Formerly Now

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The caught moment is a memory
even when you forgot it

1.

Magnetic resonance image scans of two human brains that show activity corresponding to contentment (red) and anger (blue), Zhenghan Qi et al. (2015) 'White-Matter Structure in the Right Hemisphere Predicts Mandarin Chinese Learning Success,' *Journal of Neurolinguistics,* Vol. 33.

Brain scans using diffusion tensor imaging continue to propose to locate what Descartes went to Holland to discover, the seat of the emotions. This generality for human activity is still not established and it is the poets and artists that we need to bring that about.

These Magnetic resonance image scans of two human brains, involved in learning Mandarin Chinese language, show activity corresponding to contentment (red) and anger (blue)

2.

Stanford Torus space-station, cutaway views, Don Davis, 1975, oil on board, on behalf of NASA Ames Research Center, Moffett Field, California

Getting off the planet has been on the agenda since the 1960s. In the nineteen-seventies we simulated an alternative planet orbiting the Earth on a space station. We used models that were already destroying the Earth they simulated. The image was produced after the experiments carried out by the National Aeronautics and Space Administration (NASA) on spacecraft and space-station-cabins subjected to zero gravity and high impact conditions in the 1960s. The 1975 NASA Ames/Stanford University Summer Study worked out the broad engineering requirements for a toroidal shaped space colony design. The challenge of sustaining something like a closed ecosystem.
It will already be clear that this is a proposal to duplicate what we already had.

3.

Volcanic caldera venting gasses on Jupiter's satellite Io, National Aeronautics and Space Administration (1979) photograph at 129,600 km range, on Flyby orbit

Our reliance on the news broadcasts are fraught with manipulation to smooth out our dilemma.
Voyager I after a two year journey came close to Jupiter in July 1979. Two photographs were issued by Finlay Holiday Films from the Jet Propulsion Laboratory of NASA. They both show the same volcanic caldera venting gasses on Jupiter's satellite Io.
The first photograph on the right shows the event imaged in heavy pixilation by the electronics as they were received from the radio signals, the second shows the event re-imaged and simulated so that it can be better read and then used by the news media and, subsequently, for applications to funding bodies.

4.
Trace of an Omega Minus (Ω^-) particle produced in the British National 1.5m diameter liquid hydrogen bubble chamber, C. Henderson (1970) *Cloud and Bubble Chambers,* London: Methuen & Co, plate 1 fig. 1.

The cosmos within, what we see in the sub-atomic structures and situations can be recorded using interlocution machines that inform us. They are the basis of decoherence. We are confident in our knowledge but coherence, certainty and incoherence are no longer our options. As poets, scientists and artists we must challenge normalisation and crispation.

Werner Heisenberg articulated in 1927 that the position and the velocity of an object cannot both be measured exactly, at the same time, even in theory. He called this the Uncertainty principle.

The image here is of real particle tracks in a liquid hydrogen bubble chamber and shows the production and decay of a negative omega particle.

The invention of bubble chambers in 1952 revolutionised the field of particle physics, allowing real tracks left by particles to be seen and photographed in an expanding liquid that had been heated to boiling point.

5.
Differential equation for the heartbeat and nerve impulse, E.C. (Christopher) Zeeman (1977) *Catastrophe Theory. Selected Papers, 1972-1977,* Reading, Mass.: Addison-Wesley, 123.

We already know through structural morphogenesis, that is chaos theory, through the work of C.H. Waddington, René Thom, Christopher Zeeman and others, that our heart beats and nerve impulses are not predictable: they can be qualitatively clear but not in quantitatively certain.
We have always been in this situation
We can now recognise it.

Now is contingent

For many years, scientists have been at work on vocabulary to describe what cannot be seen. Decoherence is for us the situation of reliance on the equivalent to black boxes between us and what can be seen.

6.
CERN announcing excitement and scepticism on Ghost particle 2018, CERN, the European Organisation for Nuclear Energy.

Researchers on the Compact Muon Solenoid detector at CERN have spotted curious bumps in their data that may be the calling card of an unknown particle, named ‘ghost’ by the media, that has more than twice the mass of a carbon atom. Karl Jakobs, spokesperson for the CERN team that works on ATLAS, the other multipurpose detector, said it was checking its own data for signs of the proposed particle.

For ATLAS to cross-check the result was “crucial”, Alexandre Nikitenko, a theorist at CERN said, ‘If it is confirmed by Atlas it will be the real thing.’
Georg Weiglein, a theorist on the German Electron-Synchrotron machine said it will be hard to come up with a model that has a particle like the one the Compact Muon Solenoid bump calls for.
‘This does not exclude the possibility that such a signal could actually exist.’

7.
A neural spheroid 3D human IPSC (Induced Pluripotent Stem Cells) derived for neurotoxicity profile, The image producers Pei Zhuang, Alfred Xuyang Sun, Jia Anam Chee Kai Chua and Sing Yian Chew at Stemonix, 2018.

Bioprinting offers a revolutionary approach for constructing repeatable and controllable three-dimensional *in vitro* neural tissues with diverse cell types, complex microscale features and tissue level responses. Higher fidelity becomes useful for probing disease-specific mechanisms, facilitating development of novel therapeutics and promoting neural regeneration.

The neuronal cells in the three-dimensional spheroids generate spontaneous synchronised calcium oscillations. The image producers use Carbon dye with fast kinetic fluorescence-imaging to measure the patterns and frequencies of calcium oscillations of neurospheroids as monitored by changes in intracellular calcium levels. A set of known neuromodulators was tested, including
a receptor for controlling synaptic plasticity and memory function,
a neurotransmitter that blocks impulses between nerve cells in the brain

and receptors for glutamate that mediates fast synaptic transmission in the central nervous system.

The screenshot shown is from a 384 well plate. Spheroids were loaded with dye for 2 hours and then treated with compounds for 60 minutes.

8.
Neurons grown in tissue culture stained with antibody MAP tau in red, Gerry Shaw, 2014

This image shows Tau antibodies (that is to say, neuronal micro-tubule-associated proteins found predominantly on nerve-axons). The function of Tau is to promote tubulin polymerisation and to stabilise micro-tubules.
The C-terminus binds axonal micro-tubules while the N-terminus binds neural plasma membrane components, suggesting that tau functions as a linker protein between both.

In its hyperphosphorylated form, Tau is the major component of paired helical filaments, the building block of neurofibrillary lesions in Alzheimer's diseases in the brain.

9.
Quantum cryptography equipment uses entanglement to encode data, *Nature*, 22 November 2018.

Quantum key distribution is a secure communication method which implements an entanglement-based quantum cryptography. It enables two parties to produce a shared random secret key known only to them, which can then be used to encrypt and decrypt messages.

The image shows the instrument in a final test of an entanglement-based device which came with the implementation of the link into the telecom fibre network provided by See-mens in Austria. The units connecting are Alice and Bob. The Alice unit was placed in an office room at the See-mens headquarters in Vienna. The Bob unit was installed in another part of the city at a branch office of See-mens. The two locations were connected via a standard telecom fibre of 16 km length with a total attenuation that is loss of 4.1 dB. The actual path of the fibre between sites crosses the Danube river by means of a bridge, runs along major train tracks and along a motorway. External influences on the fibre were, however, not the only problem. Since the offices that housed the Quantum Key Distribution devices and several computers for the network had no air conditioning, a more archaic method had to be used to 'control' the temperature.They opened the window and allowed a capping of the temperature to prevent devices from shutting down, but this resulted in large

temperature variations inside the room. The simultaneity of the teleportation between Alice and Bob has overcome these difficulties.

10.
Atlas at CERN, Maxililien Brice, CERN, November 2018. *Journal of High Energy Physics* (2019) 2019: 16.

ATLAS raise an existential problem. They set out to test the extreme lightness of neutrinos using data from high-energy proton collisions collected at the Large Hadron Collider and do so pairing up the known light neutrinos with hypothetical heavy neutrinos as the part of a larger child on a seesaw, lifting the lighter neutrino to give it an apparent small mass. Both neutrinos need to be Majorana particles (that is they have snow blades when they eat): these are indistinguishable from their antimatter counterparts, in fact they don't know if they exist.

A Majorana fermion is a fermion that is its own antiparticle. They were hypothesised by Ettore Majorana in 1937. The term is sometimes used in opposition to a Dirac fermion, which describes fermions that are not their own antiparticles. When I caught the bus in town there was a hum in my right ear.

11.
A Majorana fermion imaged using a scanning-tunneling microscope to show the atomic structure of a one-atom-wide iron wire on a lead surface, Stevan Nadj-Perge, Ilya K. Drozdov, Jian Li, Hua Chen, Sangjun Jeon Jungpil Seo, Allan H. MacDonald, B. Andrei Bernevig, Ali Yazdani, Princeton University.

Princeton University scientists used the zoomed-in portion of this image to show the quantum probability of the wire containing the particle called the Majorana fermion. The image pinpoints the particle to the end of the wire, which is where it had been predicted to be over years of theoretical calculations.

What you see in a mirror is history

12.
Andy Chung, Quantum Tunnel 3D specificationThis is a three-dimensional specification for the Quantum Tunnel in *Antman and the Was,* Eleni Roussos, *Antman and the Wasp,* New York: Marvel, 2018, p. 82.

13.
Dean Wolcott detail from Quantum Tunnel technical drawing specification, Roussos, 2018, p. 84.

This is a detail from the technical drawing specification for the Quantum Tunnel.

14.
Jamie Rama photograph of Shepherd Frankel set for Quantum Tunnel with film characters Scott Lang and Hank Pym, Roussos, 2018, p. 72.

This is a photograph of Shepherd Frankel's set for the Quantum Tunnel with fictional characters Scott Lang and Hank Pym.

In conversation with Scott Lang, Hank Pym sees Lang playing with some equipment. He says 'Do not screw with the regulator. If that regulator is compromised you would go sub-atomic. It means you would enter a quantum realm. It means you would enter a reality where all concepts of time and space become irrelevant.'

15.
Jamie Rama photograph of Shepherd Frankel set for Quantum Tunnel in operation with Pym in foreground and Lang disappearing, Roussos, 2018, p. 73.

This is a photograph of Frankel's set for the Quantum Tunnel in operation with Pym in the foreground and Lang disappearing.

In his log, Hank Pym writes, 'I had always thought that entering the Quantum Realm would mean shrinking for all eternity, becoming trapped in a reality where the concepts of space and time were no longer relevant.' Of course to separate space and time into separate concepts has been nonsense for more than a century. But shrinking for all eternity is another matter.

16.
Stephen Schirle, *Scott Lang enters Quantum Realm,* Roussos, 2018, p. 171.

This is a graphic showing Scott Lang as he enters the Quantum Realm and its product placements.

17.
Tully Summers, earlier version of *Ghost in Chamber,* Roussos, 2018, p. 117.

This is Tully Summers' earlier version of the Ghost in the Chamber.

18.
Jiuguang Wang, Replica of Maria from Fritz Lang's *Metropolis* (1927), Robot Hall of Fame, Carnegie Science Center, Pittsburg.

It was partly based on Jiuguang Wang's replica of the machine-man from Fritz Lang's 1927 *Metropolis*.
Wang works for Apple. His research focus has been on motion planning and control theory as applied to humanoid robots, particularly in the areas of whole-body manipulation and bipedal locomotion. He is interested in enabling robots to make decisions. His email address is robot@cmu.edu

19.

Tully Summers, Ghost in Chamber, Roussos, 2018, p. 120.

This is Tully Summers' subsequent 'Ghost in the Chamber'. The1929 Mies van de Roche *Barcelona* chair and coffee table, on display in the Museum of Modern Art, New York, could have been purchased on ebay.

I am reminded of Kurt Neumann's film of *The Fly* in 1958 when the scientist André Delambre tests his teleportation chamber on himself. In the process, unknown to him, a housefly enters the chamber leading to a merger of man and insect.

20.
Film still of Ghost in Chamber from *Ant-man and the Wasp,* Hannah John-Kamen playing Ghost in *Ant-man and the Wasp,* directed by Peyton Reed, cinematography by Dante Spinotti, Marvel Studios, Burbank, California.

This is a film still of the 'Ghost in the Chamber' from *Ant-man and the Wasp* in 2018.

The existential problem raised by the crew at Atlas CERN in November 2018 was labelled 'ghost' in the machine. The 'ghost in the machine' is philosopher Gilbert Ryle's 1949 description in *The Concept of Mind* of René Descartes' mind-body dualism. Ryle introduced the phrase to highlight the view of Descartes that mental and physical activity occur simultaneously but separately.

SPUTTOR

21-29.
The following sequence extracts 7 of the 128 pages from *SPUTTOR* (9, 14, 24, 27, 33, 37, 55, 93, 100.*,* a book I factured in 2011-12 on the pages of Andrew Wilson's 1986 *Space Shuttle Story.* It was published by Veer Books London in 2014.

Readings from Allen Fisher, 'Human health' ((*SPUTTOR* 18-19), *Black Pond 5, Black Pond 7*, stanzas 3 and 7, 'Human cosmos' (*SPUTTOR* 85), and 'Human understanding' (*SPUTTOR* 106), 2014 and 2018.
SPUTTOR published by Veer Books, London, 2014 and *BLACK POND 7* by Spanner, Hereford, 2018.

The galaxy you are travelling to no longer exists

30.
I left Pershore Station on 30th December 2018.

31.
I was flying over Berlin in December 2015.

32.
Gradually I lifted beyond the stratosphere.

Now is the future that generates where you've been.

33.
I arrived at Crickhowell in May 2018.

You went shopping and came back
with three cans of maybe
and a fourth of surprise

34.
Lightning, New Mexico, photograph by Hugh Mitchell Jnr. nd.

Sometimes in the New Mexican desert you can see in the sky a reflection of the town thirty miles north of where you are.

35.
Fire on Saddleworth Moor, June 2018.

Looking down on the planet you begin to realise that we've run out of spacetime.

The planetary boundary concept, introduced by the Stockholm Resilience Centre in 2009, aimed to define the environmental limits within which humanity can safely operate. They have snow blades when they eat. Of the original nine proposed boundaries, they identify three (climate change, stratospheric ozone depletion, and ocean acidification) that might push the Earth system into a new state if crossed and that also have a pervasive influence on the remaining boundaries.

36.
3-D Magnet Field computer simulation of reversing Geodynamo, G.A. Glatzmaier and P.H. Roberts (1995) 'A three-dimensional self-consistent computer simulation of a geomagnetic field reversal', *Nature* 377, 203-209.

The planetary situation for humankind continues to be based on estimation.

When and where I first understood this simulation of the Earth's magnetism I soon recognised that our confident reliance on a north/south dipole was only a generalised overview of our situation.

At some local levels in some rock forms, magnetism varies from the dipole. The Earth has been through periods of pole reversal on many occasions and this has led at different times to alignments in rocks that have been caught in stone, but then lost in compatibility to the processes' larger context.

The simulation of the geodynamo described by Gary Glatzmaier and Paul Roberts demonstrates a magnetic field for a period of over 40,000 years. The model incorporates a finitely conducting inner core, which undergoes several polarity excursions and then, near the end of the simulation, a successful reversal of the dipole moment.

The Earth has a magnetic field, as can be seen by using a magnetic compass. It is mainly generated in the very hot molten core of the planet and has probably existed throughout most of the Earth's existence. The magnetic field is largely that of a dipole, by which we mean that it has one North pole and one South pole. There is much small-scale variation in the Earth's field, which is quite different from that of a bar magnet.

We also know from studies of the magnetisation of minerals in ancient clay pots that the Earth's magnetic field was approximately twice as strong in Roman times as it is now. Human beings and their ancestors have been on the Earth for a number of million years, during which there have been many reversals, and there is no obvious correlation between human development and reversals. Similarly, reversal patterns do not match patterns in species extinction in geological records.

37.
Graphs from ATLAS recordings of Majorana and Dirac fermions, T. S. Baker, N. H. Olson, and S. D. Fuller, Purdue University, Indiana, Structural Biology Programme, European Molecular Biology Laboratory, Heidelberg, and The Welcome Trust Centre for Human Genetics, University of Oxford (1999). 'Adding the Third Dimension to Virus Life Cycles: Three-Dimensional Reconstruction of Icosahedral Viruses from Cryo-Electron Micrographs,' *Microbiology and molecular biology reviews,* Vol. 63*,* no. 4.

In this extract from the ATLAS data at CERN,
we can see in the continuous line the Observed
and in the dashed line the Expected 95% of the Confidence Level
the exclusion contours for Majorana neutrinos.
The accuracy and connected shortfall of the prediction highlights the dialectical debate regarding proven assurance and confident speculation.

38.
Garbage crisis Lebanon 29 February 2016, China CCTV.

This is the road into Beirut in February 2016, taken by Chinese CCTV. The Chinese Ambassador to Lebanon Wang Kejian said on Friday that China will continue supporting Lebanon's security and stability.

39.
Workers at Umicore Brussels separate precious metals from waste 2016, Nature volume 531, 24 March 2016, p. 435.

These are Workers at Umicore Brussels separating precious metals from waste in 2016. Umicore's Recycling segment treats waste streams containing precious and other specialty metals from a range of industrial residues and end-of-life materials. The company was formerly known as the Union of Mining in High Katanga and changed its name in 2001.

40.
Three-dimensional reconstruction of a rotavirus at a magnification of about 50,000, T. S. Baker, N. H. Olson, and S. D. Fuller, Purdue University, Indiana, Structural Biology Programme, European Molecular Biology Laboratory, Heidelberg, and The Welcome Trust Centre for Human Genetics, University of Oxford (1999). 'Adding the Third Dimension to Virus Life Cycles: Three-Dimensional Reconstruction of Icosahedral Viruses from Cryo-Electron Micrographs,' *Microbiology and molecular biology reviews,* Vol. 63*,* no. 4.

In contrast this is an invented image of a Rotavirus, a genus of double-stranded RNA viruses. It is one of the most common causes of diarrhoea disease among infants and young children. Nearly every child in the world is infected with a rotavirus at least once by the age of five. Rotavirus was discovered in 1973 by Ruth Bishop and her colleagues by electron micrograph images.

41.
Simulations of Polyomavirus capsid, James P. Griffith, Diana L. Griffith, Ivan Rayment, William T. Murakami & Donald L. D. Caspar (1992) 'Polyomavirus capsid and vision electron density maps computed by Fourier analysis', *Nature* **355**, 6361.

In this simulation of a Polyomavirus capsid, derived from a density map computed by Fourier analysis we can see the visual metaphor for its operation in the activity of memory and patterns of connectedness.
The engagement of consciousness with the world and artefacts is through patterns of connectedness. Patterns of connectedness are how consciousness works, how memory operates and how the nervous system and the immune system work.

For example, Lauren Sompayrac noted that the innate immune system has a 'hard-wired' memory which is extremely important in defending us against everyday invaders. This memory is the result of millions of years of experience, during which the innate system slowly evolved pattern-recognition receptors that can detect the signatures of common invaders.

When we view artefacts, they are understood through the way their elements connect through various recognitions and produce an order or patterns. These connections are made possible by different empirical experiences and decisions about the recognition of connectedness in the artefact, namely that there are patterns that match each other or that there are recurrences of what you are looking at in relation to the world you know or are coming to know or in the process of knowing. In these different knowings you already anticipate that this can no longer be the case. Where you are going is formerly now.

Reading of poems from the sequence *NO LONGER ALONE* (one and eight).