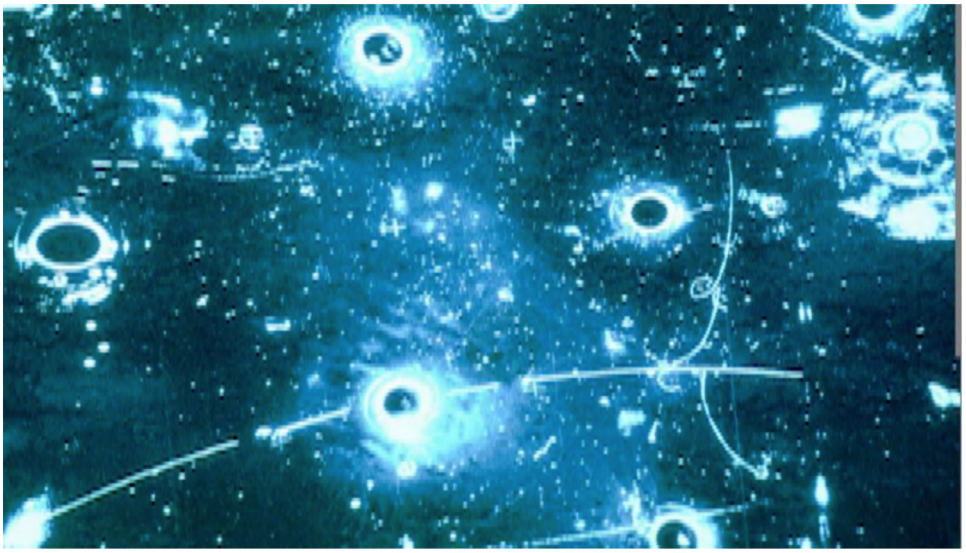
TALK TRANSCRIPT



A Chronolith Foundation Space Threshold Initiative

A presentation at Auto Italia Event
20th March 2016

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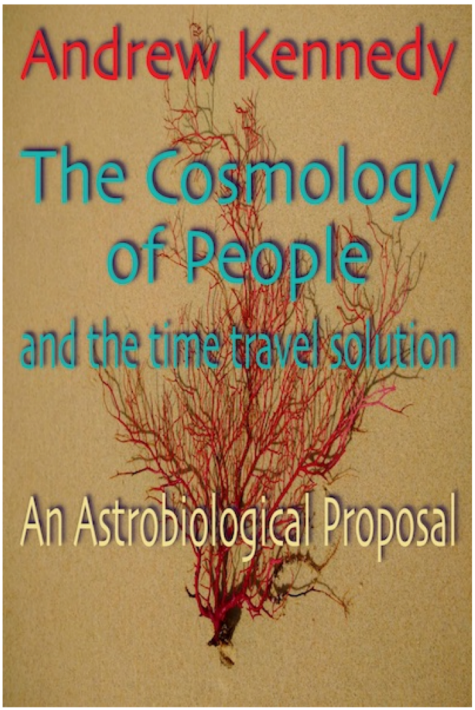

and the Chronolith™ Observatory

Text: Andrew Kennedy
Video installation: Billy Howard Price

The purpose of this talk is to introduce to you The Chronolith™ Experiment, and the background to it. The themes I shall cover come from my coming book, *The Cosmology of People, and the time travel solution*, which describes a fresh way of seeing the human future in space, although the project originated way back in a proposal to the UK Millennium Commission in 1997.

Introduction

Imagine looking out of the window at Earth revolving below. 540 people or so from 7 billion humans have done this in the 55 years of space travel. During that same time, humans have initiated unstoppable changes to the biosphere. In the next just 35 years, the World's temperature will rise by 2ºC, the oceans will rise by perhaps as much as a metre, the seas will start to die along with 3/4 of the world's biodiversity. Fresh supplies of everyday metals like copper and tin, even gold and silver will dwindle to almost nothing. Harvests will fail from drought. Pollution will damage almost all agriculture and world population will be 9 billion or more. For every 7 people you see in the street now there will be two more. By the end of the century, if temperature levels keep rising they way they are projected, 11 billion inhabitants of Earth will be living an entirely different kind of life than they do now. Almost all the traditional resources they have relied upon in the past will have failed or be compromised in some way. Earth's economy will be hardly sustainable.

Humanity is in a race. You may not realise this; it is not talked about much even among those who do realise it. Humans are in a race they are going to lose.

If the Earth economy fails before it can sustain a space economy then space investment has no future. In order to win this race, from a purely practical point of view, humans will have to secure a thriving and sustainable Earth economy first in order to make the move out into space worthwhile.

And here lies the paradox, since, in order for space to become economically viable, the space economy will need the healthy markets of Earth to not only purchase its products until it can become self-sustaining but to supply all the capital and biosphere support it requires from its own dwindling resources. It is not clear how far in the future an independent space economy can be realised but it is a safe bet to say that it will not be occurring in this century, and in this century everything of

importance in human history will happen. So if we ignore the Earth now, we will not be in any position to make the best of space later.

We can speculate whether all intelligences in the galaxy are or will be faced with a similar difficulty, but certainly here on Earth it looks like we have reached a point where we must be more careful with the Earth or no one is going anywhere.

We are beginning to recognise that getting into space means crossing a genuine threshold composed not simply in economics but in human psychology. I have written about the economic crisis elsewhere, and what I want to concentrate on in this talk is the psychological crisis that is developing.

We can observe this crisis penetrating our thinking and creating confusions, conceptual crossovers and distortions in our relationship with space.

By crossovers and distortions I am not thinking of beliefs like those of Timothy Leary, for example, who had a collective hallucinogenic experience while still in prison for possession of marijuana in which he was informed by aliens that humans on Earth had been seeded by aliens (the Starseed Transformation) and that they were half way to evolving their way back home. I am thinking more of the religious, philosophical and political aspirations that have become entangled with ideas about space.

Certainly, quite what we are supposed to think about conquering space is still a puzzle. For example, right now (20 March 2016) in Berlin a conference has just come to an end. It is called, "The Future in the Stars: European Astroculture and Extraterrestrial Life in the Twentieth Century", and it has been trying to evaluate the concept of 'astroculture' and how it fits into human history.

The enthusiasts of space travel relay their excitement at future prospects completely without the irony of say, space historian Roger Launius who noted that,

"All of the elements of religion are present among those who advocate for aggressive space exploration activities. The belief system has saints, martyrs, and demons; sacred spaces of pilgrimage and reverence; theology and creed; worship and rituals; sacred texts; and a message of salvation with humanity insuring its future through expansion of civilization to other celestial bodies.".

(2011, January, "Escaping Earth: Human Spaceflight as Religion", 49th AIAA Aerospace Sciences Meeting*).*

He wrote these words in 2011 and I suspect that they are less of an in-joke among space workers than they appear. After all we have sent human remains into space. The ashes of Leary and Rodenberry, among others, even astronauts, have been sent into orbit. Rodenberry's ashes went up on a Shuttle and came back (huh?). Leary's satellite fell back to Earth some years later. Over four hundred tiny vials of human remains have been sent into space (by the company Elysium) but all have returned. Only the ashes of Dr. Shoemaker that were shot to the moon on board a NASA probe in 1998 and those of Clyde Tombaugh, the astronomer who discovered Pluto, are still beyond Earth. Tombaugh's ashes went out on the NASA mission to Pluto, New Horizons. What remains of those initiatives is a Californian company called Celestis who will shoot the ashes of your beloved pet into space (temporarily) for a large fee, and Elysium who is now selling the idea of depositing a gram of a loved one's ashes on the Moon.

If Launius is right then we should probably expect some religious crossover. And a beautiful example of precisely this came to my attention through Andy Thomas, a researcher at de Montfort University, who sent me a document from a ceremony he attended near Perth Australia at the beginning of this year that inaugurated a new satellite link.

There were speeches by dignitaries and then an Aboriginal representative performed the Welcome to Country ritual. This ritual is usually performed when a particular group of native Australians arrives in the territory of another group. The host group leads the new group in an understanding of the local conditions, in their particular ceremonies and so forth such that when the visiting group moves on it will carry the culture of the group they visited with them. Quite how this ceremony applies to an inanimate satellite dish in this case is mysterious. After this ritual, however, and because the installation is sited near to a monastery village that is now a tourist theme park, some Benedictine priests performed a blessing, (taking an opportunity to quote from the book of Genesis), and from which I quote some passages here (and which can be read in full in the appendix),

"...Let us then bless God as we use these products of technology for our advantage...Father, fill the minds and hearts of all those involved in this tracking station with a spirit of wonder as they continue their journey into the abyss of your creation..."

While this type of crossover may be benign enough, more chilling distortions are also appearing.

For example, this February (2016), the US The White House Office of Science and Technology Policy (OSTP) (along with the national Academy of Sciences and others) co-sponsored a look at humanity's future in space called: "Homesteading in Space – Inspiring the Nation through Science Fiction." Space scientists, engineers, thinkers and entrepreneurs got together with science fiction writers and creators to examine the idea of future "homesteading" in space. The White House's specific aims in its press release were to,

"further inform the creative community about a positive vision of a future in space; and encourage people to incorporate this vision into entertaining *stories* (my italics) that will excite the public, energize entrepreneurs, and motivate and inspire children."

There is no question that many people believe that the influence science fiction gives to scientific thought is necessary to motivate innovation, to seed it. There is a Project Hieroglyth (located at Arizona State University) formed of scientists and science fiction writers to further this idea in stories and essays. It is a curious position since much of science fiction is dystopian or anti-establishment conveying warnings as much as optimism. Nevertheless examples of science fiction stimulating scientists are often put forward. Adam Weigold, a physicist who claims his work on lasers was inspired by the phasers in Star Trek, wrote an article describing precisely this, entitled "Can Futurists Change The Future?", (*IO9*, 2 December 2013). Mae Jemison, the first female black astronaut, said she was also inspired to join the astronaut corps by Star Trek.

Gene Rodenberry may well have briefed the writers of Star Trek to give it an optimistic view of human future, but such was a personal belief and not a depiction of genuine trends. Viewing television adaptions and movies, a Martian would readily observe that humans are very confused by science fiction and what humans expect space to give them by way of meaning and aspiration. Great fuss is made of a current American TV sci-fi series *The Expanse*, (2016) where humans have occupied Mars and the asteroid belt but live in a dirty gritty world of space industrialisation. Yet it is almost entirely nonsense and bears no relation even to today's actual trends. The idea that a fresh round of the miseries of industrialisation is the best we can come up with as our future in space is a fine example of psychological archaicisms permeating our minds as we stand at the space threshold.

I am not going to debate whether the existential relationship between fictional narratives and non-fictional acts is necessary in human life, or even the balance between utopia and dystopia in science fiction, because

what I am pointing to here is, perhaps, the deliberate reviving of cultural deceptions.

Positive space advocates are moving from inspirational fact into propaganda where they spin space activities to encourage a space psychology to further direct industrial development and investment.

And look back into history. The technique of injecting a yearning in people previously held back by logic and inhibition is as old as the hills. Pick a period, say the early middle ages when narratives were freely invented to create saints to make monasteries viable and to open pilgrim routes. We can't avoid further strengthening Launius' analogy here. Think about the opening up of the Americas. Did we not have El Dorado to drive investment? Were not the first Pilgrims to Massachusetts deceived by tales of Paradise and untouched fertile lands? The reality being that the soil was poor and grain brought from England did not thrive in it.

A precisely similar fantasy was again in play in the beginning of the 20th century in the US when near paradise conditions were used to encourage settlers in the mid-west, a part of the country with thin topsoil and questionable rain fall. Jonathan Raban's book *Bad Land* (1997) explains how the railroads, in partnership with government, lured people to make their fortune in what was described as free, rich, farmland practically flowing with milk and honey, with printed glossy brochures distributed all over the United States and Europe, translated into many languages and filled with romantic pictures.

Having writers pondering fictional future scenarios is one thing, but when governments get in on the act of persuasion and start unashamedly planting rosy space scenarios in public places one should wonder precisely what and for whom is at work here.

I want to lead you in a different direction, though with the same objective, human expansion into space. I want you to think of other ways in which we might use our consciousness to help humans along. In spite of all you will hear tonight, I am a pragmatist and am looking for practical ways rather than fantastical ways to further human interests.

Such a purpose is often given to the SETI program without really explaining how the information it gains will really help us here and now. There is a different kind of search I want to introduce you to that may be

more beneficial to humans, and for which we need the Chronolith Observatory.

I can put the problem about humans and the space threshold more succinctly. We need to know if humans have survived the threshold we face. The future needs us to make the right decisions here and now, and we need to make them in order to have that future. If the future is to be a success for us we need to be guided in that direction. If the future is failing us, then we need to know how to avoid making the decisions that lead to failure.

If this sounds circular to you that is because it is. It turns out that probability which drives the universe requires circularity, for, if it is literally true, then nothing would ever happen, at the quantum level.

This is vaguely and to a certain extent unwillingly acknowledged by physicists who whisper to themselves about the measurement problem or even about the notion of the von Neumann cut – just where in the system of observer and observed do you decide reality begins. The world is understood through probability but not explained by it.

And this is where the experimental Chronolith comes in.

The Chronolith will participate in the transition to what I shall call the fifth state of society. The stages of culture are typically given as 4; hunter-gatherer, agrarian, industrial and post-industrial. And it is fruitful to think of these stages in terms of how they represent time. For a hunter-gatherer, time is cyclical, social and immediately fruitful at every point. For agrarian societies, both personal and social time are cyclical but also political, and require prediction and wait, and therefore history. For industrial societies, social time becomes linear (think clocks), impersonal yet ever advancing (in this sense Hegel's thought is archaic and backward looking). For post-industrial societies time becomes, personal, relative and adjustable. In the fifth state of culture we have a space-industrial society, where time is social, political, rhythmical, relativising resources through interference of needs.

This fifth state is where space activity is a pragmatic activity absorbed into our everyday consciousness and which has begun to define our human nature, in the same way we freshly characterise children who have learnt to walk. While Hegel, along with many others, thought the modern nation state as an actual 'spiritual being' rather than simply using that idea as an analogy, we can more usefully think of humans as

an organism that accumulates decisions, and is thus able to occupy new realms of activity.

In the 5th state of culture, humans will be making new kinds of decisions, through the physics of space and the way space demands new ways of treating, storing and allocating resources. By moving into space, Humanity as a whole engages with a new master, a new dialectic, and thus a new consciousness.

The Chronolith is an experiment into the development of this consciousness and culture. The Chronolith will probe the feedback loops of probability passing into the past from the future created by a decision-making apparatus – the human brain. The coherence of your brain, your happiness and stability, your anticipations and delights always depend upon feedback loops, and their self-ignited interference. Summed over time, pathways – even the ones of the past swollen through use – are still mutable. The results will help us understand mind as well as gather information we can put to use here and now. We are looking for an intelligence in the Cosmos, but instead of searching the stars for aliens, we can search time for whispers from us, our future selves.

The experiment has in fact already begun. You are the first to fall within its compass, and it's to you here that the beginnings of the experiment's world-line can be traced in history. You are the first witnesses to these proposals. If, what I believe to be true is true, perhaps all of you but certainly some of you will self-select yourselves as components of the fifth state that will discover and maintain this future trend in the public treasury of data. Your participation here tonight will become a fact that others will marvel at. You, of course, will marvel less because in your own minds you will come to understand that it was written all along.

At the moment, however, I am guessing you think that nothing is written, there is no such thing as a secular destiny and everything is down to probability?

You are right about that. Everything is down to probability. But there are more shades to probability than you can shake a stick at (and that includes mixing metaphors).

To return to the beginning. If probability behaves as advertised then nothing would happen, least of all individuality in consciousness. Either the brain is a fully decohered entity in which case mind would be living entirely in the past, or it can form superpositions and be entangled with

states outside itself. Mind must be entangled, at least in part, with future states of unreality. This is how consciousness makes measurements. We don't have the duality of Descartes, we have interference of states of awareness. This is how we remember. This is how we anticipate. This is how we escape the mirror of self-reflection.

The physicist and cosmologist Max Tegmark, has written that we should think of consciousness as a fourth state of matter, along with liquid, solid, gas ("Consciousness as a State of Matter", arXiv:140.1219v2 [quant-ph] 27 Feb 2014). And maybe he is right. The processing of large amounts of information in complex and irreducible ways is consciousness. What we call information is just probability, however and here we are standing at the door of circularity, because probability requires futures to exist. It is probability which is behind the move of matter into consciousness. Through the choices that probability creates, consciousness shapes the energetic surface of life; evolution is no longer a random walk over a surface of possibilities, it follows channels. The mind makes and is made by decisions that the future has confirmed in their making. (quite how, I will explain), the present moment is only a provisional arrangement of states bridging the two zones of time. An outside observer sees only chaos, that nothing is written, and does not see how life makes sense from within.

Let us remind ourselves that in current thinking, uncertainty and the interference of probabilities don't really go away when events happen or are observed, they just move into the shadows. But, as I argue in my book, the past also changes to support how the future occurs. This may seem at first sight to be a reversal of what we believe happens in our lives. We assume the past is fixed because we *know* it happened like that. It isn't just our memories that help fix the past, consequences moving along with us also help to confirm what happened in the past. You are here with me today because of an invitation sent out weeks ago. We assume a literal connection between the existence of an event and the existence of a memory. What is more, we assume that the memory comes after the event, and that if we have a memory of an event, then that event occurred prior to it. This relationship between event and memory is not as fixed as we believe, and, that while the future is built on the ashes of today, those ashes are still glowing, still burning, still providing options. The arrival of the future doesn't extinguish them; it is the breeze that coaxes them back into narrative life.

Hence the Chronolith Observatory. It is part heterotopia, a place of otherness, but I am not going to go down that road right now. I am not

going to tell you here today how the observatory works, but I will tell you what I expect it to do. I expect it to alter narratives. To better get across what I am driving at, I am going to use a literary piece as an illustration.

As an exercise in narrative technique, the author, Trevanian once wrote the same story twice for a collection of short stories (*Hot Night in the City*, 2000). Read one story after the other and they seem to be the same (see below). Yet the endings are polar opposites. I knew Trevanian very well. We were friends and we talked over this very story. His point was to show how narrative works.

He let W. C. Fields respond, "That's the way it is out there, my little chickadee. It's not a fit life for man nor beast!"

"You must be lonely."

"Yup," he said. "Sometimes a fella gets lonelier than one of those lonely things you see out there being lonely." Then he suddenly stopped clowning around. "I guess I'm nearly as lonely as a girl who gets all dressed up on the hottest night of the year and goes out to see a movie...all alone."

"Well I...I don't know many people here. And what with my night classes and all..." She shrugged. "Gee, I've really got to get home."

"Right. Let's go."

She glanced again at the clock. "And you're going to walk around until dawn?"

"Yup."

She frowned down into her lap, and her throat mottled with a blush. "You could..." She cleared her throat. "You could stay with me if you want. Just until it gets light, I mean."

He nodded, more to himself than to her.

They stepped out of the cool White Tower into the humid heat of the street. At first, the warmth felt good on their cold skin, but it soon became heavy and sapping. They walked without speaking. By inviting him to her room, she had made a daring and desperate leap into the unknown, and now she was tense and breathless with the danger of it...and the thrill of it. 'Is this it?' she said to herself. 'Is he the one?'

He felt a thrill akin to hers, and when he smiled at her she returned an uncertain, fluttering smile that was both vulnerable and hopeful. There was something coltish in her awkward gait on those high heels, something little-girlish in the sibilant whisper of her stiff crinoline. He drew a long slow breath.

She led the way up three flights of dark, narrow stairs, both of them trying to make their bodies as light as possible because the stairs creaked and they didn't want to wake her landlady. She turned her key in the slack lock, opened the door, and made a gesture for him to go in first. After the dark of the stairwell, the room dazzled and deluded him. The streetlight under which they had first met was just beneath her window, and it cast trapezoidal distortions of the window

He smiled and returned to his street voice. "And now here I am, talking to a very, very sleepy girl in an almost empty White Tower. Ain't life a gas?"

She shook her head sadly. "Gosh, what a terrible way to live. And for a person who went to college, too."

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He looked at her with feeling. 'This is it,' he said to himself. 'She's the one,' and he felt a thrill akin to hers. When he smiled at her, she returned an uncertain, fluttering smile that was both vulnerable and hopeful. There was something coltish in her awkward gait on those high heels, something little-girlish in the sibilant whisper of her stiff crinoline. He drew a long slow breath.

He followed her up three flights of dark, narrow stairs, both of them trying to make their bodies as light as possible because the stairs

Anyone can use opposite words or negations to create opposite meanings in a tale. (Probably every one here is familiar with the Monty Python sketch about whether an argument can be formed through mere contradiction.) But Trevanian didn't do it like this. He made opposite endings be convincing psychological conclusions of virtually the same narrative by attending to subtle touches of character, in this case by altering what may make a person a victim, by attending to what makes us perceive personality in a story, by attending to what I am going to call the cosmology of the character.

There have been over the years attempts to introduce elective outcomes to novels, television series, movies or advertisements. I will note here that this trend is a nice example of the post-industrial stage of culture I mentioned earlier where time is very relative and personal. Anyone who has ever tried to write these optional narratives as I have, knows how hard it is to make a narrative strand serve two or more outcomes with any psychological conviction.

The touches Trevanian made are unremarkable on their own. I here illustrate the most significant one of all, a single thought originally spoken by one, now spoken by the other. If you were trying to remember one of these stories or tell them to someone else, you would make more differences than Trevanian did. You would get things wrong. Your narrative would be a much looser affair, less precise. Maybe more like a dream. The external validity of a narrative requires internal psychological truth which is where a time traveller trying to change things always trips up. Trevanian's exercise in technique shows us that we cannot change human-level events in time without changing minds, and we are unlikely to make changes in the time line stick without introducing alterations in minds as well.

This observation makes the script that Zemekis and Gale produced for *Back to the Future* even more remarkable as one of very few time travelling tales that seems to understand this.

It isn't a long jump from Trevanian's tales to recognise that all narratives, which is to say all consciousnesses don't live in a field of agreed meaning, and that minds are fairly incapable of retaining consistency of content without external props. If we took our libraries and our hard drives and our memory chips away what then would we make of memory and prediction? How would we live in genuine psychological truth? How does human identity remain consistent through time?

Cosmologies and identity

It may well be that each brain is unique in the physical tracings of its cell structure by virtue of genes and experiences, even though each brain also contains shared cultural concepts and language, but let us imagine another way of characterising an individual's identity.

Let us start by compiling a cosmological view of individuality. The track of an object or a person in Einsteinian space-time is called a world line. We will call the narrative of an object or a person as it interacts with the world lines of others a time-line. Humans live out their lives in time-lines. Your time-lines contains all those effects of your presence in the world, your influence but compounded in all the viewpoints, yours and everyone else's, that exist in that volume of time and space. We think our point of view is special but really it is only a composite and provisional picture of a cosmology with your consciousness at it's centre.

After your world line ends, your presence (or let us say, proof of your existence, your cosmology) is only retained implicitly in your children, in the repercussions of your actions in the world, or in the objects you have made that survive you and only in so far as the information these things have released into the world can be traced back to you. The cosmology centred on you for example, has informational limits or a boundary beyond which no trace of your existence could be observed or calculated.

Most of the results of choices we have made are very short lived and get readily overwritten by the sheer numbers of other world-lines. Of the 109 billion people calculated to have lived on Earth only the presence of a few can be traced to an actual individual life, and very many fewer individuals could be said to have originated a particular flow of information through a creative act (one that has unknown antecedents). For most of us the originality of the information we generate is slight and much simply passes through us from elsewhere. The effects of some world-lines linger on, however. Leonardo da Vinci still has a presence in time-lines even though his world line ended long ago. The truth is, for most of us, time lines are very much less personal than we like to think. It is what culture means - being imbued with the time lines of others.

Of course, it is not really anything of da Vinci the person, that is present, it is the changes produced in sets of event probabilities for others that he altered through his presence. Since these are in principle incalculable it is hard to see how we could remember anybody let alone da Vinci. A small

shift in probabilities, just like in the Trevanian story, could alter everything.

The changes in overlapping probabilities that define our cosmology in the universe eventually die away in time and space. The boundaries of this non-influence could in principle be mapped such that a conjugate cosmology could be defined that has an absence at its centre which also overlaps every other cosmology and their conjugates. When we talk of the grandfather paradox – me going back in time to kill my grandfather, so I never lived – we are talking about the cosmology of me being replaced by its conjugate, being replaced by a different set of probabilities. Thus in the first Back to the Future movie, the problem of where Marty McFly's dismal world disappeared to when he changed history to create a more dynamic present itself disappears into a potential, existing as fears or trauma perhaps. There has merely been an exchange of probabilities within the cosmology of McFly.

At this point in the examination of time travel we usually invoke the multiverse scenario to explain the availability of other timelines, but this is not correct. We are better off replacing the word 'multiverse' with 'cosmology'. Instead of the multiverses being separate and distinct entities unreachable from ours, we see them as cosmologies all with us in the same space. Events occur because they exist within cosmologies that determine their outcome.

Cosmologies reach forward and back in time. They are connected throughout time and space for as long as they have distinct values. Thus we reach the essence of the Chronolith Observatory. Individual consciousnesses can in principle read their cosmologies extending into an actual future as well as the past.

By reflecting upon how we might map the human cosmologies in our universe, we come to a picture rather like a map of the brain. Pathways of probability information flowing and combining, reinforcing and weakening connections in time and space. The closest helpful image is the brain itself. We can form a picture of neurons of time carrying and confirming information just the way that the neurons of the human brains in this room are doing right now.

So what do these cosmologies tell us? Only what we know that there is resonance and harmonics to the universe. Waves are fluctuating back and forth in all dimensions including time. (The arrow of time cannot exist without a place to go or by leaving nothing behind: Zeno's deepest

paradox.) Shape and rhythm to the fluctuations of energy is intelligence and character in the brain (this has been recently analysed through resonance images of the brain) just as the shape traced out in all of time is our universe. The universe is comprised of neurons of information spreading throughout the space-time that the universe occupies, through its past and its future. How else could it be? Brains and universes are analogies for each other.

Just as there is a superposition of multiverses at the core of every neuron in the brain there is a composition of cosmologies at the nexus of every human option. The observed state, the memory, the agreements with the past are made out there in what the universe has already prepared for us to discover. Where the emerging probabilities you think you know have already been.

This is the picture I want you take away with you.

(At this point I am going to introduce some exercises that will help demonstrate what I mean about these space-time neurons and the shapes they occupy, using some simple movements taken from a 3000 year old philosophy. These movements form a narrative, telling us how humans are connected by the energy of creation, by threads of cosmic information flow.)

A diversion on probability.

It is because we observe the existence of probabilities that we can tell there is a future. Overlapping uncertainties only make sense if the alternatives refer to a real future (what physicists call contrafactual definiteness). If a potential to be can never become actual then it is not probable, and if the probabilities we observe are fake then pre-destination is the fact of life. If, however, probabilities are real then they show how the future is already built into the present.

We are used to thinking that the Universe encloses all probabilities. But we can think of it the other way around. The existence of the universe is inevitable given that probability exists. This is the first paradox – probably. That the universe might not exist is one of the facts that makes it exist! Only where there is doubt can there be certainty! Or, in Shannon terms, existence is *less* informative than non-existence? (It is this fact that makes the read message less meaningful than the unsent message, something which bears directly on the flow of information in the world. About more later.)

So the future exists, but where does it exist. Where is the future from my present? We can think of the future as being places occupied by unused probabilities produced when space expanded at the beginning of time.

Let us think about roulette, for a moment. What makes the possibilities of the ball falling into the home of a number is that all the homes for numbers exist already concretely, and for the ball to be in one home, it has to be physically excluded from the others. In a quantum measurement of a state of a particle say, all these homes suddenly appear at the point of measurement, but all the same, these homes, these multiverses must exist as a future for the particle. Quantum physics took probability out of the casino and started calculating that the likelihood of some events occurring and the likelihood of the same event not occurring were not exclusive variables. Probability became not a frequency distribution but a disposition, and our world becomes simply an emergent phenomenon built from the first dispositions bottom up. For the world of human consciousness, however, is this *sufficient* explanation?

Here´s an illustration. My wife looked up at our wall clock at one point saw that it had stopped. The battery had died. By the time she bought a new battery a week had passed. She unpacked the battery and put it in the clock and was about to re-set it when she saw that the clock time set on the stopped clock was precisely to the second the actual time. She didn't have to move the hands at all. She described this to me and started to work out the odds of this happening. I had to persuade her that there was no way to calculate the odds, because traditional probability in the everyday world is based on frequencies and there are no frequency distributions of that kind of coincidence. The things she was relating are completely independent of each other.

She started to calculate how many seconds there were in a day saying and it had to be one of the 24 x 60 x 60 seconds and thus there is a 1 in 86,400 chance of starting it going again on the same time. But this is wrong because there is nothing stopping her setting the clock on the wrong time every single time she did it. She is not obeying any distribution of times, any bell curve of properties or anything governed by a wave-like function. There was nothing constraining her to hit some seconds more often than others. She could choose to set the clock one second after the time it had stopped every single time until the end of the universe and no frequency law would be transgressed. There is simply no way to calculate the coincidence. Supposing you did this a

million times. Perhaps you could form a view of the number of times you are likely to deal with the clock at any given second during the day. But this frequency does not connect you with the clock, and it cannot say that during the next million trials the likelihood of the coincidence gets more unlikely, not more likely.

Not even quantum probability describes this clock coincidence. For one thing there is a vast number of interacting wave functions at the human level. This is not a question of a single electron interacting with a slit or even a group of molecules forced into a superposition by a laser. There are billions of particles with billions of histories all functioning at a point chosen not by random collisions but by consciousness, itself formed by billions of particles and superposed states. Where is the actual point at which the wave functions of observer (my wife) coincide with the wave functions of the clocks and produce a value in consciousness? We have no idea at all. We have notions of the arrow of time and of entropy. But these ideas are pretty much after the fact, even as we know that life drives in a direction opposite to the expressions of entropy.

Yet these kinds of coincidences are happening everywhere all the time forming our minds and personalities, forming our cosmologies, and quite unexplained, so far, by behaviours at the particle level. Could they be linked in higher level ways? Is it possible to conceive a narrative law that might predict or account for this kind of activity?

Now you are probably thinking of Jung's synchronicity, or Kammerer's Law of the Series here. And both these notions, that events are connected by non-obvious causal relationships, are grasping at the same ideas we are talking about right now. For Jung, synchronicity had a spiritual dimension and was an indication for him of the wholeness of creation. Kammerer, on the other hand, was an obsessive and indiscriminate noter of coincidences and did not theorise beyond his law of the series.

I shall theorise further but before I do so I am going to discriminate between two types of coincidence. Type 1 coincidences are those basic accidents of life that we all experience and which are simply the consequences of things occupying neighbouring or in some cases the same place. I talk to couples a lot about coincidences in their lives. Couples often revere the accident which brought them together. One of them goes to a bar and meets the waiter and they fall in love. They will say, if only she had gone a different bar we would never have met. Sometimes people are introduced to each other by a third party who

knows them both independently, and one of the couple will say, Gosh, if hadn't decided to go to the picnic with my friend we would never have met. These are just accidents, some seemingly rarer than others. There is a tale told about a traveller, let's call him Mr. Smith, who checks into a hotel, gets his key and jokingly asks if there is a letter for him, and the concierge hands him an envelope addressed to Mr. Smith (the previous occupant) left in the pigeon hole for his room. Amazing, but so far only an accident of life, a type 1 coincidence. If, however, he had opened the letter and read something pertaining to perhaps his work or a business deal he was going to do the next day, or to a work he was developing, then we would have a type 2 coincidence.

A type 2 coincidence is an accident that works upon information pre-loaded into the brain, into consciousness. Here is another illustration of a type 2 coincidence. I have a friend in my town who struck up a strong friendship with a Japanese student who lived in the town for two years before going back to Japan to collect his fiancee and return with her for a visit. Unknown to him, his fiancee had bought a guide book to the country. In the guide book (which I have seen) there was a picture of one of the major tourist sites in our town, with our friend in the picture striding in the foreground looking at the camera and smiling. If you saw this photo on its own you would think that it was a holiday snapshot of my friend and not a picture of the palace behind him. Someone is likely to be in the picture and that person will have friends and family, but only my friend is pre-loaded with the Japanese connection that makes this coincidence a type 2 for him (and for the others).

Type 2 connections are how awareness drives evolution more quickly than one might expect, because evolution supports organisms that learn to profit from accident, to use their pre-loading (alleles, for example) to become more successful (this is not quite the same thing as learning through experience). It is easy to trace successful tactics from bacteria to humans in the way organisms learn to be less rigid in their programming. There is, in fact, a point where this use of accident becomes the accelerating engine of the evolution of life. Channels of development appear because the pre-loading is the equivalent of information appearing in the mind before it makes a decision. It is where memory is the *anticipated* truth.

Certainly we can conceive a number, the Coincidence Number, for our universe. All universes are born with a characteristic coincidence number which dictates how it will evolve, and its presence in human affairs tell us something more about how observations can be made. Because

coincidence, at the human level, is a way of confirming observations where probability and decoherence are insufficient, it gives us a way of incorporating human consciousness and personality into the story of the universe.

Proof of Cosmology

Well, there is more to the story of my wife and the clock, which I hope will help you grasp what is at stake here. I was actually sitting at the kitchen table with my computer open working on this very talk, when my wife came in and sat down opposite me. She looked over my shoulder to a mechanical fifties clock we had found on a junk heap sitting on the top of the dresser. This clock needs winding once a day and we never remember to do it. It had stopped long ago at 6:34. She looked up and over her shoulder to the wall clock on the wall and saw that it was exactly 6:34. My god, she said. It's happened again. And it was then she told me about the incident I described earlier, which I then began to incorporate into the text of this talk.

What is that kind of thing? she asked. I replied, employing my conclusions to the fullest extent, that the coincidence with loading the battery into the clock happened then because I am using it now in this talk. It was my writing of your experience here that helped bring the coincidences in line. She pondered this for a moment, and then said. So this coincidence just now happened in order to remind me of the previous coincidence so I could tell you about it now. Yes, I said, the importance of this example in my talk helped bring both these coincidences about.

These type 2 coincidences are examples of intersecting cosmologies. We are a well-matched couple in that respect. We are supported by our coincidences and always have been; our cosmologies are superposed to some degree at a number of points.

It is the cosmologies of people that are involved in the realisation – even the selection – of the kinds of event for which probability does not help bring about. Our cosmologies are the reason why at least some events at the human narrative level occur. So while the type 2 coincidences may be just a higher level emergent phenomenon, there is no doubt that they can reach down into the bottom layer as it were of probability and produce outcomes not predicted in that bottom layer, that would never emerge out of it. Since consciousness is a continual evolution of its

history, it finds meaning in observations precisely because they connect backwards and forwards in time.

Proof of our cosmologies are found in our coincidences. Coincidences in turn form bonds between like cosmologies, and turn the processes of evolution into channels. It is these channels that properly design life and society. Every universe is born with a coincidence number and which help define the numbers of channels connecting its systems; it is part of the cosmic reality. It is what makes our universe seem like it has our interests at heart. Life without coincidence is colourless, friendless and isolated. Those theories of the world that begin with God end up explaining coincidence as miracles, as grace, as a good destiny. But god is not required to put our homes and our friends on our side. Just the coincidence number of our universe.

So now I want to take you to the Chronolith Observatory

The Chronolith Observatory?

It is an observatory whose most significant component is a human mind.

It is a universal messaging system capable of connecting with consciousness in other zones of time and space. I will talk about how we might use it to connect with extra terrestrial intelligences in another talk. Right now I am more concerned with how we connect with ourselves.

The cosmologies of members of the public are the essential components to the apparatus. They lie at the heart of the instrument, and it is they who will establish the composite viewpoint of the data recovered by the individual experience in the instrument.

In order to perceive information flows from our future selves, or from any extraterrestrial in our future, we have to disconnect from self-regard, enter, however briefly, the anxiety of mortality. Part of the instrument is covered by the modern notion of heterotopia, a space of otherness, designed to offer the chance of this disconnect and to revive perhaps the most ancient dialectic struggle for a future.

Some key components of the Chronolith.

It will involve individuals selected at random.
It will be public
It will be secure
It will be culturally agnostic
It will be long lasting
Its results will get woven into the social fabric.

Many minds will pass through the observatory, and they will talk to one another and come to conclusions about what they have heard and what it means. They will go on to form their own community as members of the Foundation. Membership is for ever and can be passed on to children or to anyone. Members will be curators of the experiment, part of an engaged and collaborative network.

There are implicit proofs around us that would tell us whether humans are future-proof, or whether humans fail here at this threshold of space travel. The Chronolith Observatory, however, is a way of explicitly organising such perceptions through its membership into usable data.

The experiment is designed not to simply observe whether we got across the threshold but to read embedded information about the kinds of decision we need to make to ensure we reach that future and to close the loop of influence.

Following the arguments I have given you, we should accept that, on disconnect, each cosmology will embody more information about the future than people of the future know about their past. Our predictive capacity contains fewer uncertainties than our interpretative capacity. The gambler knows more about the future outcome of the bet he has made than he knows about why the outcome occurred. Explanations are always provisional, whereas imagining forward, as it were, contains more 'truth'. And this is what we have always tried to see about ourselves – science fiction is a good example of this effort even though it, like most culture, is rooted in the inertia of the past. The observatory will be able to recover and examine forward truths on the way to new insights and potentials.

The observatory exists with the capacity to answer at least two conundrums about life. The first conundrum is the age old puzzle of reality, the brain in a vat. How do I know that I am what I appear to be and not some brain kept alive in a bottle being fed impulses that

simulate this reality? Given our new understanding of quantum processes, this conundrum has been modernised. How do we know that the universe we live in is not being produced inside a quantum computer simulation performed by other beings somewhere? The second question is the age-old puzzle of time travel. Can we move about in time? Although again, with our knowledge of quantum processing, we can convert this puzzle into the question of whether information derived in the future can move back in time.

The observatory lays to rest any fears that those in the future or those running their simulations may have about the introduction of irreparable changes to their own times or simulations, because it will be a site from which no *paradoxical* information can flow out into the time stream. In this particular sense, the observatory will be safe for time influencers or those in the future to try to manipulate the interacting cosmologies to convey information to us.

The first installation will be installed within the year. News will be disseminated through usual channels of newsletters, Twitter and so forth. There will be funding campaigns to establish the Foundation that will curate the experiment, and there will be the book of course. Everyone here will be offered the chance to take their turn in the observatory and be as it were the founding members of the cosmological society of voyagers. So keep the card you found on your chair when you sat down, it has a serial number in the flash code that will identify you as present here and now. For reasons I have touched upon, preference will be given to groups of long time friends and parents and their children. This will, I believe, create a unique body of individuals who have shared access to a long range, utterly individual message from the universe.

So, when the Chronolith comes on stream and you take your first voyage remind yourselves to look around as you prepare to enter the Chronolith, and to recall as much of the past as you would like, because if it works, yesterday will be different for you. Some of the things you believed in, the things you were sure of may possess new qualities, and at the centre of everything will be events that confirm the presence in you of the future that awaits.

It has to be like this in fact. Because naked probability implies nothing at all. The feedstock of probability that makes consciousness is no longer random or linear in our cosmologies, it is exponential. The present can make sense, only through ever strengthening pathways to action. This is how we can go forward at all, because the future comes to us.

The use of the Chronolith Observatory can be summed up quite simply.

We don't have to make time travel work, we simply have to allow it to happen.

And there my talk about the Chronolith observatory, the instrument of decisions, should end. There is, however, one more thing that I briefly want to introduce to you today.

In fact, it is the big secret. This is the point where you all become adepts. Earlier, I stated that our cosmologies reach backwards and forwards in time without giving any explanation. Now I will explain that statement.

Everyone knows that the reality we are aware of occurs only in our brains. This is a simple truism roundly ignored when we come to our examinations of the universe we appear to live in.

What we perceive of the world is not only the result of quantum fluctuations of atoms and molecules in the brain's neurons but also the result of the interactions of higher states of consciousness and their memories, strategies, instincts and learnt behaviours. All these are described in the single composite wave function that flows throughout the brain and through its sense organs to the external world, some of which is decohered and lying forever in the past and some of which is not and remains superposed with possible futures.

And herein lies the essential difference between consciousness and the rest of matter: consciousness is continuous from beginning to end. Consciousness is an evolving whole that remains connected to its previous moments within the wave function. When that mind recovers a memory, it is going back in time through wave function history to the moment where events entered the brain's wave function. Inanimate matter, on the other hand, does not lay down memories and has no continuous information record of which particle went where and what happened to it. Waves and particles become integrated into the composite. If a particle is ejected again after absorption, it is not made out of the same collection of energies that was absorbed. We cannot say, Oh there´s *that* electron coming round again. We can only observe *an* electron appearing. We could never say about a particle that we once observed that very particle in another time and place. Particle states do not preserve that type of information. It is only as we move up the

complexity scale that matter gets distinguished by accumulated identity until we reach the individual consciousness found in brains.

Once begun, consciousness is a continuous transformation of the wave function that describes it, in which are stored not only memories but the metadata of what a memory is and why it might be needed. Consciousness has a circular and paradoxical function: It must know about a memory and how to retrieve it before it needs to retrieve it.

If the brain not only accumulates every thing it experiences but maintains them as the items get adjusted over time, it has a big processing problem, because the level of complexity should, necessarily, rise exponentially over time. Does the physical brain actually do this? If not, then other ways of looking at the functions of the brain must be considered.

As far as we understand the brain, its sensory data throughput appears to be relatively small. When the senses are overwhelmed by data the brain's response is to forget about some of it. When the brain spends time concentrating narrowly on events in its visual field, it can simply be blind to other events also occurring in the same field of view. The brain often doubles up on processing, using one centre for several types of input, and often just assumes data when it is missing, for example, the brain fills in gaps in the visual field where receptors are missing in the retina. Many perceptions seem to require advanced knowledge of what the brain is looking before before they can work properly. Focussing the retina's image, for example, seems to require in some way not understood knowledge of what the brain wants to look at before the focussing can reveal the object clearly. So the brain, for most of us, appears to be an incomplete register of the environment it is immersed in.

Working out how much processing the brain is capable of is difficult since processing in the brain's centres waxes and wanes depending on what is going on in the world. Concentration calls for more oxygen, so one can assume that more neurons are firing then than when idle. But it is unknown how many neurons are involved in any particular task, or how the brain is divided between autonomic maintenance of the body and senses and general consciousness.

Some people can remember everything and can fully recall any event of their past. Some have eidetic memories where they can review scenes they witnessed as if they were present again in the moment of

happening. If the brain does in fact record such an extraordinary level of detail every waking second of every day, then the problems of processing, contextualising and storage become insurmountable in a very short time if pragmatic calculations of bits and nerve firings come close to describing the power and limitations of the brain.

For example, neurons seem to fire from once a second to 100 times a second, and as there are around 100 billion neurons in the brain, there is an average operating flow of 5×10^{10} bits of data arising in a brain per second (or ≈6 gigabytes sec^{-1}) Is this the limit to consciousness? In comparison, IBM's Watson when it won Jeopardy in 2011, and working solely in text, processed 500 gigabytes per second and had a total operating system of 16 TB of which 4 TB of RAM stored its data. And yet Watson did not even work in audio, while the brain has to process live, moving images as well as be its own manufacturer of the energy it uses. How can the brain do it?

This crude measure exposes the little we understand about how the brain can accumulate the daily information flow of life and manage its own personal consciousness. There is more detail about neurons that exposes the paradox even more. Not all neurons are the same, and Inhibitory neurons use less power than excitation neurons, and not all neurons transmit the same amount of information (they are optimised overall for information per unit of energy expended), and some fire when they shouldn't and others fail to fire when they should. Thus the brain has low bandwidth senses, operates at a level lower than our best computers and with an unknown mechanism of storing the high density of data required for all it can remember. All this on very little energy expenditure compared with currently our most efficient computing power.

Organic intelligence is pretty efficient in comparison to the inorganic digital intelligences of our computers. Let us say a typical current in a firing human neuron is around a 5 pA (10^{-12}) with a voltage of around 0.100 v, then a neuron peaks at 5×10^{-13} watts, or ≈2.5 watts for the neural net of the brain (10^{11} neurons) and not including the blood supply and the workings of other cells like glia cells (that support neurons and of which there may be more than neurons in a brain). Whereas some rather circular calculations put the brain at taking 20% of a person's daily energy needs. 20% of the resting calorie consumption rate typically gives ≈12.7 watts consumed by the whole brain.

These problem are avoided if we consider a more radical interpretation of quantum theory, in which we consider consciousness as a continuous quantum formulation of its entire history, and including its sensory apparata. As present in a quantum field the brain must process superpositions and entangled states reaching across time; it employs *all* its previous conscious states. Many puzzles are avoided if we consider that there are few actual discrete memories maintained in the present and that most eventful memories are actual connections with the past. And that to remember at least some classes of event is to recover at least partially the wave functions that altered the brain at the moment of the event. When I remember, the wave function of the brain reaches back into the past to the time my consciousness was changed during that event.

Let us run with this idea.

We can consider then that the wave functions describing events we experience in the present also comprises the influence of all those revisiting the event in their consciousnesses. The present must include them.

This moment right now that we are collectively experiencing also contains something from at least some of the minds in the future that are thinking back to here, a connection with all the cosmologies that we continue to be. This is a possible route of change for each of us and which the Observatory is designed to explore.

I will leave you with this to ponder. There is clearly more nuance to tease out with memory and how the brain manages to zero in on what it wants to think about. There are also tantalising gaps in our understanding of how genes and epigenetic processes work in cells that could be filled by considering the quantum wave function in this way. But that is for another discussion.

The take-away point, and the one on which the Chronolith Observatory is built, is that while individual cosmologies of people will spread out over time remembrances of at least some events, this one for example, can intensify the presence of that event in the time line and reinforce its lifetime.

So recollect this event whenever you remember to do so and watch out for coincidences to mark the intersections of similar cosmologies. This is how you can prepare yourself for your experience in the Chronolith

Observatory and to play a much needed role in connecting us with the future and and the decisions we need to make to get us safely into space.

Thank you

14:10
20 March 2016