Allen Fisher, **Complexity Manifold**: Talk one: draft notes and extensions

1.
title page

2.
Allen Fisher, notebook diagram 1.

3.
Allen Fisher, *OCTOBER '87,* 1987-88, oil on canvas, one of three panels. Reproduced on www.allenfisher.co.uk

- work factured from local landscape, figure drawings and Still-lifes of tools,
- factured before and after the Great Storm hit SE England 15-16th October 1987.
- reported as worst storm to hit Britain since 1703.

4.
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. Glatzmaier and Roberts are at Los Alamos National Laboratory and University of California, Los Angeles.

- Palæomagnetic records indicate geomagnetic field on Earth for at least 3 billion years.
- Records show dipole polarity reversed roughly every 200,000 years with individual reversals taking about 2,000 years each.
- fluid outer core surrounds solid inner core both composed mainly of iron. convection of fluid in outer core driven by thermal and compositional buoyancy sources at inner core boundary as Earth cools and iron-rich alloy solidifies onto inner core giving off latent heat and light.
- these buoyancy forces and Coriolis forces due to the Earth's rotation cause fluid flows to be helical, which twists and shears magnetic field, generates new field to replace that which diffuses away.
- note: http://www.psc.edu/science/glatzmaier.html

5.
C .A. Muses, idealised spatial representation for time and consciousness *ARK* 40, 1966, 'Divination, Higher Consciousness and Mathematics'

- in quantum spacetime there are resonances and not exact recurrences.
- Muses' orange threads are tangents to the black sphere developing a helicoidal (seven-angled) surface and a spiral periphery
- this work links directly to ideas of Pythagorean (Platonic) solids and the mathematics of Euclid, Fibonacci and Pacioli.
- Charles Arthur Muses (1919–2000) published *Chronotopology: Destiny and Control in Human Systems*

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- Muses was an informal student of Norbert Wiener. Wiener published *The Human Use of Human Beings: Cybernetics and Society* in 1950.

6.
Allen Fisher, *Thought to Tune My Lute*, 1994, oil on canvas.

- part of a set of responses to ideal forms and logical method.

7.
Allen Fisher, *Crow Trap Study,* 1993, ink and china white on selenium print.

- using photographs factured by Paige Mitchell of fallen, poisoned crows trapped in a woodland.
- the work is part of a complex sequence of writing and images headed *TRAPS OR TOOLS AND DAMAGE.*
- selections from *Traps or Tools and Damage* were published in a booklet by Roehampton University, as part of Allen Fisher's inaugural professorial lecture in 2002. Part of the lecture transcription is available on www.allenfisher.co.uk → gallery → Traps.

8.
Mappa Mundi, C13th (1283 or later).
Hereford World Map by Richard of Holdingham or Sleaford (identified beneath Augustus' seal bottom left). P.D.A. Harvey (1996) *Mappa Mundi. The Hereford World Map,* Hereford and London: Hereford Cathedral and The British Library.
[Holdingham also Haldingham, a village just outside Sleaford in Lincolnshire.]

- East at the top with Terrestrial Paradise, North on the left with England.
- Red colouring is Red Sea and Persian Gulf. Central sea once green is Mediterranean with a very large Sicily.
- Jerusalem is centre of map.
- Above Paradise Christ sits in judgement, on his right the saved are led upwards, on his left the damned are banished and led to the mouth of hell.
- In right hand corner a reference to Paulus Orosius (born c. 375-not before 418), a Christian historian, theologian and student of Augustine of Hippo from Gallaecia. best known for his *Historiarum Adversum Paganos Libri VII* ('Seven Books of History Against the Pagans'), which he wrote in response to the belief that the decline of the Roman Empire was the result of its adoption of Christianity.

9.
detail from *Mappa Mundi.*
showing Hereford and its Surroundings.

- Hereford was not on original map, it was added by a different hand, as was the name of the River Wye.

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10.
Figure 3, Europe 1988, as seen from the US weather satellite NOAA, from Pontus Hulten, Wenzel Jacob, Edith Decker (1992) *Erdsicht, Global Change,* Bonn: Verlag Gerd Hatje.

- taken by advanced very high resolution radiometer.
- Mediterranean Sea discoloration via dazzle of sun radiation reflected from sea.
- sensor resolution is about one kilometer and allows vegetation vitality mapping.

11.
Figure 12, Off the East North American coast, 1984, using infrared rays, photo source *op.cit*. Hulten et al (1992).

- warm Gulf Stream from Caribbean Sea meets cold Labrador Current from North.
- colours indicate temperature differences of warm and cold in shades of red, orange, yellow, green, blue, and purple.

12.
Earth as home
Earth from space photographed 1992 from Meteosat Weather Satellite. The photograph has been enhanced by the Met office and the colours are imaginative.

- two second generation spacecrafts METEOSAT-9 (MSG2), METEOSAT-8 (MSG1) and three old generation spacecrafts METEOSAT-7 (MTP1), METEOSAT-6 (MOP3), METEOSAT-5 (MOP2).
- The new generation Meteosat satellites (Meteosat 8 was operational on January 2004) has more advanced technical features compared to all the other first generation satellites.
- Meteosat 5, 6 and 7 were moved over the Indian Ocean at 57° and 67° East.

13.
'Herakles and Hesione confront the Monster of Troy', detail column-krater, c. 550-540 BC, late Corinthian black-figure vase. Boston, from Adrienne Mayor (2000) *The First Fossil Hunters. Paleontology in Greek and Roman Times,* Princeton, New Jersey: Princeton University Press.

- story in *Apollodorus, Gods and Heroes of the Greeks.*
- the monster of Troy appears on Trojan coast after a flood, it preys on farmers in the neighborhood of Sigeum. the king's daughter, Hesione, is sent as sacrifice, but Herakles arrives in time to kill it.
- the vase painting shows Herakles and Hesione confronting the monster. she hurls rocks from a pile at her feet, he shoots arrows. two of her rocks

have struck home, one under the eye and another lodged in the creature's maw. one of Herakle's arrows is stuck in the jaw.
- it was in Sigeum that the colossal bones of Homeric heroes Ajax and Achilles suddenly appeared in the Roman period (reported by Pausanias and Philostratus). the sediments around Sigeum contain rich fossil deposits.
- the sclerotic eye rings are features of bird and dinosaur skulls. the hollow eye socket, extended back of the skull, forward-leaning teeth, natural detail of the broken-off premaxilla (upper jaw and nasal structures) was of a large Tertiary mammal, or an Eocene whale skull or giant Miocene giraffids, including *Samotherium* and *Helladotherium*.
- the Corinthian artist could of course have made the drawing from an assemblage.

14.
Allen Fisher, *Views of the City triptych: Barbarian, Savage, Civilian*, 1991-93, oil on three panels. Reproduced on www.allenfisher.co.uk

- the work includes research into Augustine, Jean-Paul Sartre, Simone de Beauvoir, Tony Hancock, local farming, and the work of the Ordnance Bomb Disposal Squad and the Special Air Service (SAS) in Herefordshire.
- related poetry may be found in the sequence *Gravity as a consequence of Shape* (the 3 volumes *Gravity, Entanglement* and *Leans*).
- part of the work derives from studies of (i) Carpaccio's *Augustine in his Study,* Scuola di San Giorgio, Venice; (ii) the work of Joseph Beuys, particularly the three exhibitions curated and displayed in late 1985 in London and Naples.
- Allen Fisher, 'Monuments to the Future: Social Resonance in the art of Joseph Beuys' on e-space at: http://e-space.openrepository.com/e-space/bitstream/2173/38654/2/Monuments%20to%20the%20Future.v2.pdf

15.
Plate E, Nebulæ in the Pleiades, Robert S. Ball (1910) *The Story of the Heavens,* London, New York &c.: Cassell and Company.

- the unaided eye can sometimes see ten stars in the Pleiades group, a telescope will produce thirty or forty.
- Galileo saw forty through his first telescope. 625 stars were visible with a powered telescope in 1910.
- sometimes known as the Seven Sisters (Messier object 45), is an open star cluster containing middle-aged hot B-type stars located in the constellation of Taurus.
- one of the nearest star clusters to Earth.
- the cluster contains over 1,000 statistically confirmed members, excluding unresolved binary stars.
- the total mass contained in the cluster is estimated to be about 800 solar masses including many brown dwarfs (objects with less than about 8% of

the Sun's mass, not heavy enough for nuclear fusion reactions to start in their cores and so not defined as stars).

16.
Plate 15 in Rupert Gleadow (1968) *The Origin of The Zodiac,* London: Jonathan Cape. Horoscope drawn by W.M. Flinders Petrie from the ceiling of a tomb at Athribis (April 26th, A.D. 141 and February 14th, A.D. 177), British School of Archæology in Egypt, 1908.

17.
Allen Fisher, Tulse Hill potato, c.1972, *extract from Blood Bone Brain* 'Memory jars'. Photograph by Jude Walker.

- *Blood Bone Brain* was a performance and installation project, often included as part of the English *Fluxus* and post-*Fluxus* activities in the 1970s.

18.
Plate 1 Figure 1, an Omega Minus (Ω^-) is produced in the British National 1.5m liquid hydrogen bubble chamber from C. Henderson (1970) *Cloud and Bubble Chambers,* London: Methuen & Co.

- Omega (Ω) containing neither up nor down quarks. The first Omega discovered was the Ω^-, made of three strange quarks, in 1964.
- The incident high energy K (koan)- meson is from a mass-separated beam of the CERN proton synchroton. It interacts with a proton of the chamber's liquid.
- scanners have considerable powers in seeing events against confusing background tracks.
- these events are rare occurring about once every hundred million centimetres of track.
- in liquid hydrogen the δ-rays (Delta-rays) lose energy almost entirely by ionization and form rather perfectly spiraling helices.
- δ-ray electrons are the name for any recoil particle caused by secondary ionization. The term was coined by J.J. Thomson.
- bubble chambers 'discovered' by D.A. Glaser in 1952, same year as CERN proton synchroton.
- those interested are referred to J.S. Bell (1987) *Speakable and unspeakable in quantum mechanics,* Cambridge University Press.

19.
Fig.23. in E.C. Zeeman, 'Differential equations for the heartbeat and nerve impulse', in C.H. Waddington (1972)(Ed.) *Towards a Theoretical Biology: 4: Essays,* Edinburgh: Edinburgh University Press. Republished with same figure number in E.C. Zeeman (1977, 1978) *Catastrophe Theory. Selected Papers 1972-1977,* Reading, Massachusetts: Addison-Wesley Publishing.

- the figure describes the electro-operation of nerve axons using mathematics and a visual metonym of local nerve impulse equations
- the voltage clamp technique was evolved by Kenneth Cole
- the technique isolates segment of axon, clamping voltage difference across membrane to various fixed values by means of electrodes inside and outside and measuring currents carried by flows of potassium conductance and sodium conductance of membrane
- cusp catastrophe illustrates this
- the sequence is (i) clamp switched on (ii) potential V jumps from '0 potential' to clamp potential V, thus displacing equilibrium E on V-axis to F (iii) then the fast equation goes to G on slow manifold (iv) and slow equations via å component carry the state to H where å = 0 perpendicular to clamp plane.
- the result of voltage clamp on sodium conductance is a fast increase along the path followed by slow decrease G to H, while the effect on potassium conductance is a delay F to G followed by a slow increase G to H.
- this correlates to the A.L. Hodgkin and A.F. Huxley descriptions of membrane current and their application to conduction and excitation in nerves.
- the idea of catastrophe theory's application to nerve impulses was suggested by Francis Crick and by A.L. Hodgkin's book *Nervous Impulse.*
- Those interested are also referred to René Thom's great work (1975) *Structural Stability and Morphogenesis,* Reading, Massachusetts: W.A. Benjamin.

20.
image from Ravindra Acharya, Elizabeth Fry, David Stuart, Graham Fox, David Rowlands, Fred Brown (1989) 'The three-dimensional structure of foot-and-mouth disease virus at 2.9 Å resolution', *Nature* 337, 709-716 (23 February 1989). Laboratory of Molecular Biophysics, Oxford, and the Department of Virology, Wellcome Biotech.

- The structure of foot-and-mouth disease virus has been determined at close to atomic resolution by X-ray diffraction without experimental phase information.
- The virus shows similarities with other picornaviruses but also several unique features. The canyon or pit found in other picornaviruses is absent; this has important implications for cell attachment.
- The most immunogenic portion of the capsid, which acts as a potent peptide vaccine, forms a disordered protrusion on the virus surface.

21.
figure 4-14, p152, visualizing the interior of cell membranes, canning electron micrograph of the organ-pipe-like arrangement of stereocilia projecting from the surface of hair cells in the inner ear. Freeze-fracture and freeze-etch electron microscopy from Bruce Alberts, Dennis Bray, Julian Lewis, Martin Raff, Keith Roberts, James D. Watson (1983) *Molecular Biology of the Cell,* New York and London: Garland Publishing.

- without plasma membranes cellular life is impossible
- it encloses every cell, defines the cell's extent and maintains essential differences between its contents and the environment.
- it is not a passive barrier.
- All biological membranes consist of a continuous double layer of lipid molecules in which various membrane proteins are embedded. This lipid bilayer is fluid, with individual lipid molecules able to diffuse rapidly within their own monolayer.
- lipid molecules very rarely transfer spontaneously from one monolayer to the other.
- Membrane lipid molecules are amphipathic (having hydrophilic and hydrophobic parts), and most of them spontaneously form bilayers when placed in water. For this reason, cellular lipid bilayers form by self-assembly and reseal if torn.
- There are three major classes of lipid bilayers in the plasma membrane bilayer–phospholipids, cholesterol, and glycolipids–and the lipid compositions of the inner and outer monolayers are different.
- the different membranes of a single eukaryotic cell have distinct lipid compositions. p263

Brian Goodwin (1994, 1997) *How the Leopard Changed Its Spots, The Evolution of Complexity,* London: Weidenfeld & Nicholson and London: Phoenix.

- molecular composition influences the development of a particular form
- the morphology of organisms cannot be explained by the action of their genes.
- in order for evolution of complexity to occur DNA has to be within a cellular context; the whole system evolves as a reproducing unit.
- Further comprehension can be followed through S.E. Luria (1975) *Lectures in Biology,* Cambridge, Massachusetts: MIT Press.

22.
Fluorescent proteins visualise cancer in *vivo*. Robert M . Hoffman, *Lancet Oncol* 2002; 3: 546–56.
http://www.metamouse.com/links/RMH-2002.Lancet%20Oncology.pdf
http://asia.stanford.edu/events/spring07/slides402S/okazaki.pdf

- a way of imaging metastases in mice by use of tumour cells expressing green fluorescent protein (GFP) that can be used to examine fresh tissue, both in situ and externally.
- real-time studies of tumour progression, metastasis, and drug–response evaluations.
- the GFP gene, cloned from bioluminescent organisms, has now also been introduced into a series of human and rodent cancer-cell lines in vitro, which stably express GFP after transplantation to rodents with metastatic cancer.
- Techniques were also developed for transduction of tumours by GFP in vivo. With this fluorescent tool, single cells from tumours and metastases

can be imaged.
- GFP-expressing tumours of the colon, prostate, breast, brain, liver, lymph nodes, lung, pancreas, bone, and other organs have also been visualised externally by use of quantitative transcutaneous wholebody fluorescence imaging.
- GFP technology has also been used for real-time imaging and quantification of angiogenesis (development of new blood cells).

23.
photograph from page 111 of Rita Carter (1998) *Mapping the Mind,* London: Weidenfeld & Nicolson. Scans of neural activity in the brains of people with synæsthesia as they listen to words. Bottom left: a large area of auditory cortex lights up, not just the language areas; Bottom right: a significant amount of visual cortex is active. The scans above show the activity in these areas seen in people, who do not usually experience synæsthesia, listening to the same words.

- Synæsthetes experience a richer sensory world, it is as if they switch off their cortical categorization process from time to time.
- strict categorization of information into different sensory modalities probably developed in humans in order to speed up identification of incoming stimuli.
- in babies there are connections between auditory and visual cortices, and others between the retina and the part of the thalamus that takes in sound. the infant experiences 'seeing' sounds and 'hearing' colours.
- Richard Cytowic (see reference below) found that when people experience synæsthesia the overall level of cortex activity drops quite dramatically, while that in the limbic system increases.
- this suggests synæsthesia may be a type of prototype sensory perception at a subcortical level.
- these experiences are recorded in Vladimir Nabokov (1951)(extended with photographs 1966) *Speak, Memory* and in Richard Cytowic (1993) *The Man Who Tasted Shapes* and (1995) 'Synæsthesia: phenomenology and neuropsychology', *Psyche,* 2: 10.
- Rimbaud assigned colours to the five vowels, Whistler and Mondrian tried to paint sound, Kandinsky and Scriabin could hear colour.
- See also Antonio R. Damasio (1997) 'Neuropsychology: towards a neuropathology of emotion and mood', *Nature* 386: 6527, 769.

24.
William S. Burroughs, 'Last Post Danger Ahead', from *LINES* magazine 1966, republished in Aloes Books' *White Subway* 1973.

- Burroughs' best work in the period 1959-66 used typed columns and made us of images from his scrapbooks.
- many of Burroughs' ideas of perception relate to his reading of W. Walter Grey (1953) *The Living Brain,* New York.

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25.
Allen Fisher, photograph of television aerials reflected into television screen, from a set of slides titled *Ideas* and used in *Blood Bone Brain* performances.

26.
Allen Fisher, *Initial Stress,* 1992, watercolour and gouache on papers. Part of a brief series titled *Stress,* paintings developed through ideas of derivation and transformation.

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27.
Claes Oldenburg, *Pastry Case, I,* 1962. MoMA, New York.

- discussions of 'simulation' via Francis Bacon (1597) 'Essay VI. Of Simulation and Dissimulation', Aby Warburg (1999) *The renewal of pagan antiquity: contributions to the cultural history of the European Renaissance*, translated by David Britt, Los Angeles: Getty Research Institute for the History of Art and the Humanities and Jean Baudrillard (1983) *Simulations,* translated b Paul Foss, Paul Patton, Philip Beitchman, New York: Semiotext(e).
- note Claes Oldenburg (1967) *Store Days, Documents from The Store (1961) and Ray Gun Theater (1962),* New York: Something Else Press.

28.
Georges Braque, *Violin and Palette,* oil on canvas, 1909-10, Solomon R. Guggenheim Museum, New York.

- multiplicity of spacetime one plane, with related ideas about *trompe l'œil.*

29.
Pablo Picasso, *Still life with Chair Caning*, oil and oilcloth stuck on oval canvas framed with rope, 1912, Musée Picasso, Paris.

- collage and simulation in one text.
- more than one spacetime and an analysis of different realities at once.

30.
Simulated movie-set, source unknown.

31.
'Space Settlement' on toroid space station, graphics by Gerald K. O'Neill and Princeton team, published via the National Aeronautics and Space Administration, in Nigel Calder (1978) *Spaceships of the Mind,* London: BBC.

- O'Neill asked his students at Princeton to calculate the requirements for a space settlement holding a normal atmosphere and five feet of soil and rotating around the Earth to simulate gravity.
- using twentieth-century technology O'Neill expected materials would be fifteen miles in diameter, seventy-five miles long, with a land area of 7000 square miles (about the size of Wales).
- O'Neill and team developed this into a settlement of two counter-rotating cylinders, each carrying three big mirrors, three windows and three strips of land. to justify the expense involved the initial settlers will be employed building satellite solar power stations, which will supply electrical energy to the Earth.
- in 1976 O'Neill began to offer cut-price designs for the settlement now called *Crystal Palace*. in 1977 building settlements and building power stations plans went together. they planned to complete in time for the scheduled Space Shuttle in 1981.

- NASA workshops to develop the settlements around the USA included Stewart Brand (Whole Earth Catalogue) and Timothy Leary (Tune in, Drop out).
- the budget was not achieved.

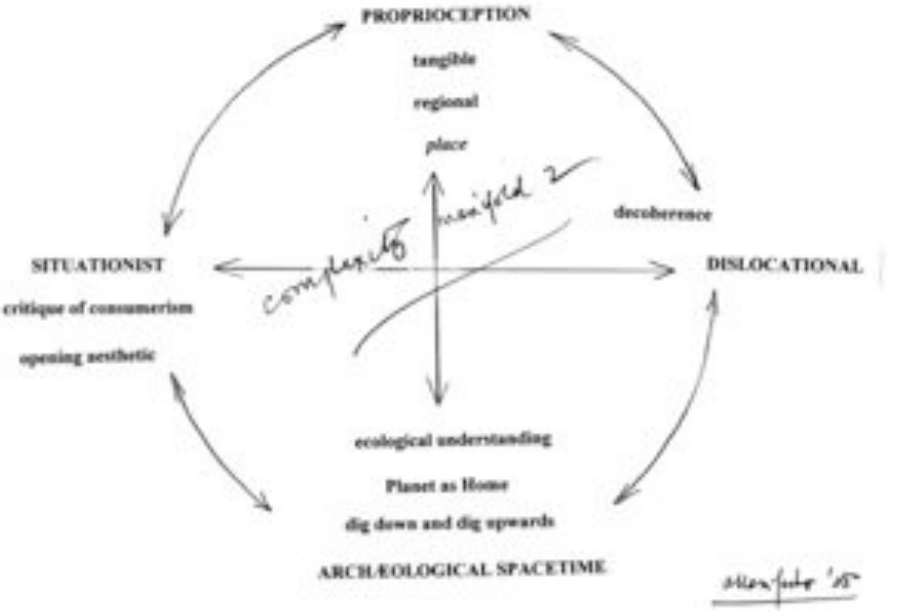
32.
NASA slide via Finlay from *Voyager I*, Jupiter's satellite Io, revealing its volcanic caldera venting gasses.

- The *Voyager 1* probe was launched on September 5, 1977, by NASA from Cape Canaveral, Florida.
- is currently the farthest human made object from Earth.
- the example shows massaged photography to promote public funding.

33.
Allen Fisher, *Melody Chambers, no.6,* c.1980s, oil and mixed media on canvases, with sculpture, displayed Hereford Museum, 1993. Part of a sequence of sixteen triptychs. Reproduced on www.allenfisher.co.uk

34.
Allen Fisher, summary of notebook diagram 1, see page 11.

35.
Allen Fisher, notebook diagram 2, horizontal cut-through, 'assemblage and empathy', leading into Talk two.



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