

## POMPOSO, MA NON ALLEGRO

BY ROWAN GRIGG

*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 balked 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 can'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 most bright 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 Lu-

ther, 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.

## $\alpha$

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 camp fire, 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 light-years 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 unmistakable 'signatures'. Indeed, it is on the basis 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 actually 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 a distance of 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 is capable of simulating 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 actually 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 anti-reality inhabited by Mister Rabbit). In our modern mythology, based though it is on evidence rather than 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 in the course of 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, it could 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 *actually* 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  $1.6162 \times 10^{-35}$  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 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) times smaller than the proton, can never be reached using the 'sledgehammer' approach. As the great 20<sup>th</sup> 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 1 000 000 000 000 000 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 relati-

ty 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 in reality being *translated* from one place to another. The *information* about an object at any particular 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 ra-

dio 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  $1/100,000^{\text{th}}$  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 a distance of  $10^{-35}$  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  $(10^{-35}$  me-

tres/ $10^{-43}$  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 ex-

tending 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 UTM’s 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  $\sim 10^{-35}$  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 UTM’s whirring away inside it. The UTM’s, 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 of this vast space stretching out before us is merely *simulated*, so it is that the *legion* UTM’s 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 exactly

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*.

## β

*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 canvases 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 scientific 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 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 mate-

rials (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 100<sup>th</sup> 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. As long as 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 Design-Book 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 milieu. 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 in-

stead 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<sub>2</sub>. *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 re-

sponsible 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 particular 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 apprised of the facts) to become a member of The Commonwealth. This quality of mercy (which Mohammedans also understand) is very comforting to people like myself 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 is able to enter into 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 have to 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 graciousness.

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 have to 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 Volkswagens to protect themselves from themselves, because Volkswagens 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 completely 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 re-

warded 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 Governor*

*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 expedites the process of 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 14<sup>th</sup> 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 num-



bered, 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.

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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