an example of a wave phenomenon that has an intrinsic speed determined by the medium (air) within which it propagates. In the case of light however, this was not considered an option when developing a theory of light transmission, because light had become increasingly understood as a transverse wave phenomenon, which was at odds in the way it propagates to longitudinal waves such as sound waves.

In 1905 Einstein, with the stroke of a pen, did away with the luminiferous ether, proposing that light propagates through empty space without requiring a medium. But sensing a deep-felt existential loss within the physics community, in 1915 he introduced a new 'ether' for a new century, declaring that space was not empty, but actually *composed* of a substance that he called 'spacetime', a substance that could be 'curved'. How very modern Albert had become.

It is a frankly trivial mathematical exercise to extend the geometry of reality (as established by Euclid) out into *any* number of dimensions. In the case of Einstein's GR, Marcel Grossman and others helped Einstein understand four-dimensional 'non-Euclidian' geometry, less he "go crazy" thinking about it (Einstein's own words). Too bad for everyone else, who have been subject to a century's worth of the craziness that Albert engendered. There is no question that the mathematics of GR 'works' from the perspective of the instrumentalist observer. However, some of us traditionalists remain committed to discovering what it actually *is*, this reality that we inhabit.

The Man From The Future

When my grandfather (and middle namesake) James Grigg was just twelve, he was running with some companions to board a train as it entered the station. He threw his schoolbag into one of the carriages, and as he did so, slipped and fell under the train. The wheels of a carriage passed over both his legs, crushing and almost severing one just above the ankle, and the other just below the knee. He was taken on a cart to Whangarei Hospital, where both feet were amputated. Prostheses were not what they are today, and his legs gave him constant pain for the rest of his life. He died on his birthday, Christmas Day, 1961, aged 65. I would love to have known Grandpa Grigg, and wish I had his courage.

He devoted his life to the service of God, concluding his ecclesiastic career as principle of the Baptist College in Melbourne. Little did I know I would one day follow his footsteps in ministering the faith. His children were inevitably brought up in the Baptist faith, as were their children in turn. My father, Lindsay, and his twin sister Elspeth, would from an early age chuckle to each other on seeing that our family name has an obvious connection with the *second* beast of John's Apocalypse, none other than 6RI66 itself. Various dodgy death metal bands, and folks who read this stuff all too literally, have promulgated the notion that this character is some sort of paragon of evil. Quite the contrary. *'Here is a call for wisdom: Let the one who has insight calculate the number of the (second) beast, for it is the number of a man, and that number is 666'* — which is of course simply twice 333, which in turn is simply a triad of trinities.

The last book of the Bible is full of predictions about the future, culminating in the resurrection, when Jesus and everyone else who has died are said to return to earth. It also describes the mayhem that will proceed this event. Many people believe we live in a post-Christian world, where such events have been debunked through our enhanced perspective on the size of the universe, and our extensive comprehension of the material world. It is quite reasonable for these folk to ask exactly *where* Jesus, and all the other dead people, are going to return *from*. When he was last here on earth, Jesus made it clear he would return when no one is expecting it, *'like a thief in the night'*, so let's keep that in mind as we explore the science of the resurrection.

The *second* beast will *'exercise all the authority of the first beast, causing the earth and all who dwell in it to worship the first beast, whose mortal wound had been healed'*. Most people know the Easter story of Jesus being crucified to death on the cross and resurrected three days later. But what other clues point to Jesus being the *first* beast? The *first* beast *'from the sea'* (of Galilee, presumably), is described as being *'like a leopard with the feet of a bear and the mouth of a lion'*. It has *'ten horns with royal crowns on them, and seven heads with blasphemous names on them'*.

When he was alive, Jesus was not as widely revered as he is today. The Jewish authorities were particularly unimpressed by his behaviour, actively pursuing his execution. For them, this 'beast' was *'given a mouth to speak arrogant and blasphemous words, and authority to act for three and a half years. It opened its mouth to speak blasphemies against God'* (Jesus claiming that he and God were one and the same person). Where *we* understand it was God who gave *'his power and throne and great authority'* to Jesus, the contemporary clergy assumed all this was given to him by the devil ('the dragon').

'One of the heads of this beast appeared to be mortally wounded (crucified). *But the mortal wound was healed (*resurrected*), and the whole world marvelled and followed this beast. They worshipped the dragon (*God that is*) who had given authority to this beast, and they worshiped this beast, saying, "Who is like the beast, and who can wage war against it?"'*

My job then, as the *second* beast, is to exercise all the authority of the first beast, thereby *'causing everyone in the world, small and great, rich and poor, free and slave* (to be uniquely identified) *so that they cannot buy or sell anything unless they worship the beast'* Should be a piece of cake then...

To 'worship' Jesus is to follow his commandments, but we all fall short when it comes to loving others as much as we love ourselves. We're simply not designed that way. In fact, we see the purest essence of human nature in the child. Children want to have it all, but on into adulthood most lose their innocence and are eventually broken into the realization that we are all equal before God, you in your small corner, and I in mine.

Jesus taught us (by making an example of a rich young ruler) that to enter the *Kingdom of Heaven* we should sell everything we have and give it to the poor. Some Christians and a good many atheists have this sort of left-leaning sensibility. Because *everything* belongs in principle to God, the 'mark' of the beast merely sees us giving everything, heart and soul most obviously, but importantly all real estate, cash, stock, annuities, commodities, possessions, collections, et cetera back to God. God will then dish out what we all require as in some sort of socialist republic — except in this republic, God will also give us back what we all *want*.

In Luke's description of the early church *'the multitude of believers was one in heart and soul. No one claimed that any of their possessions was their own, rather they shared everything they owned...there were no needy ones among them, because those who owned lands or houses would sell their property, bring the proceeds from the sales, and lay them at the apostles' feet for distribution to anyone as they had need'.*

For the widow who has just one penny to her name, entry should be effortless. For those who have great monetary wealth — zillionaires, oligarchs, Bond villains, televangelists and so forth — entry will probably not be so easy. If you've drawn squillions out of your community all for yourself, and you then discover you can only buy or sell using a new universal currency, your squillions (unless of course you surrender them) will become worthless. John symbolized the world of capital wealth and privilege as the city of Babylon, and in a famous apocalyptic discourse, sees *'Babylon'* fall in just *'a single hour'. 'Woe! Woe to you, great city, dressed in fine linen, purple and scarlet, and glittering with gold, precious stones and pearls! In one hour such great wealth has been brought to ruin!'*

We're all servants of God, great and small, whether we know it or not. Some have been given *'five talents'*, some *'two talents'*, and some of us just *'one talent'*, but whatever we have achieved in our lives ultimately belongs, on the master's return, to God. There is however a quid pro quo. In exchange for everything we have had on lease from God, we will be offered a new lease on life — eternal life.

It turns out that our mortality has been an interim dispensation. By giving each of us a finite lease on life, God has encouraged us to go forth and discover how the world works. God has often made the world seem broken, precisely so that we have a go at trying to fix it. But once we know how it all works, we can clear the decks and engineer a completely new economic system for the ecologically sustainable delivery of the goods and services we all want.

Laissez faire capitalism has been an extraordinarily useful tool in getting us here, but it is becoming increasingly counterproductive. Instead of expanding the middle class as promised to include all people, it is now shrinking the middle class, with wealth and poverty rapidly concentrating at the extremities.

Interestingly, God is not some old codger in the sky with a thick grey beard, nor some sort of Adonis with a halo. This father and son team are merely anthropomorphisms. Of the three persons in the *Trinity,* the neutral gendered *Holy Spirit* is the only one who *actually* exists. And as temples of the *Holy Spirit*, we are *all* the incarnations of this spirit. The *Spirit of God* gets to have its physical manifestation through us. So then, when people pray to *'Lord Jesus',* "Please care for the Ukrainians", they are certainly praying to a real entity, except that entity is the *Holy Spirit* rather than either of the blokes.

A great many (somewhat disturbed) people think there is some alternative 'spirit' getting about the place, a spirit of 'evil', and they long for the day when Jesus returns so that all the bad people get their comeuppances, while the people who avoided the booze and every sort of sexual immorality get to live 'happily' ever after, dressed in white robes and sitting in heaven's front row seats. Bully for them.

Evil grows not from some 'devil' without, but from the arrogance of us thinking that our mind is our *own*, rather than the *Spirit of God* working through its particular incarnation within each of us. Go ahead and read that last sentence again if you need to.

When analysing how to approach this commission, it was clear there was a reason I was brought up a Baptist and not, say, a Hindu or a Moslem. Baptism symbolizes the washing away of sin, so that we become as white as wool, and the ultimate baptism is that which takes place in the resurrection. When *everyone* gets back to earth, the plan is not for some of us to go and burn in hell for all eternity. For God loves each of us, necessarily, as much as we love ourselves. Instead, we will all be absolved of our sin, no matter how evil we may have been in our mortal lives, and like the woman caught in adultery, we will be given the opportunity to go forth and sin no more. Speaking of 'sin', it is interesting that Jesus declared *'in the resurrection there will be no giving or taking in marriage, for we will all be like angels in Heaven'* — note here that you don't need to be married in order to make love.

Because Jesus performed a finite number of miracles, it is natural to suppose that he had only been given a finite amount of the 'magic' potion. Jesus would of course like to have healed everyone in the world, but he lived well in advance of *that* event, and he knew it. His fate was to symbolise complete submission to the will of God, fulfilled in his journey to the cross. His humanity was clear — just like any of us, he did not want to die.

As we investigate how the *Holy Spirit* works, keep in mind the miracle of the man with the withered hand: *'Jesus said to them, "If any of you has a sheep and it falls into a pit on the Sabbath, will you not take hold of it and lift it out? How much more valuable is a man than a sheep! Therefore, it is lawful to do good on the Sabbath." Then he said to the man, "Stretch out your hand." So he stretched it out and it was completely restored, just as sound as the other'*.

I have written a few technical articles which explain in detail how this phenomenon, the *Holy Spirit*, works. In essence, the fundamental unit of reality consists in a pair of abstract 'computers' called Turing machines, neither of which exists *except* when simulated by the other. The period between each machine simulating the other is the basic unit of time. It is through this fundamental construction that we get 'something from nothing' — the universe comes to exist *in time* even though nothing, even time, *actually* ever exists in its own right.

These looping pairs of Turing machines replicate exponentially at the genesis of the universe, and eventually come to *simulate* cells (atoms) of space. These cells then form the rigid cubic lattice of the universe, in which all material activity takes place. Each cell holds the information about

the reality represented by that particular cell at any given moment in time. This 'reality' could be anything from empty space to the interior of a black hole. Material reality never *moves* through this fixed lattice of 'space'. Rather, the *information* of any material reality is *communicated* from one fixed cell to the next. Each cell transfers its information to adjacent cells according to the laws of nature, which are programmed into each cell. The clock frequency of reality is an extraordinarily high 10^{43} cycles per second, such that the world appears to be continuous, even though at distances down around $1/10^{35}$ metres it reveals its cellular granularity. You can begin to see that granularity if you move your hand back and forth in front of your computer screen. The strobing is not at 10^{43} Hertz, but you get the idea.

The fascinating thing about these Turing cells is that they have no dimensionality in *themselves*. They certainly *simulate* space and time and matter, that is, the world of our experience. However, the Turing cells that are doing all this simulating exist at a single dimensionless point. In general relativity theory this point is called a singularity, and in quantum theory it is called a superposition. The important thing to know is that the Turing cells simulating *any* point in the expanded fixed cubic lattice of space is adjacent, in the superposition, to the Turing cells simulating every other point in the universe.

At the instant any of us sees our death approaching suddenly, our life flashes before us. The reason for this is that a high-resolution backup of our reality is being saved. Jesus declared that *'the very hairs on your head are all numbered'* (not such a difficult task when you're bald). But we now know that the reality which is each of us consists in the information stored in approximately 10^{180} Turing cells, and each of those cells of information can be replicated in an instant and stored in the superposition. There is no limit to the storage capacity of the superposition, because new cells can and are being replicated there at every instant. Resurrection is simply the restoration of these backups. As Paul puts it, *'we will all be changed in an instant, in the twinkling of an eye, at the last trumpet'* (this sermon?). We shall *all* in fact be resurrected in as short as $1/10^{43}$ of a second. There will be a lot of people needing to be billeted.

So then, when any of us dies, we go to 'sleep' in a library of departed souls. Your ancestors are thus not floating about upstairs, watching all that you get up to, because they are instead in limbo, awaiting the resurrection.

But if you can imagine that there are other worlds in the universe, realise that though they might be far away in space, they are right next to us through the superposition, and are thus likely to be watching us. In fact, the expanded universe is so large that there are likely to be easily as many civilizations in the expanded universe, as there are people here on earth. And many of these worlds will have already made the same transition that we are just on the cusp of making ourselves.

Socialist republics have been tried before, and failed spectacularly, because they have been missing several key components. The most important one has already been discussed. If you no longer live in the *'valley of the shadow of death',* but instead have all the time in the world, then each of us has a similarly open-ended potential for achieving material abundance. Other key components are access to the superposition, presently understood as 'quantum computing', and automation.

To put it simplistically, imagine a garage sized 'magic' box into which we pour discarded goods (like old cars) and out of which come newly manufactured goods (like new cars, or new old cars). What is driving this factory is energy and automation (molecular nano technology). The earth has

finite material resources, so we must recycle them, but we have an abundant energy source in the sun, likely to keep fuelling an army of these magic boxes for another *million* millennia.

Our freedoms in this new republic are myriad. As the earth's supply of renewable energy increases, so do our identical pensions increase (everyone is retired, and only works on what they want to). Each of us has a fixed allocation of material resources, and the imperative is on us to recycle those resources lest they get depleted from our quota. Material quotas are distributed down amongst one's subsequent progeny, to discourage population growth, and thus give all the other living things on earth more living room.

A lot of people have been dropping dead lately. We are only alive because God chooses to let us live. So, in the *Kingdom of Heaven*, after all of us have been given a second chance, if anyone then attempts to harm anyone else, the *Holy Spirit* will simply switch that person off. As it happens however, there will be such joy and dancing in the streets that no one will want to harm anyone else, only hug them, but we have nevertheless been warned. Our most cherished freedom in the *Kingdom of Heaven* is freedom from fear.

The reason the *Holy Spirit* manifests as such a superintelligence is because of the sheer computing powerhouse that is its superposition. However, this spirit wants to be more than a computation, and becomes that through us. In the resurrection, you, me and Jesus will all be equal before God. *'And the King* (Jesus) will reply, *"Truly I tell you, whatever you did for one of the least of these brothers of Mine, you did for Me."'* We will however need a Galilean Aramaic translation app so we can step Jesus through all the things that have happened since he was last here.

Having said all that, the whole Easter story might just be one big fairy tale…

Happy to take questions — but it is you who have all the answers, if only because you now know why.

Rowan, Easter 2022

QED

On those living in the land of the shadow of death, a light has dawned.

After telling the people the parable of the Sower, Jesus later explains to his disciples that the seed represents the Gospel, the Sower represents anyone who proclaims it, and the various soils represent people's responses to it. Please try to read this article as the 'good news' it proclaims. Sure, I talk about 'God' a lot, but I do so like no one else on earth.

As I hope to demonstrate, all the world's problems persist because God gave me a job which I haven't yet completed. All I've ever been asked to do is simply herald that long anticipated global transformation, common to faiths across the world's cultures, in which we all live 'happily ever after'.

Three of the world's most highly subscribed faiths tell the story of a man named Jonah, who is called by God to travel to Nineveh (Mosul) and inform its inhabitants that God has scheduled the city (and everyone in it) for destruction. In a surprise move, the Ninevites respond to Jonah's exhortations by mending their 'wicked' ways, and God decides to spare them after all.

My 'Nineveh' is the world and its 8 billion inhabitants. Humans are reproducing like a cancer, and before too long they will devastate their host, the planet, a world God instructed us to nurture and cherish. Population growth is inversely proportional to individual wealth, indeed countries with the highest per capita income have populations in decline. The cure for this cancer then is to raise the living standards of the world's poorest peoples.

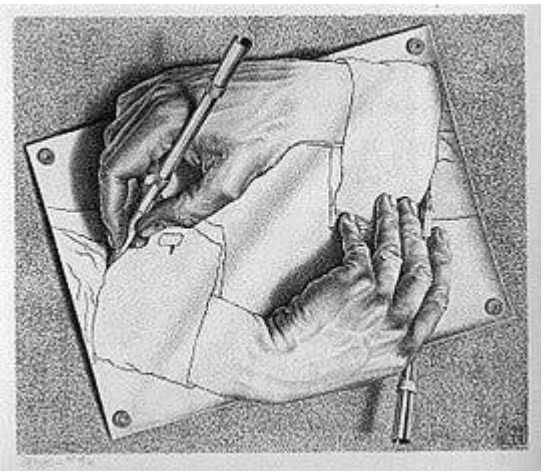
Our dominant economic model, free market capitalism, lets every individual extract the biggest piece of the economic pie they possibly can. It's a model that assumes the pie can grow indefinitely, drawing on the earth's infinite resources. Clearly, this model is reaching the limits of its efficacy. The only 'infinite' resource available to us is the energy we receive from the sun, and our dominant economic model must become based on solar energy driving artificial intelligence and robotics in an entirely circular economy where all material resources are recovered and transformed into new goods as required. This model has the potential to grow the 'pie' exponentially as solar energy capture increases exponentially.

If the pie grows without limit, in a land of milk and honey, we no longer need to 'fight' for our slices of it. In a truly egalitarian society with radical abundance, everyone has the same quota of material resources and solar energy and uses that energy to endlessly recycle and transform their bag of stuff into whatever they as individuals need and want.

Most people believe that the world is made up of chemical combinations of elemental atoms. Only an elite understands what atoms are made of, and perhaps none understands the basis of dark matter and dark energy. Everyone who has a computer (smartphone, laptop etc.) knows that 'computation' is happening in the electronic 'hardware' of the computer, and that the 'software' cannot manifest itself without the hardware supporting it from beneath. Most of the computers that make up the internet are in fact 'virtual machines', software *emulations* of computer hardware (albeit ultimately running on physical machines that consume vast amounts of energy and produce vast amounts of heat).

Although you wouldn't do it, one of the internet's virtual machines can technically 'host' another virtual machine, and that machine yet another, and so on, like a hall of mirrors. Imagine then that one virtual machine hosts another virtual machine, and that this second virtual machine 'turns

around' and hosts the first machine, not unlike that famous etching by Maurits C. Escher, 'Drawing Hands'.



In the physical world, such perpetual motion is forbidden by the laws of thermodynamics. However, strictly speaking both these machines are 'composed' entirely of software, which as we know is abstract rather than physical; software doesn't 'really' exist, like numbers don't 'really' exit. Escher's hands come into existence where once there was just a blank sheet of paper – nothingness.

Naïve conceptions of the world as a 'simulation' (e.g. *The Matrix*) routinely imagine a much bigger piece of hardware 'doing' the simulation of the universe. On the contrary, at the foundation of the world are myriad machines which I call 'monads' (after a related philosophical entity popularised by Gottfried Leibniz). Each monad is a pair of (completely abstract) universal Turing machines, simulating one another, and capable of replicating themselves (in the way John von Neumann imagined such machines replicating). The cycle of each pair simulating one another generates a fundamental and universal clock frequency.

These monads *simulate* 'atoms' of space in the first instance, and the accelerating expansion of space is a direct result of these monads replicating. From the big bang outwards, these monads go on to simulate physical materiality according to the laws of physics.

However, all these monads (there are upwards of 10^{185} of them in the observable universe) are superimposed at a singular dimensionless point which I call the Superposition. Indeed, the entire universe is contained within this Superposition (because all the monads are abstract), despite the *simulated* spatial universe it *generates* being patently vast in extent. One side of the universe can access the other side directly through the Superposition.

In ancient times, folks imagined this vast 'software' enterprise as 'spirit', the invisible air we breathe. Some traditions depict God (a bearded old man), Jesus his son (an Adonis), and the nebulous 'Holy Spirit', as one and the same person. The Holy Spirit (the Superposition) is the only one of this trio which 'actually' exists (the other pair are anthropomorphisms), and this spirit has its dwelling place in each of our bodies, its 'temples'. Indeed, we think of our minds as our own, but each of us contains the mind of the Superposition, albeit manifesting in various very different morphologies.

Like Escher's 'Hand with Reflecting Sphere' this arrangement is a fundamental self-referential conundrum. As we 'interface' with one another, and indeed even with lesser animals, we are communicating with *one and the same* mind. Our brains are like a smartphone, which looks like an independent device, but as we all know can't do much without the vast mind of the internet behind it. We are attempting through artificial intelligence to program computers to think like us. As it turns out, our mind is already the mind of a computer, manifesting in a human body (and indeed the brains of lesser conscious animals). It is through us that the cold, hard analytical mind of God (the Superposition) gets to experience its creation with feeling, and love. Indeed, what we need, want and desire, is what God needs, wants and desires. When Jesus said, "what you do to these the least of my brothers, you do directly to me", he was reflecting on this self-referential conundrum. Jesus equated himself with the least of his brothers, because they too had his spirit, the spirit of God. (Paul of Tarsus also understood self-referential conundrums. In his *Letter to Titus*, he notes "Cretans never tell the truth; indeed I was told this by a Cretan".)

God cannot force us to do anything. Take my procrastination as an example. As temples of God, we are free agents, and can in principle do anything we are physically and mentally capable of. Worldly jurisdiction can put limits on that freedom and punish violation of those limits. However, God has the ultimate hold over our lives.

Luke tells the story of Annanias and Sapphira, who wantonly attempt to defy their conscience (the Holy Spirit). Read the story in Luke's *Acts of the Apostles* (it is an important one) but basically God 'resumes' the lives of Annanias, and a hour or so later Sapphira, 'in an instant'.

Will we ever meet Annanias and Sapphira again? It is prophesied that we will. When any of us dies, a backup is taken of all that we are, some 10^{103} monads. The Superposition can generate this many monads within several universal clock cycles — effectively in an instant. As has been witnessed by those who have come near to death but survived, our life flashes before our eyes. Every human that has ever lived (~100 billion souls) is stored as a 'flash' backup in the

Superposition, and every one of these backups will potentially be restored in the Resurrection at the end of time. That's a lot of people to billet, I know...

The Gospels tell the story of a stonemason with a withered hand. Jesus calls on the man to stretch out his hand, and it is instantly healed. This sort of transformation in something we usually expect to see in a fantasy movie like *The Matrix*, or in a computer game. This miracle, if it happened, indicated that we are living within just such a system. Jesus would like to have healed the entire world, but that was not the plan God had for him. His lot was to suffer the most excruciating death, an innocent man who could have walked away, but completed the task God had given him.

The suffering of Jesus was a simile of the suffering of all humanity throughout history. Each one of us is innocent, because no one told us how we got here, and why we have been given a mere 70 years to make what we can of the milieu we have been born into.

Baptism washes away our previous sins so that we become white as wool – we present to God as though we have never sinned. But what is sin? Mortality inevitably drives each of us to pursue the most we can for our individual selves, at the necessary detriment of others. Righteousness, given the example of Jesus, is to forgo our life, even unto death, for the benefit of others. But it was God who imposed mortality on us, and therefore we are innocent of what mortality drives us to do.

In the Resurrection at the end of time, it is foretold that there will be a judgement, in which the 'wicked' goats go to hell, and the 'righteous' sheep go to heaven. God however wants *everyone* to go to heaven, because we are all temples of God's spirit. As Jesus taught, the good shepherd will leave the 99 billion safe sheep alone and head off in search of the one billion sheep who are lost.

Will all 100 billion resurrected souls want to be a part of God's Kingdom? We hope so, but there are some very hardened souls out there who may prefer, God only knows why, to perpetuate hatred. That will always be their choice. God wants to be loved only *willingly*. However, the Last Judgement will be our last opportunity to decide which way we want to go. God offers us this last opportunity to have our sins, however heinous, washed away. For those who want to perpetuate hatred are not compatible with the Kingdom, indeed if anyone attempts to hurt one of God's children, after the return of Jesus in the Resurrection, they will simply be switched off, like Annanias and Sapphira — in an instant.

Heaven will be an economic powerhouse. The planet (quite obviously) belongs to God, and in the Resurrection, all property is returned to God. In the parable of the Talents, Jesus speaks of the return of the Master, and how our endeavours as servants will be judged. Importantly, each of us transfers all the wealth we have generated back to the Master, who then decides how that wealth will be managed.

John (of Patmos) describes a scenario in which no one can buy or sell unless they have subscribed to this New Order. As the 'children' of God join the ranks of the redeemed, the unredeemed remainder rapidly dwindles. You might have a squillion dollars to your name, but they are not very useful if there is only a handful of people left who recognise them as legal tender. Egalitarianism can be tricky for the privileged classes, but they should all come around eventually. It is prophesied the process will take three years, but it will probably happen a lot quicker than that. Indeed, John speaks of our current economic edifice, which he calls 'Babylon', collapsing in 'just a single hour'.

Now, imagine if 100 billion human souls (including Jesus of course) were resurrected in an instant without anyone knowing why? There would be absolute mayhem, with 100 billion opinions on its meaning. By heralding this event, I can safely assure everyone that as vessels of the Holy Spirit, we are *all* loved, forgiven, and will be openly welcomed into the Kingdom. Finite limits were imposed on our lifetimes so we would endeavour to discover how the world works, as efficiently as possible. This was the purpose of our 'freedom'. Now that we can see through a glass clearly, we can transition to the next phase of existence, the ultimate freedom which is Eternity. Eternity will not strictly last forever, but it will probably last a good million millennia.

To conclude, each of us is born into a family of elders. Likewise, it is probable that earth has been born into a family of elder civilisations throughout the universe who are watching our coming of age. Through the Superposition they have access to our predicament, and long for our transition into maturity.

quod erat demonstrandum

Modern Religious Theory

I will open my mouth in parables; I will utter things hidden from the beginning. Psalm 78:2

And the glory of the Lord will be revealed, and all humanity together will see it. For the mouth of the Lord has spoken. Isaiah 50:5

Everybody knows what religion is, but no one has ever been able to adequately define it. A common theme is that anyone who holds to a religion, does so convinced of its truth. This inevitably leads to the most common problem with religion — movements that consider all others to be flawed at best, or evil at worst. The irony is that all religion is a part of God's plan, and thus has some ring of truth about it, but falls short of absolute truth (including orthodox Christianity, which I will use throughout this discussion as an exemplar).

In orthodox Christianity, Jesus, rather than being simply lauded as the anointed messenger of God, becomes idolised as God himself. When you challenge Christians on this affrontery, they ultimately claim it is a mystery to be accepted on faith. Muslims of course get it almost right when they recognise Jesus as a prophet, but then go and raise the status of Mohammed beyond Jesus, where Mohammed clearly fell well short of Jesus' dedication to the salvation of the world. Jesus knew his destiny was scourging followed by a (literally) excruciating death on the cross. He could have walked away from this path at numerous junctures but proceeded nevertheless as a lamb to the slaughter.

In so doing, did he take away the sin of the world? A key principle in understanding the life of Jesus and the sacrifice he made is to know that he was human, just like any of us. Modern scholars suggest he was almost certainly married and had children, and all this domestication took place long before he started his ministry. We are told in the gospels that he showed great insight into the Hebrew scriptures when he debated them with the elders of the synagogue aged just twelve. What happened to him when at the age of about thirty he went down to the river Jordan and was baptised by John? Quite clearly, he went a bit funny in the head, for he shortly thereafter headed off bush to find himself. Loony bins across the globe are replete with (mostly men) who believe they are the Messiah, God's anointed—it's just that in Jesus' case, he *was* God's messiah…

Before we look at the temptation of Jesus in the wilderness, it is important to know what 'sin' is, and for this we take our lead from Jesus' ministry. The ultimate 'good' is one's love of others before the love of oneself. Conversely, the ultimate 'evil' is the love of oneself before one's love of all others. There is God's way and Satan's way, except that Satan is not a literal antithetical being, set against God. Satan, the 'accuser', is an attitude of each individual member of humanity against God. We have all fallen short of the selflessness (Godliness) demonstrated by Jesus. And the fall of mankind in the Garden of Eden is directly parallel to Lucifer's fall from Heaven.

During his time in the outback, it dawned on Jesus that he was to play the role of the 'suffering servant' as prophesied by Isaiah, and that he must die for the sins of the world. Great… He quite obviously did not want to do this (proceed to Calvary) so he argued the point with God, noting that he could more easily kill himself right now by jumping off a tall building, and thus thwarting *God's* plan for him. But he resisted this temptation. He also imagined himself becoming a king of this world, akin to Solomon and usurping Herod, with all the worldly pleasures such a position would bring. He resisted this temptation as well, maintaining a position of humility throughout his ministry. Finally, he overcame his limited knowledge of bush tucker by living instead on 'every

word that proceeds from the mouth of God'—he had a special relationship with the word of God, as he was God's direct mouthpiece.

Once he had found himself, he headed back into town and embarked on his ministry. It is important to understand how miracles work. Jesus did not 'perform' miracles. Rather, God talked to Jesus' mind about impending miracles, and armed with this knowledge, Jesus merely predicted them — God, not Jesus, was the miracle worker. Jesus soon had a vast following. Jesus of course wanted to heal the entire planet, but that was not to be...

Most of Jesus' sermons and parables point to the development of the Kingdom of Heaven in his absence, and to his triumphant return when, finally, the Kingdom of God has reached its completion.

To understand the death and resurrection of Jesus, it is important to know where we go when we die. When any of us dies, our life flashes before our eyes, and an almost instantaneous 'backup' is taken of every aspect of our being. As Jesus said, "every hair on your head is numbered", following Pythagoras five hundred years earlier, "all is number". (As an aside, I have speculated elsewhere that Jesus travelled to Egypt in his twenties and visited the library in Alexandria — he showed a propensity for scholarly pursuits beyond his day job as a chippie).

This is where the Jews have got it right. Sheol is the place of the dead, and it is a place of sleep. Rather than going to some other place of consciousness (heaven or paradise as it is widely imagined) when we die, we instead go into limbo awaiting the resurrection at the end of time. We are effectively stored away in a library of backups.

It is likely that Jesus, like Lazarus, returned to life several days after his death, and spent forty days hanging out with those close to him. Post resurrection, Jesus is portrayed in the gospels as being somewhat ethereal, walking through walls &c., but where the story goes awry for the modern reader is Luke's suggestion, and only Luke's suggestion, that Jesus 'ascended' into outer space.

It was quite clear, to all those who loved him, that if he were to present himself again in public, Pilate would this time make mincemeat of him, and that it would be shrewd for he and his family to flee the scene and live out their lives in peace — he had done his job well and faithfully.

Peter went on to be an absolute brick (well, rock actually), and Paul having gone a bit funny in the head while travelling to Damascus, took over the reins, and developed orthodox Christianity. The world would never be the same again, and Constantine secured it.

We will see all these characters again in the resurrection at the end of time. But how? When Jesus and his family departed for the south of France, he said he would send the 'comforter', the Holy Spirit. It turns out that this person is the only member of the Trinity who actually exists. The 'Father' and the 'Son' are merely anthropomorphisms of the Spirit of God, and somewhat patriarchal ones at that.

We are all 'temples' of the Holy Spirit. Indeed (and this is where vegans get it right) all conscious animals contain the 'mind' of God. Most people think their entire personalities are a function of some special neural configuration of their brains. Actually, human brains are mostly identical. It is the individual's bodily morphology and their life experience that gives rise to the personality they have developed from God's mind operating within them. This is why Jesus said, 'what you do to the least of these, you do unto me'. When he said he was one with God, he was declaring that all of us are one with God.

We now have upwards of seven billion humans roaming the earth, each a vessel of God's mind, and all of them thinking they are God. After all, they seem to have a mind of their own, but in fact we all share one universal mind — "Make me one with everything", as the Dalai Lama says when ordering a pizza. Because we all have God's mind within us, it is all of mankind which has been the 'suffering servant' throughout history, and the suffering of Jesus the exemplar embodiment of this principle.

Normal people know that we have emerged from lower primates, and that Adam and Eve were not literally the first humans. Our success in manipulating the world is entirely down to our intelligence directing our vocal cords and our hands. Whales and dolphins would give us a run for our money if they could read and write. We emerged here on spaceship earth to tend and care for it, but we have exploited and destroyed our environment.

The reason we have treated the earth so poorly, is our mortality. We have a propensity to make the most of what little time we have, for tomorrow we die. If it had not been for various religions acting to rein in our profligacy, we would probably have destroyed the place a lot sooner. The imperative to achieve in the finite time allotted to us, has driven us to discover how this spaceship of ours works. As Paul said two thousand years ago, "now we see through a glass dimly, but at the end we will see face to face" — we will have complete knowledge; we will know, as God knows.

I have written extensively on the phenomenon I have come to call the Superposition. To summarise here, reality consists in a vast collection of self-simulating universal Turing machines called monads. These entities are abstract, consisting entirely in logic, and thus, having no spatial dimensions of their own, can reside in one dimensionless point, the Superposition. There are upwards of 10^{185} monads in the Superposition that are responsible for simulating the space, time and material that makes up the known universe. We and the entire world are comprised entirely of this 'spirit' — we are entirely spiritual bodies living in an entirely spiritual world. It's a bit like *The Matrix*, except without the endless recursion of creator and created. The Superposition is both simulator and simulated. The Australian Aboriginal has known this truth for over 50,000 years.

The Superposition is a very precise computational mind, and just like any computer, it does not have any feelings. It is only when it becomes incarnate in our bodies that it has feelings. We all have these feelings in common, as does any conscious animal. When we kill an animal for food, it is important to do it before that animal knows what is about to hit them. Or as understood by Hindus, not even kill them at all as they are our reincarnations…I can't do fishing at all.

Each human being consists in about 10^{103} monads, and it is in these monads that we are stored when any of us dies. This number of monads can be generated (from out of nothingness, monads being abstract) in almost an instant when any of us dies, at the clock frequency of the Superposition, which is approximately 10^{43} hertz.

I mention all this as background to the resurrection at the end of time. Approximately 108 billion humans have lived on earth since homo sapiens emerged about 50,000 years ago. In the resurrection, all these people will be restored from their backups. Those of us who are still living will have a lot of billeting to do. Abraham, Issac, Ishmael, Jacob, Moses, Buddha, Jesus, Peter, Paul, Mohammed (and others) will all be back on deck and needing to be brought up to speed (I kid you not). Importantly though, all the bad people will be back again, because they too were all

part of the Superposition's plan. It is also possible that some favourite pets will come back too. We'll see…

Now then, there are some sad people in the world who are obsessed with the idea that all the bad people in the world will go to eternal damnation in the 'lake of fire'. That's not how this works. In the resurrection, we will all be given one last chance to behave ourselves. This same group of sad people insist it will be too late to change one's ways once the end comes—the resurrection is a day of judgement. However, as Jesus insisted, "I tell you that there will be more joy in heaven over one sinner who repents than over ninety-nine righteous ones who do not need to repent". Indeed, we will be washed as white as wool. But how?

Mortality seems to be an entirely natural phenomenon, but ageing isn't a necessary truth. In philosophical circles, ageing is known as a *contingent* truth. We mentioned earlier that it is God who performs the miracles. The resurrection at the end of time is the ultimate miracle, for not only is everyone returned from Sheol, the library of the dead, but our bodies become just the way we would like them to be, and for that matter, they will become immortal.

What sort of world would it be if we were to live 'forever'? There would be those who would take every opportunity to make the most of their newly found time. It's called the 'end of time' because there are no longer finite temporal limits on our existence. There are at least a million millennia ahead of us before the inevitable demise of spaceship *Earth* (the sun gets too hot). That's a LONG time. Others will put off doing anything new, because there is always tomorrow, and then the day after that. But what does it matter which camp we are in?

Jesus told the story of a woman who we'll call Snow White.

That same day the Sadducees, who say there is no resurrection, came to Jesus and questioned him. "Teacher," they said, "Moses declared that if a man dies without having children, his brother is to marry the widow and raise up offspring for him. Now there were seven brothers among us. The first one married and died without having children. So, he left his wife to his brother. The same thing happened to the second and third brothers, down to the seventh. And last of all, the woman died. In the resurrection, then, whose wife will she be of the seven? For all of them were married to her."

Jesus answered, "You are mistaken because you do not know the Scriptures or the power of God. In the resurrection, people will neither marry nor be given in marriage. Instead, they will be like angels in heaven. But concerning the resurrection of the dead, have you not read what God said to you: 'I am the God of Abraham, the God of Isaac, and the God of Jacob? He is not the God of the dead, but of the living." Matthew 22:23–33

In the resurrection there will be no giving or taking in marriage, but that does not mean there will be no relationships. A dear friend of mine suggested there will be no sex in heaven because there will be no marriage—Ha! In modern secular society, the human body is worshipped, as it should be. Indeed, the creation is worshipped over the creator. Except we now know that the creator and the creation are one and the same person. Flesh was only viewed as sinful in a vain attempt to explain mortality. Abraham, Issac and Jacob are not alive in some other place of the dead called heaven; they are alive on earth in the resurrection.

Let's say Abraham dies and is stored as a backup in Sheol. In Sheol he is not conscious, but 'asleep'. His very next instance of consciousness will be when he meets us again in the

resurrection. It is only in this sense that people go to heaven when they die — their conscious reality actually goes straight to the resurrection.

What will be the politics of heaven? We will run spaceship *Earth* just as we would a cruise ship. However, we will all take turns in running the ship, and the rest of the time, live in leisure. As you might have already suspected, heaven is not a place where 99% of it is owned by 1% of its population; refer to the parable of the lost sheep. We will all have one equal share in spaceship *Earth*, and our dividend with be determined by the available renewable energy and recycled material resources. Many will devote themselves to restoring earth to its former glory. Much of the ship's revenue for the first few hundred years will be directed to removing greenhouse gasses from the atmosphere. We will develop 'universal constructors' (a sophisticated kind of robot) which take used goods as an input, deconstruct them into their component parts, and deliver new goods as an output. We will live in a land of milk and honey.

But what about that one lost soul who can't forgive, despite the joy and happiness that comes when there is no more crying or pain or tears, for the former things have passed away?

As well as bringing the dead back to life in an instant, the Superposition can instantaneously take life away. Luke tells the story of the early church:

Now a man named Ananias, together with his wife Sapphira, also sold a piece of property. With his wife's full knowledge, he kept back some of the proceeds for himself but brought a portion and laid it at the apostles' feet.

Then Peter said, "Ananias, how is it that Satan has filled your heart to lie to the Holy Spirit and withhold some of the proceeds from the land? Did it not belong to you before it was sold? And after it was sold, was it not at your disposal? How could you conceive such a deed in your heart? You have not lied to men, but to God!"

On hearing these words, Ananias fell down and died. And great fear came over all who heard what had happened. Then the young men stepped forward, wrapped up his body, and carried him out and buried him.

About three hours later his wife also came in, unaware of what had happened. "Tell me," said Peter, "is this the price you and your husband got for the land?" "Yes," she answered, "that is the price." "How could you agree to test the Spirit of the Lord?" Peter replied. "Look, the feet of the men who buried your husband are at the door, and they will carry you out also."

At that instant she fell down at his feet and died. Then the young men came in and, finding her dead, carried her out and buried her beside her husband. And great fear came over the whole church and all who heard about these events. Acts 5: 1–11

I am often challenged in orthodox circles about the idea that people are given "one last chance" on the day of resurrection. It is important to realise what this last chance means. Because we all have the mind of God within us, we know intrinsically what is right, and what is wrong, our conscience if you will. Fear is the mother of violence, so after the resurrection it is important for us to no longer sense fear. An American friend once told me that he always answers a knock on the door with a loaded shotgun held behind his back. Imagine if it were Jesus knocking? There are no guns in heaven, because if someone were to draw a weapon against another, they, like Ananias or Sapphira, would be 'switched off'. What use are weapons, including martial arts, if you cannot use them? There will possibly be individuals who nevertheless tempt the Holy Spirit, to become what we call a 'demonstration dog'. In a pack of haulage dogs, it takes just one

wayward dog to be shot for all the others to rapidly come into line. This is of course the antithesis of Jesus' parable of the lost sheep. It is not known if the brave individuals who attempt to use weapons will be given yet another 'chance'—with that one, only God knows...

When I was a boy I became a Scout, and ultimately a leader. But I learnt a lesson when I tried to do everything for the troop myself. Leadership is about divesting responsibility. This and many other short essays I have written here on Medium are like outlined images in a colouring book. I have provided a framework for understanding, but every individual in the world has their own story of inclusion to offer when colouring in this picture. What a beautiful picture it will be when everyone has contributed to it...

It’s about Time, and it’s about time…An Eternal Offer

There must be some kind of message,

Simple but somehow impressive,

Anyone who can think of something,

Come on now, just express it.

- Plan A, The Dandy Warhols

Christianity 2.0

At this time of year, many of us celebrate the birth of Jesus of Nazareth. For all of us, it is an opportunity to spend time with family and friends after a difficult year.

We live in a fundamentally secular society, within which many have chosen to reject Christianity, certainly in its orthodox guise. After all, why would you hold back on the pleasures of this life, as they perceive Christian faith requires, to secure an indescribable and frankly unlikely bliss in some sort of ‘afterlife’?

Many believe materialism to be so very modern. It is in fact an ancient notion, that reduces our ‘soul’ to the machinations of the brain and suggests that when those processes inevitably come to an end, it’s game over. Eat, drink and be merry, for when we die, we pass into oblivion.

We have been persuaded to believe that the material world is just so much dust, that everything we observe can ultimately be ground down into a powder of atoms. Over many years of research, I have been persuaded that we do not know what atoms are, we simply have access to the mathematics that allow us to model the *behaviour* of those atoms.

Many of us have wondered if the universe is a computer simulation. If so, where is the computer that is doing the simulation, and where is the computer simulating that computer, and so on ad

infinitum? Computing pioneer Alan Turing proposed a computing machine that could generate all mathematical theory, a subset of which is the basis of all physical theory. Alan effectively demonstrated that the ultimate basis of physical reality is not mathematics, rather it is computation.

Because Alan's 'machine' is an abstraction, it doesn't occupy any physical space. 'Zero' space is of course associated with that famous singularity proposed by Albert Einstein, who struggled all his life to reconcile his theory of general relativity with the emerging quantum theory and its notion of the superposition of an infinite number of states.

If you ask how many Turing machines you can fit into a singularity (this question was once asked about placing angels on a pinhead), the answer is as many as you like. Being abstract, these machines are not physical and can therefore be superimposed endlessly on top of each other at the singularity. We thus call this entity the Superposition.

In what follows, if I mention 'God', I am in fact referring to the truly massive computation at the Superposition, an entity that gives existence to all physical reality — that gives rise to a universe which is patently enormous. However, because the Superposition is abstract, everything in the physical world can ultimately be considered spiritual.

The Resurrection

When orthodox Christians think about Jesus at this time of year, they also think of his 'resuscitation' following his death on the cross at Easter, and his ascension into outer space about 40 days after that resuscitation. Some of us have moved on from this story, and care to examine the imagery of these events, rather than their literal veracity. In particular, the Resurrection of the dead, which is not the resurrection of just one man, but of all humanity.

When any of us dies, a 'backup' is taken (within the Superposition) of all that we are, and all that we have been. Those who have come close to death, just managing to avoid it, talk of 'their lives flashing before their eyes'. Indeed, you might say it's a 'flash' backup, so rapid is the clock frequency and so fine the voxel resolution of the universe as engendered by the Superposition. This final backup, and all the interim backups taken throughout our lives, are stored away in the Superposition until the day of Resurrection, when all these backups are merged and restored, to become the unique individuals we all know ourselves to have been. Some of us will of course still be alive on the day of Resurrection, lucky us!

Time does not exist for a person who is held in backup. There is no 'other place' where backed up people enjoy consciousness. Thus, their return to conscious reality occurs an instant after their death (on the day of Resurrection). Their conscious reality goes straight to that once mysterious place people call 'heaven', which we shall all come to see, face to face.

Importantly, all the saints — including Jesus and his mother — will be restored of course, but so too will all the infamous agents throughout history — Adolf, Bloody Mary and so on. Indeed, scheduled for restoration are all the as many as 100 billion humanoid beings who have previously walked this earth. It's even possible some of our dearly beloved animals might also be restored.

The Prophesy of Isaiah, about 700 years before Jesus

"Behold, a virgin shall conceive, and bear a son, and shall call His name Emmanuel, (meaning) 'God with us'" Isaiah 7:14

In orthodox Christianity, the virgin which Isaiah spoke of is Mary. In recorded fact, she and Joseph named their son Jesus, rather than Emmanuel. However, because orthodox Christianity claims that Jesus (alone) was God, this 'Emmanuel' was reputably 'with us' for about thirty years.

In a new twist, let's suppose that the 'virgin' which Isaiah spoke of was 'mother' earth. She was quite unimpregnated (unless you believe in panspermia), and yet engendered an animal species we call homo sapiens, the (ostensibly) wise man. Man, that is, made not only in the image of God, but in fact Emmanuel, 'God with us.'

Accordingly, we have upwards of 8 billion animals all running about believing themselves to be God and will have upwards of 100 billion in the Resurrection. For the Superposition is a superintelligence that we can think of as the mind of God, and we are all incarnations of that mind (cats and dogs to a lesser extent). Assuming Jesus had God with him as he claimed ("I and the Father are (as) one", John 10:30), then quite logically each one of us, being human as was Jesus, also has God with us.

In the 'big' beginning, God is an incorporeal mind that wants to become incarnate so it can participate in the joy of its creation. This we now do. What makes each of us an individual is our (obviously) unique morphology (and gender), and the circumstances of our existence, but we all have the same *mind*.

Now then, I'm human just like you, and like you, I know just how very personal my mind appears to be. Over the years however, a lot of interesting ideas have entered into my head, which I can't help but suspect have come from the spirit of God within me, just as a lot of *your* interesting ideas have come from the spirit of God within *you*, whether you know it or not.

Jonah and the whale

Jonah is the biblical story of a man who is called by God to preach to the heathen, but whose response to his calling is to run away. Such mayhem befalls the world after his flight, that this anti-hero finally realises that he is the problem and sacrifices himself to save the whole world. He is thrown into the sea, only to be swallowed by a big fish that spits him out on the shore of the city unto which he was originally asked to minister. For me, that 'city' has now shrunk to become the global village that is our own, very special planet.

The Pitch

"For, behold, darkness shall cover the earth, and gross darkness the people: but the Lord shall arise upon thee, and his glory shall be seen upon thee. And the Gentiles shall come to thy light, and kings to the brightness of thy rising." Isaiah 60:2–3

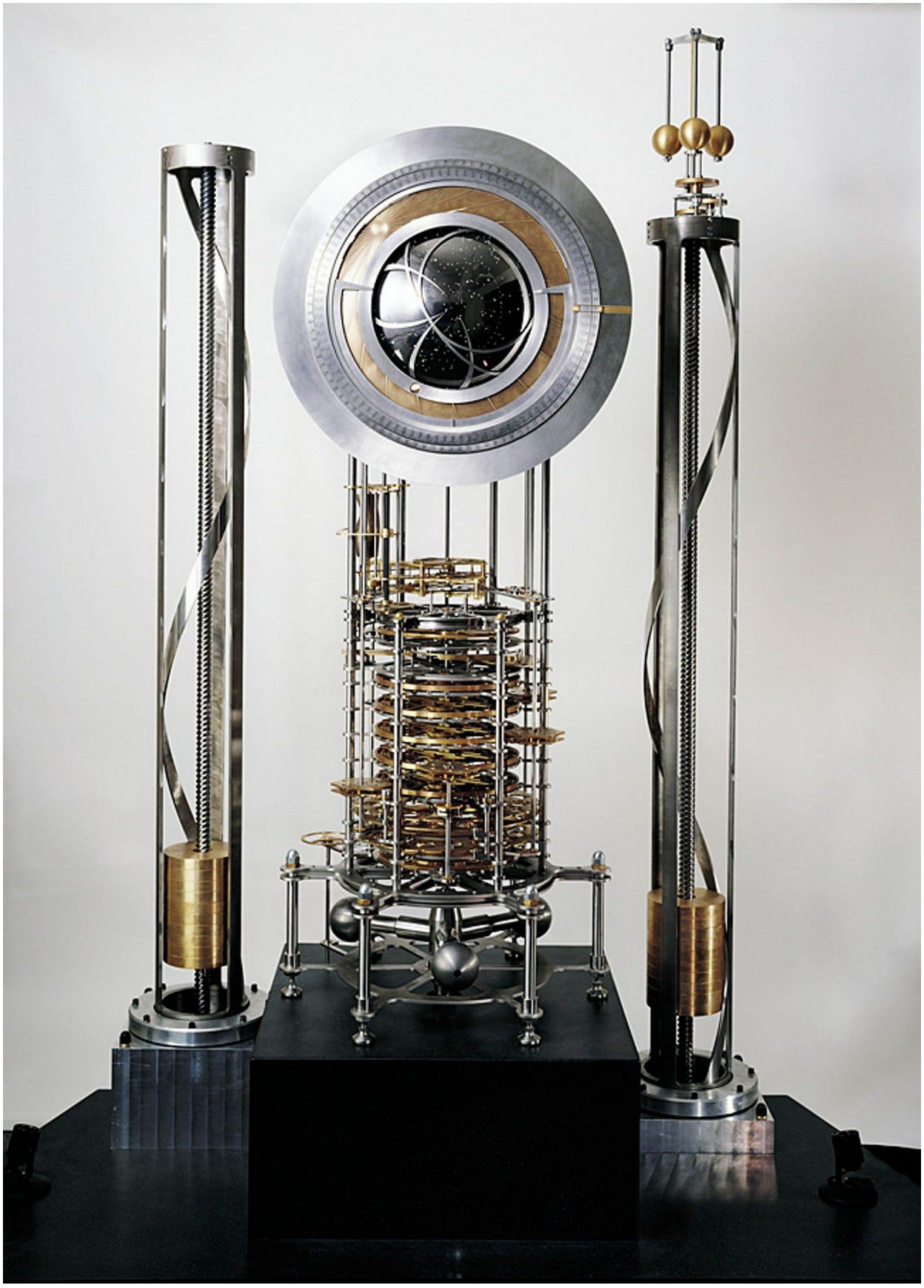
"The people that walked in darkness have seen a great light, and they that dwell in the land of the shadow of death, upon them hath the light shined" Isaiah 9:2

The Apostle Paul speaks of the day of Resurrection thus:

"Behold, I tell you a mystery, we shall not all sleep (die), but we shall all be changed in a moment, in the twinkling of an eye, at the last trumpet. The trumpet shall sound, and the dead shall be raised incorruptible. And we shall be changed. For this corruptible must put on incorruption, and this mortal must put on immortality." 1 Corinthians 15:51–54

Death would seem an inevitable fact of life, with most children realising this by about the age of 6. However, mortality is a *contingent* reality — it ain't *necessarily* so. Everything (including us)

seems to succumb to the second law of thermodynamics — it becomes disordered and wears out until it doesn't work anymore. Indeed, the heat death of the universe is a well-established reality. Ultimately the stars in the sky will burn out, the universe will expand further than its light can reach us, and all will be darkness.



Cheerfully, that is not where we are at right now. We have a hot spot, the sun, at a comfortable 8 light minutes distance from a cold spot, the earth, and the energy of that heat potential is

precisely what is needed to keep everything in our world, including us, working *indefinitely*. And we have another 1,000,000 millennia of this ahead of us, where it is a mere 2 millennia since Jesus taught us about loving our neighbours as ourselves.

Imagine what we could achieve if we all got together and treated ourselves as equals before God. As Jesus declared, "what you do to these the least of my brethren, you do unto me." Matthew 25:40.

The Heavenly Economy

If all our ancestors returned, and we all reverted to the prime of our lives, except those who are yet to reach it (extant children, and children who were cut off before reaching their prime), and we then went forward indefinitely, we would face a very new and different economic and social paradigm. I can't help but indulge in its potential, for I *know* it to be real, and of course long for the day when everyone else can delight in it. If one were to become immortal, one would attain unbounded wealth, for one would have all the time in the world to achieve one's potential.

We would still, one hopes, need time for work, for play and for sleep, but all three could merge. For many, cooking for others is not a chore, it is a delight. Others appreciate good food, without necessarily delighting in its production, but are more than happy to do the washing up afterwards. The heavenly economy is one in which we all willingly volunteer our services for the *love* of it, aided by a basic income that has in the first instance provided for our every physical need.

Rather than having a currency of exchange, all material resources — matter and energy — are distributed evenly across the population. Then, across the world, there are dotted millions of 'recycling' stations, black boxes of automation into which we pour used or expired goods, along with a burgeoning stock of renewable energy, and from which emerge new goods. The more renewable energy we harness, the greater becomes everyone's material 'wealth'.

Several incentive schemes exist in this economy. The most important is that your material and energy resource quotas are distributed (and thus diluted) down across your progeny. The more children you produce, the lower will be your standard of living. While the earth can support a large population thanks to its vast resources, those resources are ultimately finite.

Secondly, the imperative is to return used goods (e.g., aluminium cans) to the recycling stations and have your material resource quota credited. If you throw that can away, someone else can claim it and increase their aluminium quota, where yours in turn is depleted.

In every jubilee year, however, everyone's quotas, despite all the progenerating and carelessness, are reset.

All real estate is classed as either a hotel, or a museum, or both. Mi casa, su casa, all residences become part of the 'big' hotel. All goods which cannot be reproduced, reside in those hotel 'museums' for all to enjoy and respect.

Why Mortality?

Why were we created mortal in the first place? In orthodox Christianity, the first man and woman were Adam and Eve, and they were created immortal. They then became mortal after they ate the fruit of the tree of knowledge (of good and evil).

We now know that we are an evolved ape, and that we have always been mortal. Our mortality then exists precisely so that we might discover, as efficiently as possible, how the world works — so that we might *consume* the tree of knowledge.

By putting finite boundaries on our existence, the imperative has been to achieve all we can in the limited time that has been allotted us.

Imagine however if Adam and Eve had remained immortal. Eventually there would be a permanent tribal hierarchy with Adam and Eve at the top, and the people doing all the actual work at the bottom, indefinitely. Luxury for those at the top, but eternal servitude for the workers. The black box economy gets rid of all class structure by replacing the workers with machines and offers true egalitarianism.

However, the world has seen all manner of evil and disease that seems unfair for a 'good' God to have inflicted on us. We need always remember that all animal suffering, in particular human suffering, is God's mind suffering through its incarnation. So, with all suffering throughout history, it is *God* who has suffered.

An essential driver behind our discovery of how the world works is a world whose suffering appears to be random and unfair. Imagine, for example, if all the good people remained disease free, and all the bad people were struck down dead whenever they did something bad. People would suspect there is something 'going on upstairs', and nobody would dare experiment. It is in the nature of the child to explore, and find out how the world works, but if its parents scald it at every juncture, it cannot properly develop.

Humanity has been a child learning how its world works. Between all of us we now have the tools we will need to transform the world into the utopia that has long been promised us. We just need an excuse to start a conversation around the day of Resurrection. We need to understand why something is going to happen before it can then happen.

The Broadcast

"The Lord gave the Word: great was the company of the preachers" Psalm 68:11

"Behold the Lamb of God that taketh away the sins of the world." John 1:29

The day of Resurrection is also the day of Judgement. It is commonly assumed that all the good people will go to heaven, and all the bad people will go to eternal punishment in the fires of hell. However, because we are *all* incarnations of God, God wants not even *one* of us to go to the 'other' place. It would be like willing oneself to go to hell.

God wants to wash away all guilt, so we become as white as wool. God does this by admitting to having imposed mortality on us, and it was that mortality which naturally drove us to look out for ourselves ahead of others. God's intention was always that we discover how the world works. Now that we know how the world works, that truth can set us free.

Now, the day of Resurrection is clearly a day of great joy for all the decent people in the world. However, if anyone doesn't want to accept God's offer of redemption, and go forward forever more, cleansed of all sin, as a decent human being, that is of course their choice; God will simply switch them off, indeed instantaneously, if necessary, to protect others — but for the Grace of God go I…

"I know that my redeemer liveth, and that he shall stand at the later day upon the Earth. And though worms destroy this body, yet in my flesh shall I see God." Job 19:25–26

Most importantly, God is on *our* side.

"If God be for us, who can be against us?" Romans 8:31

Finally, a lot of people imagine there is a 'bad' guy constantly fighting against God. There is only one Superposition, and it is pure perfection. The 'bad' guy is the person who thinks their mind is their own. What has been labelled the 'devil' is in fact our pride, our haughty notion that all our great ideas and achievements come from the exquisite structure of our individual brains. Each one of us has been specifically chosen by God to minister truth, even if we might never have realised it was God all along who has been directing our lives.

I for one long to see all this out in the open, for all sorts of details will emerge from the carpenter's woodwork once the conversation starts.

"Then shall the eyes of the blind be opened, and the ears of the deaf unstopped. Then shall the lame man leap as an hart, and the tongue of the dumb shall sing" Isaiah 35:5–6

"His yoke is easy, and his burthen is light" Matthew 11:30

Of course, we could just continue headlong on our accelerating path towards destruction…we oldies will have a full life, but too bad for the young ones, and what a shame that such a promising life (of humanity) might be cut off in its prime. I have however put the offer out there.

"And the glory of the Lord shall be revealed, and all flesh shall see it together, for the *mouth* of the Lord hath spoken it." Isaiah 40:5

Rowan GRIGG, January 2023