Outsider Cosmologies and Studio Practice

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For learned nonsense has a deeper sound

Than easy sense and goes for more profound.

(Samuel Butler)

Abstract:

Outsider Cosmology and Studio Practice: James Carter and John Latham

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Through detailed interrogation of the ideas, histories and oeuvres of the American outsider cosmologist James Carter (1944 –) and the British artist John Latham (1921 – 2006), this thesis explores outsider science and traces the epistemological heritage of unique, contemporary, cosmological systems. The first chapter introduces Carter and Latham, and starts to explore the complex, universal systems that they propose, and questions this activity in terms of definitions of outsider art and science. In the second chapter the development of Carter's and Latham's systems is compared to theories within alchemy and the evolution of alchemical ideas and a number of parallels are found. In the third chapter these system building strategies are examined through the epistemological theories of the French philosopher Michel Foucault (1926 – 1984); a closer reading of Carter's and Latham's outputs, including writings and correspondence, reveals that both men adopted an approach to creating knowledge that was consistent in several distinct ways with Foucault's definition of the Renaissance episteme. However, Carter's and Latham's systems are also found to be a response to the challenges of contemporary knowledge production. I conclude by considering how this should impact our treatment of and understanding of these oeuvres, and their current status in the world of art.

List of Images:

Introduction

i. *Alchemy: The Telenomic Process of the Universe*, Paul Laffoley, 1973 Oil, acrylic, ink and vinyl lettering on canvas 73 ½ x 73 ½ in., reproduced in Laffoley, P. (2013). Premonitions of the Bauharoque. p.19

ii. *Proton Model*, Philip Blackmarr, 1993. Rugoff, R. (2013). The Alternative Guide to the Universe. p.142

iii. Installation View *No More Car Sick,* Bonnie Camplin, Cabinet, London, 11 July - 10 August 2013, http://www.cabinet.uk.com/index.php?bonnie-camplin (accessed 28.05.2016)

iv. *Untitled proposal for Flat Time House*, Simon Gould, 2006 (detail) as shown in *The Shift* at Flat Time House Gallery (2016). Photo my own.

v. John Latham with *Six Noits – One-Second Drawings*, 1970, at the Städtische Kunsthalle, Düsseldorf in 1975. Flat Time House, Archive of John Latham, 'Individual works' Folder, Photo box 2

vi. James Carter with abalone off Catalina island, 1970s, Carter family archives, reproduced from Wertheim, M. (2011). Physics on the Fringe. central photo section

Chapter One

1.1 Exhibition shot *Lithium Legs and Apocalyptic Photons: The Imaginative World of James Carter* , Santa Monica Museum of Art Website, https://smmoa.org/programs-and-exhibitions/lithium-legs-and-apocalyptic-photons-the-imaginative-world-of-james-carter/ (accessed 29.03.2016)

1.2 *The Circlon Model of Nuclear Structure*, James Carter, first published 1977, http://www.circlon.com/pdf/new-element-chart.pdf (accessed 29.03.2016)

1.3 *Time Based Roller*, Latham, 1972, mixed media, 1859 x 6370 x 660mm, http://www.tate.org.uk/art/artworks/latham-time-base-roller-t11975 (accessed 29.03.2016)

1.4 *Praying Figure*, Latham, 1953-54 reproduced from Walker, J. (1995). John Latham - The Incidental Person - His art and ideas. P.15

1.5 Diagram explaining lithium, Carter, J. (2010). The Other Theory of Physics, a Non-Field Unified Theory of Matter and Motion, p.172

1.6 *the basic (T) diagram,* Latham, 1992, Photo Ken Adlard, http://flattimeho.org.uk/exhibitions/flat-time/ (accessed 29.03.2016)

1.7 *Time-Base Roller with Graphic Score,* Latham, 1987, Photo Ken Adlard, http://flattimeho.org.uk/exhibitions/flat-time/ (accessed 29.03.2016)

1.8 *Still and Chew: Art and Culture*, Latham, 1966, http://www.moma.org/collection/works/81529?locale=en (accessed 29.03.2016)

1.9 William Thompson to Hermann Helmholtz, 22nd January, 1867. Quoted in (Smith, C. and M. N. Wise, 1989) P.418

1.10 *Valley of Bones*, Latham, 1948, Photo John Riddy, courtesy of the Lisson Gallery. Reproduced in Walker, J. (1995). John Latham - The Incidental Person - His art and ideas. p.14.

1.11 *Man Caught Up with Yellow Object*, Latham, 1954 © John Latham Estate, courtesy Lisson Gallery, London, http://www.tate.org.uk/art/artworks/latham-man-caught-up-with-a-yellow-object-t06490 (accessed 29.03.2016)

1.12 Rudi Schneider with Harry Price, 1920s, reproduced in (1930). "Rudi Schneider: a Scientific Examination of his Mediumship." Nature 126(3185): 756.

1.13 *America Tropical: Oprimida y Destrozada por los Imperialismos* — or "Tropical America: Oppressed and Destroyed by Imperialism.", David Alfaro Siqueiros, 1932 (detail shown as digitally enahced visualisation of the recently restored work), NPR website: http://www.npr.org/templates/story/story.php?storyId=130519329 (accessed 19.04.2016)

1.14 Cover of *A Proposal for the Millenium Dome*, Latham and Macdonald-Munro, 1998, Flat Time House, Archive of John Latham, Box 2

1.15 Diagram explaining 'Time and Mass on an Accelerated World', Carter, J., 2012. The Living Universe, New Principles in Mass, Space, Time, and Gravity Explain the Evolution of the Big Bang. p.127

1.16 Diagram explaining 'Orbiting Chains', 2012,. Ibid., p.106

1.17 Diagram explaining 'The Gravity Cannon Experiment', 2012. Ibid., p.112

Chapter Two

2.1 From The Principles of Alchemy, Laffoley, 1972, reproduced in Laffoley, P. (2013). Premonitions of the Bauharoque. p.43

2.2 *The Alchemist*, Pieter Bruegel the Elder, c.1558, engraving, 33.5 x 44.9 cm

2.3 Wheel. George Ripley, The Compovnd of Alchymy (London, 1591), (London, 1591), M3r. Wren Library, Trinity College, Cambridge, Grylls.3.412. (By kind permission of the Master and Fellows of Trinity College, Cambridge) cited in Principe, L. (2013). The Secrets of Alchemy. photo section

2.4 Tetractyl (my diagram)

2.5 Pythgorean ratios and their pitch equilalents (my diagram)

2.6 Alchemical tree as recreated by L. Principe: Principe, L. a. (2013). The Secrets of Alchemy. photo section

2.7 Smoke rings in Jim Carter's yard, photo credit Linda Carter, http://physicsonthefringe.com/page/film (accessed 19.04.2016)

2.8 *One-Second Drawing (17" 2002) (Time Signature 5:1),* John Latham, 1972, spray paint on board, Tate collection: http://www.tate.org.uk/art/artworks/latham-one-second-drawing-17-2002-time-signature-51-t02070 (accessed 30.05.2016)

2.9 Aristotelian elements (my diagram)

2.10 Hippocratic humors (my diagram)

2.11 Galenic system (my diagram)

2.12 Alchemical cosmology from Theosophische Darstellung zur Alchemie - http://www.deutschefotothek.de/documents/obj/88967129

2.13 The metabolic pathways for the oxidation of acetate, the citric acid, or Krebs cycle: http://en.wikipedia.org/wiki/Citric_acid_cycle#/media/File:Citric_acid_cycle_with_aconitate_2.svg

2.14 Thomas Knyvet's *Wheel*. Cambridge University Library, MS Ff.2.23, 32Ar. reproduced in (Rampling J.M. 2013, p.74)

2.15 *Joules of the Universe*, Carter, 2011, http://www.circlon.com/home/10-The-Joules-Of-The-Universe.html (accessed 30.05.2016)

2.16 *Seven Binary Pulsars*, Carter, 2011, http://www.circlon.com/pdf/7-Binary-Pulsars.pdf (accessed 30.05.2016)

2.17 Observer I, Latham, 1959, painted books, metal fragments, electric cable, wires, wire-mesh, plaster, paint on canvass on hardboard, 114 x 49cm, Civiche Raccolte d'Arte Contemporanea, collezione Boschi di Stephano, Palazzo Reale, Milan, reproduced in the catalogue of *Art after Physics* 13 October 1991 - 5 January 1992, The Museum of Modern Art, Oxford.

2.18 *Observer IV*, Latham, 1960, Logs covered with canvass, books, metal fittings, machine fragment, wires, plaster, paint on cavass on hardboard, 244 x 183 x 38cm, Collection Nicholas and Caroline Logsdail, London, reproduced in ibid.

2.19 *Latter Day Observer*, Latham 1963, Books, wires, wire-mesh, machine fragments, plaster and paint on hardboard, 97 x 122 x 26cm, John Latham Estate and Lisson Gallery, my photo from *Kaleidoscope, A Moment of Grace,* at Modern Art Oxford, 6th February - 31st December 2016

2.20 *Evenometry of the Reflective Intuitive Organism,* Latham, 1989, Flat Time House, Archive of John Latham. folder 151, box 1:

2.21 The red King and White queen enjoy some immersion in the bath from the Rosarium Philosophorum (1550) reproduced in Jung, C. G. (1995). Jung on Alchemy. p.197

2.22 Mundus Elementaris from Museaum hermeticum reformatum et amplificatum (1678) courtesy of the Wellcome Trust medical photographic library, reproduced in Linden, S. J. (2003). The Alchemy Reader : from Hermes Trismegistus to Isaac Newton.

2.23 An Alchemist receiving the *donum dei*, depicted by Thomas Norton, The Ordinall of Alchimy in Theatrum chemicum britanicum, reproduced in in (Nummedal 2007) P. 29

Chapter Three

3.1 *Circlon Shapes in Nature,* Carter, 2013, Next Impossible Discovery in Physics. p.81 (and other earlier publications)

3.2 Electron vs Earth Orbits, Carter, 2010 The Other Theory of Physics, a Non-Field Unified Theory of Matter and Motion. P. 83

3.3 *The O-Structure*, Gregory and Kohsen, 1959, The O-Structure An introduction to Psychophysical Cosmology. P.69

3.4 Texas clouds above a painted balloon, Carter, 2010, The Other Theory of Physics, a Non-Field Unified Theory of Matter and Motion. p.123

3.5 Diagrams showing different gravitational models, ibid. P. 121

3.6 Column bosses at the Museum of Natural history in Oxford, showing different branches of the plant kingdoms with columns of different British rocks. photo credit Benjamin Woodward, http://picssr.com/tags/benjaminwoodward/page2 (accessed 30.05.2016)

3.7 Letter to Isham and Savvidou, Latham, 2001, Flat Time House. Archive of John Latham. box 1

3.8 *White Painting* [three panel], Rauschenberg, 1951, latex paint on canvas, 72 x 108in, San Franscico Museum of Modern Art, https://www.sfmoma.org/artwork/98.308.A-C (accessed 30.05.2016)

3.9 Archive photo of *Observer V*, Latham, 1960, Flat Time House, Archive of John Latham, photo box 2, Binder: 'Individual works 60s'

3.10 *Left and Right*, Latham, 1983, A4 paper and pen, Flat Time House, Archive of John Latham, photo box 1, Binder: 'Events'

3.11 Excerpt from letter to Norman Reid, Latham, 1980. Flat time House, Archive of John Latham. Box 1

Conclusion

4.1 Archive photo of *Big Breather* (Latham, 1972-73), 1972 Flat Time House, Archive of John Latham, photo box 1, Binder: 'Events (2)'

4.2 Stills from CGI circlon animations, Carter, screen-grabbed from ABC, N. R. (2014). The Science Show, May.Blueprint for *Big Breather*, Latham and Wallace, 1972, Flat Time House, Archive of John Latham, photo box 1, Binder: 'Events (2)'

Introduction:

> I made it clear to both that I did not believe their fantasies, but I admired them as human beings and as imaginative artists. I admired them most of all for their stubborn refusal to remain silent. With the whole world against them, they remained true to their beliefs. I could not pretend to agree with them, but I could give them my moral support. (Dyson 2012)

Fig i: *Alchemy: The Telenomic Process of the Universe*, Paul Laffoley, 1973, Oil, acrylic, ink and vinyl lettering on canvas 73 ½ x 73 ½ in.

In the quote which opens this chapter, the distinguished English born American physicist Freeman Dyson (1923 –) reflects on two dissident thinkers he counted as friends: the

great physicist Sir Arthur Eddington (1882 – 1944), whose latter years were preoccupied with his own unorthodox cosmological theories, and the Russian thinker and psychologist Immanuel Velikovsky (1895 – 1979), who proposed a cosmological history based on the comparative study of myths, most notably in his bestseller Worlds in Collision(1950)[1]. Dyson deals with the dissident ideas of Eddington and Velikovsky as the products of 'imaginative artists', hence neatly defining (condemning?) their ideas to the sphere of art.

In essence this thesis picks up where Dyson casually leaves off: the arrival of non-canonical theories from science and cosmology in the field of art.

Where Dyson probably used the word 'artist' in a descriptive rather than categorical sense, he did prefigure a trend within the art world. In recent years there has been a growing interest in artists and curators exploring alternative cosmological models. The Hayward Gallery show: *The Alternative Guide to the Universe* curated by the Australian science writer and curator Margaret Wertheim (1958 –), offered a succinct glimpse of the variety of these outsiders. This show included the American gallery-represented painter and architect Paul Laffoley (1935 – 2015) whose theories drawn from alchemy, sci-fi and mythology underpin prototype constructions and machines, and are illustrated in immaculately executed paintings [see fig i], and who I was lucky enough to see speaking at the opening of the show before his recent death. Also included in the Hayward show was the American Philip Blackmarr (1945 –), who unlike Lafolley has never sought exposure in the art world and has spent much of his life developing his idea of quantum geometry outside of mainstream physics, building delicate and immaculate cardboard models of the complex shapes derived by his theory [see fig ii].

[1] Had he cast his mind back to his school days Dyson might have recalled another dissident acquaintance: as a near contemporary of the British artist John Latham they would have attended Winchester College at the same time in the late 1930s.

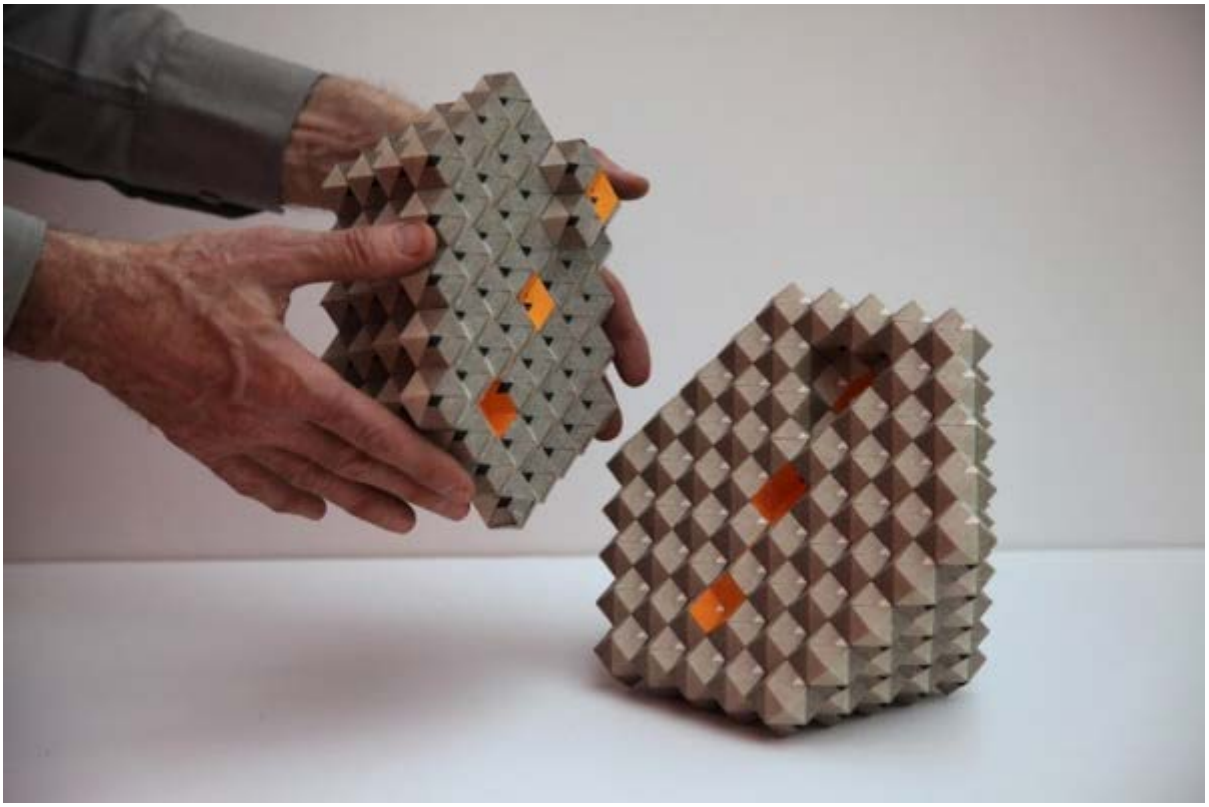


Fig ii: *Proton model*, Philip Blackmarr, 1993, cardboard

The Hayward show would have been a neat appendix to the 2013 Venice Biennale Palazzo show *The Encyclopaedic Palace*, curated by Massimiliano Gioni (1973 –), exploring in his own words “the desire to see and know everything”(2013, p.23). Gioni is quite explicit that the Biennale show was an exploration of the creation of knowledge, and touched upon epistemological questions explored in this thesis: specifically, how art making relates to the creation of knowledge in the contemporary episteme. Other examples abound: London based British artist Bonnie Camplin (1970 –), nominated for the Turner prize in 2015, creates work which explores a single system of her invention. ‘The Invented Life’; Camplin’s system draws together a range of theories and ideas which is then elaborated through pseudo-scientific notations alongside installed images and texts [see fig iii].

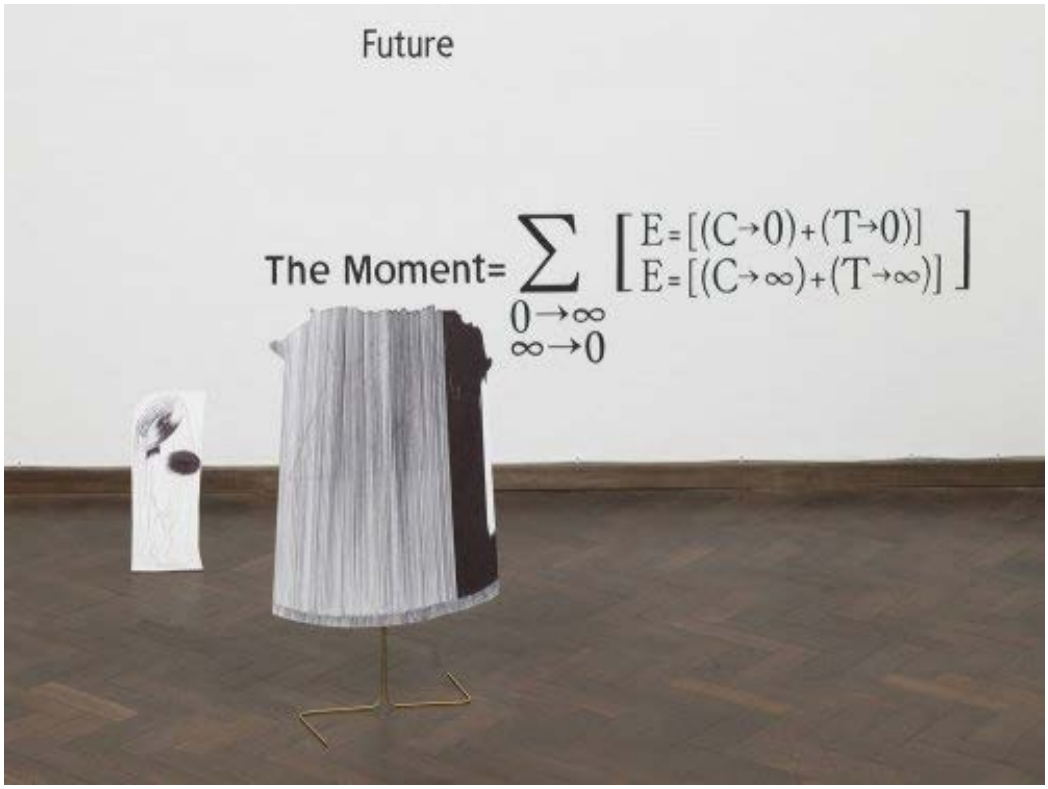


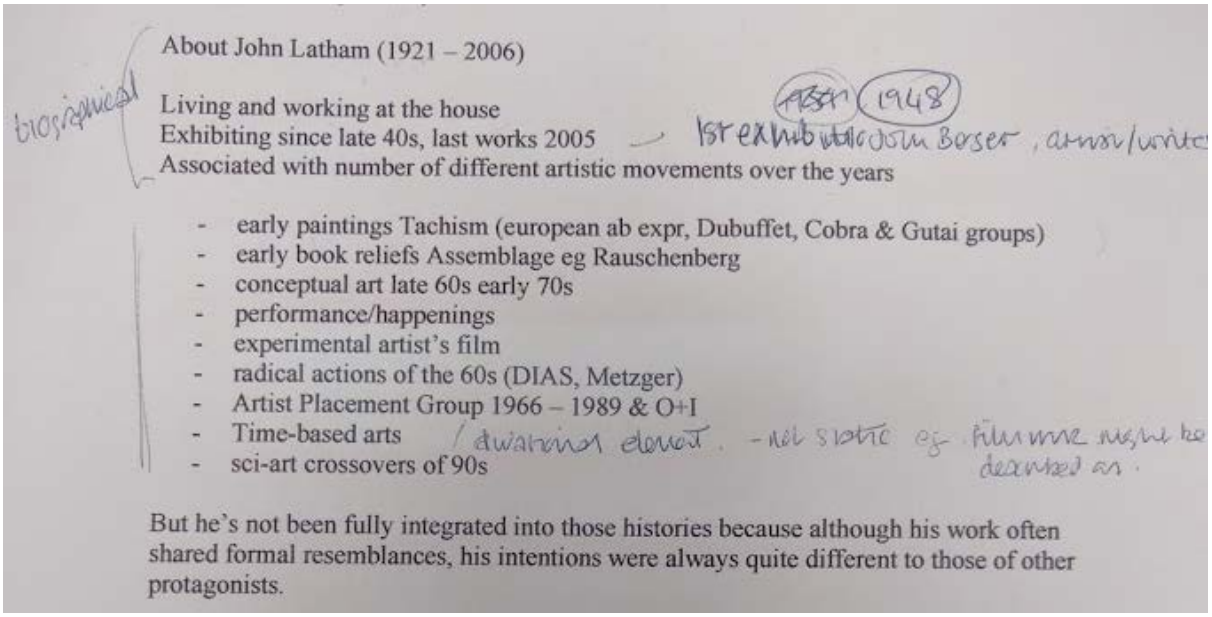
Fig iii: Installation shot from ***No More Car Sick***, Bonnie Camplin, 2013, mixed media and wall lettering

These systems are not in the lab or the philosophy department because they are eccentric, dissident and, by the consensus of those who might try to engage with them literally, *wrong*. Yet they are still intriguing: it cannot be their aesthetic qualities alone that are supporting their thriving presence in the gallery.

Much like Laffoley and Blackmarr, one of the subjects of this thesis is an artist with a mainstream following and critical success, and the other an outsider who arrived late in the art world, having developed his cosmological model largely independently for several decades.

The life and oeuvre of the British artist John Latham (1921 – 2006) is neatly summarized by the curator Simon Gould (1976 –) in a proposal for the ongoing use of Flat Time House, Latham's former home, as an art space. Written in 2006, following Latham's death, the

proposal is displayed as part of *The Shift*, the final show in the house and a retrospective of many of the projects hosted there in the years since his death[2] [see fig iv].



About John Latham (1921 – 2006)

Living and working at the house
Exhibiting since late 40s, last works 2005
Associated with number of different artistic movements over the years

- early paintings Tachism (european ab expr, Dubuffet, Cobra & Gutai groups)
- early book reliefs Assemblage eg Rauschenberg
- conceptual art late 60s early 70s
- performance/happenings
- experimental artist's film
- radical actions of the 60s (DIAS, Metzger)
- Artist Placement Group 1966 – 1989 & O+I
- Time-based arts
- sci-art crossovers of 90s

But he's not been fully integrated into those histories because although his work often shared formal resemblances, his intentions were always quite different to those of other protagonists.

Fig iv: Untitled proposal for Flat Time House, Simon Gould, 2006

As Gould explains, Latham practiced in and around London over seven decades. His work intersected with a huge array of other practices within the British avant-garde and his work might be included in many varied art historical studies. His varied output includes figurative and abstract painting rooted in the London postwar art scene of the 40s and 50s, with early canvasses responding to the "School of London", echoing Frank Auerbach (1931–) and Francis Bacon (1909 –1992). Latham had been a pioneer of art film, including formally and conceptually experimental works like *Film Star* (1960), where opening and closing books assembled on a canvass exhibit different coloured pages over time; or *Encyclopedia Britannica* (1971), where each double page spreads from an encyclopedia are shown as successive frames in a short monochrome film. He produced Dada-esque happenings, immersive installed exhibits, and staged performances, as well as text works, sculpture and his distinctive roller canvasses.

[2] curated by Gareth Bell Jones in collaboration with previous curator/directors Elisa Kay, Claire Louise Staunton and education officer John Hill

However, rather than explore any of these outputs in isolation, it is his grand post-art and post-physics theory, Event Structure*,* whose development underpins *all* this activity, that will be the focus of this thesis.

Later in his proposal Gould wryly notes art history's 'ambivalence' to this theory, stating that Latham is variously categorised as:

- Genius philosophical visionary of the ilk of William Blake
- Intuitive scientist of the Einstein mould
- Crack-pot eccentric with scientific pretentions

I will conclude that Latham cannot be catergorised entirely by any of the above.

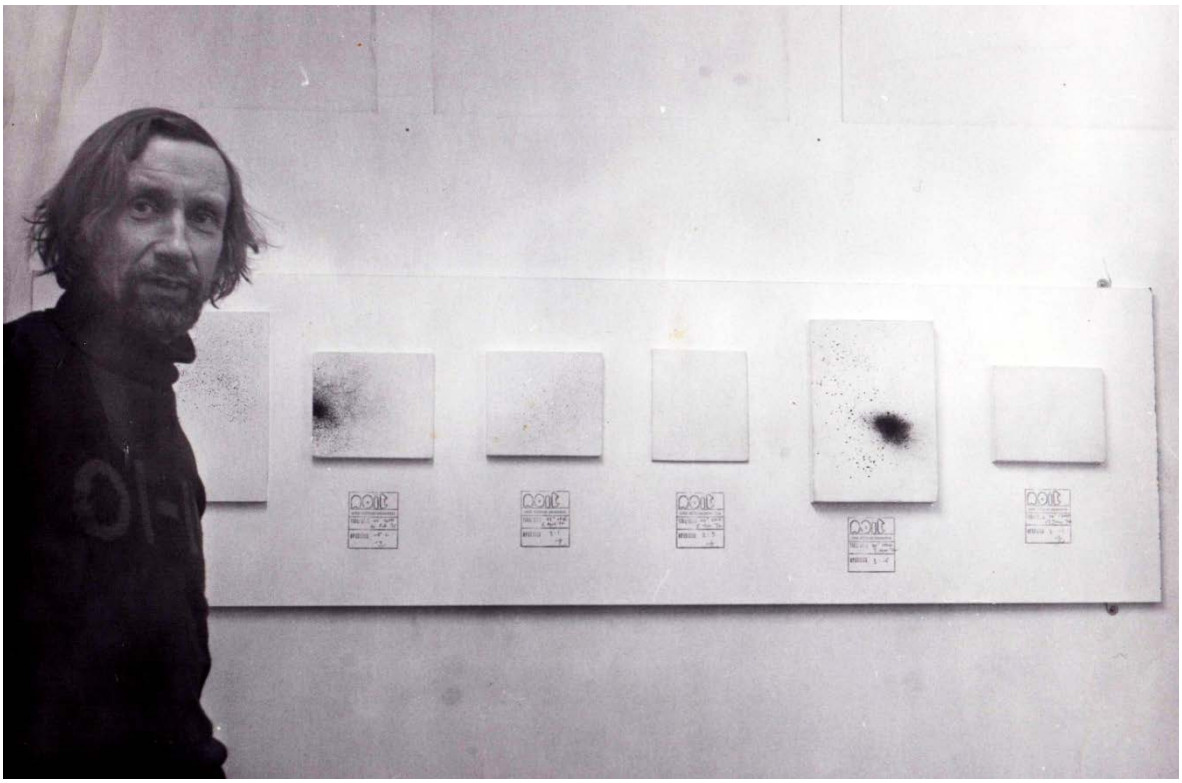


Fig v John Latham with *Six Noits – One-Second Drawings*, 1970, at the Städtische Kunsthalle, Düsseldorf in 1975

fig v: James Carter in the mid 1970s when he worked as an abalone diver on Catalina; he published his first booklet on his theories: The Cosmic Ring in 1974.

The other subject of this thesis, James Carter (1944 –) lives in upstate Washington in the USA, where he runs a trailer park, fixes up cars and indulges his talents as a practical problem solver, including the construction of a small hydroelectric plant in the gorge on his property, a vast bunker under his house, and a hot tub hidden in a hand carved cave behind a waterfall. He also runs a small business which manufactures floatation bags that he invented when working as an abalone diver. Along with these achievements Carter has developed a complex cosmological theory: The Living Universe. Over the past four decades he has published pamphlets and books, created elaborate digital and physical models and proselytized his theories through international networks of dissident physicists. He had no presence in the art world until his fifties, when the attentions of Margaret Wertheim took him from the anonymity of his trailer park and small business into the gallery. Carter's ideas were also featured in Wertheim's Hayward Gallery show, although this was not his first gallery outing under her curation.

Carter and Latham make up the focus of this study because they are in many ways alike, both building elaborate, comprehensive theories, both singular in their beliefs, and dogged in the development and dissemination of them. Whilst they both have existed in the art world and engage with mainstream science, they are also in many ways opposites. Latham began in the gallery and tried later in his career to bring his theory into direct conversation with science, whereas Carter's journey has been, in a way, the reverse.

My claim in this thesis is that these men are best described as 'outsider cosmologists' and through a comparison with alchemy we find that they share a number of key strategies to creating and developing knowledge and ideas within their systems. I will show that both men take an approach to knowledge creation which is consistent with Foucault's definition of the renaissance episteme and speculate that outsider cosmologies of this sort are profoundly dissident, not regarding science but regarding knowledge creation within the contemporary episteme. Hence, their place in the gallery reflects upon a wider cultural sense of epistemological dissidence and is evidence of the considerable blurring of boundaries within Foucault's apparently neatly regimented epistemological theory.

In **Chapter One**, I provide biographical background to our protagonists and start to describe their cosmologies and the history of their development. I address the label 'outsider science' as used by Wertheim in light of definitions of science, and in terms of the field of outsider art, and give examples of scientific dissidents for whom this label might be better reserved. Chapter One concludes proposing that Latham and Carter should be described as 'outsider cosmologists' given the comprehensive aims of their theories and an absence of any genuinely scientific reasoning within their theories.

In **Chapter Two**, I examine the history of alchemy, and describe the development of a number of ideas and theories within that system. I offer these for comparison alongside

elements of Latham and Carter's systems and find surprising similarities. This chapter dissects the two protagonists' cosmological systems in more detail and identifies key elements of their wider aims, such as an account of the individual's experience within an overarching cosmological system.

In **Chapter Three**, I explore the theories of Michel Foucault (1926 – 1984), which encompass the development of three systems of knowledge creation: the renaissance, the classical, and the contemporary (which he calls the Analysis of Finitude). I reflect on the similarities between our two outsider cosmologies and the renaissance episteme then follow the structure of Foucault's discourse analysis as a device to explore further Latham and Carter's writings in the light of this. Chapter Three concludes that these are men whose theories are apart from institutional, cultural or scientific validation within their own episteme and speculates that their renaissance thinking is in part a rejection of contemporary uncertainties.

In the **Conclusion** I return to consider two works by these men and ask: why do epistemologically dissonant projects end up in the art world, and how should we categorise these cosmologists in light of this fact?

I conclude that the gallery is a fitting home for these systems, regardless of the 'art' status of their creator. This is not because they should be seen as 'outsider art' by any contemporary definition, but because fascination with the operation of non-contemporary epistemological models is part of our wider cultural fabric. The objects and images these non-contemporary systems frequently produce are resonant with still potent ways of thinking from earlier epistemes, whilst simultaneously acting as riddles, whose fascinating specificity, but lack of revelation under contemporary epistemological conventions, gives us pause to consider knowledge and the pitfalls of its creation in the present day.

Primary Research

I have where possible tried to root this study in primary research. As explained in the project introduction, I was first introduced to Latham's work at Flat Time House, where I was involved in the digitization of his archive. As such I had plenty of opportunity to view first hand material for study as well as meet many of the protagonists in his history, including his wife and sons, and a number of other researchers, artists and curators involved in the burgeoning study of his oeuvre. I have also corresponded intermittently with James Carter and Margaret Wertheim, visiting Carter for a few days in Washington late in the writing of this thesis. I have attended the Chappell Natural Philosophy Alliance annual conference, a society of 'dissident physicists' from across the globe, and spoken to many of its members. The research driving the chapter on alchemy was facilitated by a project with the Museum of the History of Science in Oxford, in collaboration with Dr Vid Simoniti, and we were lucky to have the staff's help and support in accessing primary material as well as the chance to discuss it with more experienced academics in this field.

Studio Led Research

The relation between this writing and the wider project is more thoroughly explored in the overall introduction to the D.Phil and through the studio texts (Part I), but as this thesis may be encountered outside this context, it should be stressed that as a studio led research project, the overarching direction of activity in this project has been led by developments within my practice. It has been particularly with reference to my practice (as well as the word limit!) that I have excluded some of the better developed research detours encountered along the way, notably a much more developed social history of its protagonists, and explorations of outsider cosmology with reference to Situationism on one hand, and Pataphysics on the other. I look forward to the chance to return to some of these in future writing, most notably: the relationship between the riddle and the artwork touched on in the conclusion; and the recurrence, or longevity of the renaissance episteme, as a wider cultural phenomenon.

Field

It is not the intention of this project to present Latham and Carter's lives and works comprehensively; for this, several texts already exist in the case of Latham, most notably John Walker's John Latham - The Incidental Person - His art and ideas(1995), along with numerous catalogue essays and documented interviews, supported by the huge resource of his archive at his former home in Peckham, Flat Time House, and numerous other archival resources[3] and a long overdue monograph is currently the subject of another D.Phil. Likewise, Carter's output has been extensively published, not least by himself in print and online over the past four decades and through his ever evolving website[4], conference papers and presentations. The Wertheim biography: Physics on the Fringe: smoke Rings, circlons, and alternative theories of everything(2011) does an excellent job of thoroughly accounting for this project in an historical as well as conceptual sense.

Instead, this thesis traverses several disciplines including: art and social history, alchemy, and a discussion of the philosophy of Michel Foucault. Given the scope of this thesis, throughout the text I have tried to give specific examples to contextualize material. However, there are a few key texts that might usefully set this thesis in context at this stage.

Erik Davis' TechGnosis first published in 1998, has provided a useful, if frustrating counterpoint to this research. Davis, whose enquiry ultimately focuses on understanding contemporary phenomena of the mystic, through the media of technology can be cursory, imprecise and flippant: 'As any Thomas Pynchon fan know, entropy is a heavy trip, a metaphysical and existential conundrum as well as an irrevocable law of the cosmos'(p.82). However, his freewheeling survey which ranges from Pythagoras to Poe and Séances to Edward Snowdon has not just shown that such eclecticism can be effective, or even essential, in getting to the root of an idea (perhaps demonstrating an

[3] Including at Modern Art Oxford and the Tate.
[4] www.circlon.com

a*rchaeology* of sorts, as Foucault would have it), but also touched on and catalysed some of the key themes of this thesis. At the other extreme, the patient studies of Francis Yates, specifically Giordano Bruno and the Hermetic Tradition first published in 1964 and Carlo Ginzburg's The Night Battles : witchcraft and agrarian cults in the sixteenth and seventeenth centuries first published in 1966, have helped develop a stylistic approach to primary and secondary source material and an archetype of their use in constructing an argument, as well as relating directly to themes and material in the thesis (particularly the Yates).

There are some notable absences from the thesis: Jung and his engagement with alchemical theories, and the recent theorisation of science within the humanities (notably Lacan), being perhaps the most striking. Some related texts appear within the project bibliography and their ultimate exclusion from this thesis is down to a lack of direct relevance to the questions explored and a lack of space to accommodate their discussion.

There are countless other digressions that have been avoided or latterly excised for similar reasons: a discussion of the wider phenomena of science/art or sci-art projects in relation to these practices; a more thorough contextualisation of the philosophical or theoretical themes that emerged later in the writing; a richer reading of the occult's influence on Latham; or Wertheim's fascinating and ongoing relationship with Carter, are all such examples.

Many of the researchers I have engaged with around Latham's archive are also engaged in rich and worthwhile studies of the artist, for example concerning his role as social activist through the Artist's Placement Group (APG), or focusing on his early paintings, or the extraordinary earthwork project near Edinburgh that he developed on his APG placement at the Scottish Office. The wealth of relevant unpublished material in his archive made it difficult to resist the temptation to respond directly to elements of these projects. Ultimately however, the process of assembling this thesis has been a close conversation with my developing practice, which has driven this research from the start.

My aim has been that this conversation is reflected as faithfully as possibly in the text which you are about to read.

Terminology/ Conventions

I will use Event Structure and Flat Time theory interchangeably throughout to refer to Latham's cosmology as there seems to be little consistency within his writing (although he latterly settled on the former). Likewise, The Living Universe will sometimes be called Circlon theory or The Other Theory of Physics as these expressions were all used by Carter himself to refer to his ideas, with his preference shifting over time.

In both these oeuvres, there is also some blurring between what is simply an explanatory diagram and what constitutes a finished work, particularly as Carter iterates some of his diagrams and graphics between publications, and some of them have appeared reproduced from his books in gallery installations. I have tried to disambiguate these in the referencing: generally, where a graphic appears unchanged with its own title that isn't merely the title of the theory it's describing, I've considered it to be a 'work of art' and it appears italicised. Where this is not the case I've described them as 'diagram explaining 'xxxx''.

Gioni, M. (2013). Il Palazzo Enciclopedico, The Encyclopaedic Palace: Biennale Arte 2013, Venezia, Marsilio.

Davis, E. (2015). TechGnosis: myth, magic + mysticism in the age of information. Berkely, California, North Atlantic Books.

Dyson, F. (2012) "Science on the Rampage." The New York Review of Books (website) Retrieves 28th May 2016 from: http://www.nybooks.com/articles/2012/04/05/science-rampage-natural-philosophy/

Ginzburg, C. (2013). The Night Battles: witchcraft and agrarian cults in the sixteenth and seventeenth centuries, Baltimore, The Johns Hopkins University Press.

Nummedal, T. E. (2007). Alchemy and Authority in the Holy Roman Empire. Chicago, Ill.; London, University of Chicago Press.

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Velikovsky, I. (1950). Worlds in Collision. New York, Doubleday and Company Inc.

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Wertheim, M. (2011). Physics on the Fringe. New York, USA, Walker Publishing Company Inc.

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Chapter One: Outsider Art and Outsider Science

> But space and time themselves are neither things, nor events: they cannot even be observed: they are more elusive. They are like a kind of framework for things and events: something like a system of pigeon-holes, or a filing system for observations. (Popper 2002, p.242)

Fig 1.1: Exhibition shot *Lithium Legs and Apocalyptic Photons: The Imaginative World of James Carter(2002)*

Chapter one is an introduction to James Carter and John Latham. It will offer a relevant biography of each and introduce the origins and some of the details of their cosmological systems. We will consider outsider-ness both in art and science through a quick survey of art brut and various strands within outsider art, and a discussion of the theories of Thomas S. Kuhn (1922 – 1996) and Karl Popper (1902 – 1994). Finally, through an exploration of Margaret Wertheim's use of the term 'outsider science', we will make the case that the systems of Carter and Latham are better understood as 'outsider cosmology'.

Two Transitions

On 20th April 2002 an exhibition opened at the Santa Monica Museum of Art entitled *Lithium Legs and Apocalyptic Photons: The Imaginative World of James Carter*. Curated by the Australian science writer Margaret Wertheim, the gallery walls were 'rife with mathematical formulae, diagrammatic illustrations, and computer animations'(SMMOA 2002). David Pagel, arts critic for the Los Angeles Times continues:

> Four vitrines, packed with books, pamphlets and professional correspondences, form an "X" in the center of the main gallery. Four monitors, embedded in the walls, show animated sequences of atomic particles interacting with one another. Two inflatable models hang from the rafters, and a dozen brightly colored flotation devices, also blown up to maximum capacity, are stacked in various corners.(Pagel 2002)

The subject of the show, James Carter, is the proprietor of a trailer park in upstate Washington and the owner of a small company manufacturing floatation bags for divers; since the 1960s he has been developing a comprehensive alternative to mainstream theories of physics.

As a gallery show the Santa Monica exhibit is a miscellany of brightly coloured images and objects relating to these theories, and is dominated by the elaborate chart of his periodic table which covers one wall. This detailed diagram follows the familiar Mendelev schema, with periods and groups progressing through the apparent growth of ever more complex snowflake like ideograms [see fig 1.2].

What is perhaps initially surprising about this show is not its eccentric contents, but that it happened at all. Over the past five decades that Carter has spent developing his alternative to mainstream physics, The Living Universe, he has never set out to be seen as an artist, or prior to this show been exhibited or discussed as such.[5]

[5] Naming his theories has been a work in progress for Carter as they have multiplied and evolved in complexity with time. Early publications tended to address specific facets of the system or standalone principles, for example his early publication in 1977 Gravity Does Not Exist. He appears to have settled on The Living Universe, as an overarching term for his interconnected theories as it titles the opening chapter of the first edition of his 2010 book The Other Theory of Physics.

Wertheim first encountered Carter in 1993 having been passed a mail-order form for one of his early books by a physicist colleague. She has made several trips to Enumclaw, Washington, where Carter lives, to watch the ongoing development of his cosmology and document his personal history; activity which has culminated in not only the Santa Monica show but a 2001 documentary *Jim's World*, and more recently her book Physics on the Fringe. Physics on the Fringe is not just a biography of Carter but an exploration, and perhaps celebration of what Wertheim describes as 'outsider science'. Calling Carter the 'Leonardo da Vinci of fringe theorists', Wertheim sees Carter's work as preeminent in the eclectic and loosely defined corpus of those proposing alternatives to mainstream science.

Towards the end of Physics on the Fringe, Wertheim tracks the progress of outsider art into the mainstream art institution and draws parallels with the status and trajectory of outsider science(Hoffman 2011). In her notes she goes on to thank the Santa Monica Museum of Art curator Elsa Longhauser for her role as a champion of outsider art, suggesting the 2002 Carter show may be the first instance of an outsider scientist joining this genre in the gallery; a harbinger perhaps of more such transitions to come (Wertheim 2011, p. 303).

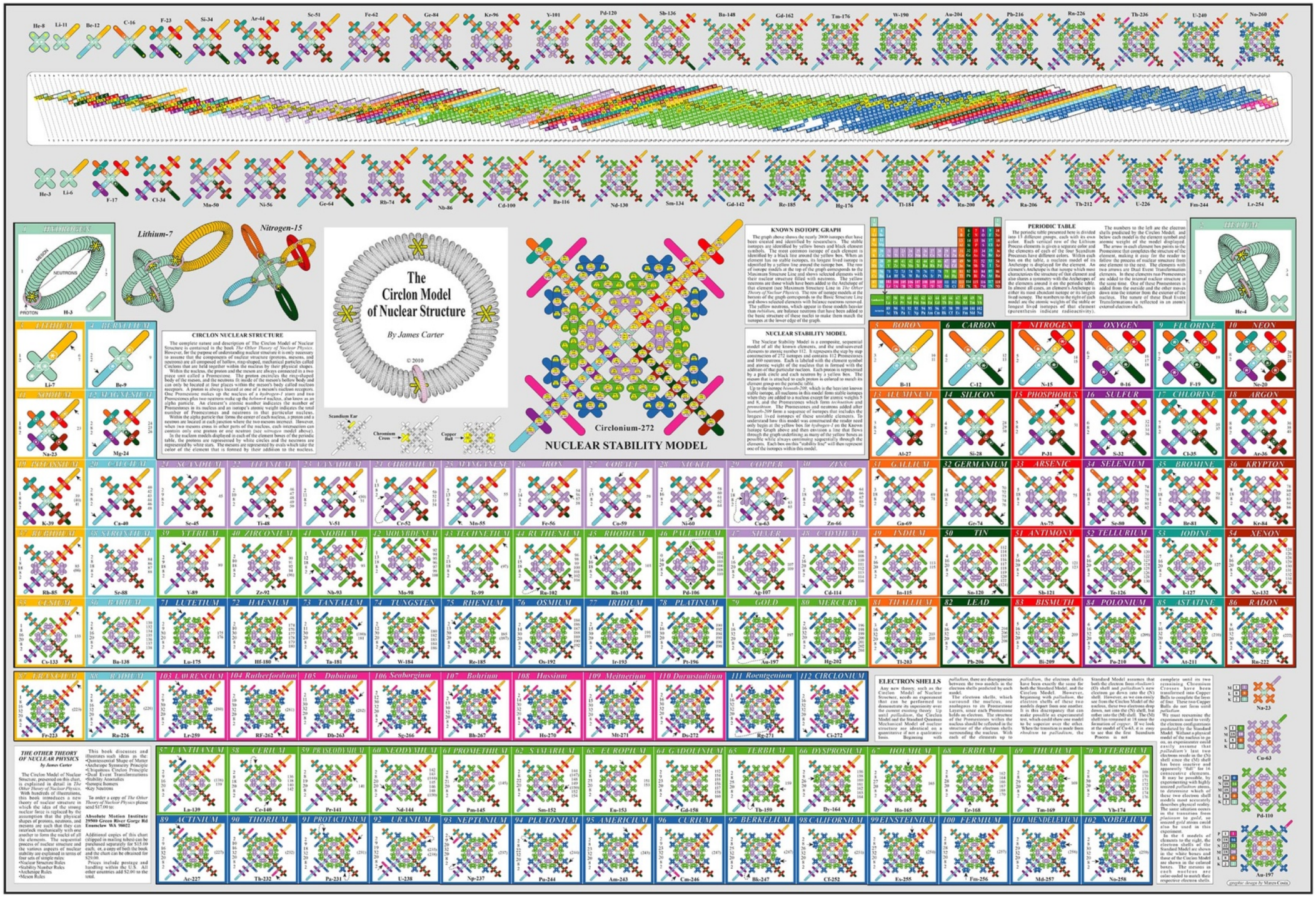

Fig 1.2: *The Circlon Model of Nuclear Structure*, James Carter, as shown on a poster produced by his website. This diagram was reproduced in the Santa Monica show as a series of square cards, pinned individually to the wall, each representing one element and following the layout above

A few months after the 2002 Carter show opened in California, the British artist John Latham wrote to Catharine Kinley, then Curator at Tate Modern in London, drawing her attention to a reference to his 1972 work *Time-Base Roller,* and a reproduction of an image of it [see fig 1.3], in an essay on Time by the eminent theoretical physicists Chris Isham (1944 –) and K. N. Savvidou (Latham 2002).

Fig. 1.3 *Time Base Roller*, Latham, 1972, mixed media, 1859 x 6370 x 660mm as reproduced in Isham and Savvidou's essay

Despite Latham's five-decade long dissemination of his Event Structure theory, Isham's mention of Event Structure is the first 'scientific' publication to acknowledge Latham's ideas[6]. Despite his own later attempts to downplay its significance, the Isham and Savvidou article is hugely important to Latham[7]. So significant is it that it catalyses

[6] Like Carter, Latham uses various terms to refer to his theories, settling on Event Structure as the general catch-all a few decades into its development. Flat Time theory, is probably how it is most commonly known but also TIME-BASE THEORY is used. Event Structure is a return to the origins of the theory: The O-Structure text that will be discussed more fully later in the chapter first coins this term.

[7] We will see how dismissive Latham later becomes of Isham and Savvidou's progress in chapter three, nevertheless he repeatedly makes mention of this reference in a number of his correspondences and draft essays, e.g. Latham, J. (2000-2009). art-science hybrid discovery as FLAT TIME. Flat Time House, archive of John Latham. **Box 1, folder 20**.

Latham to resurrect a proposal, first mooted to Tate Gallery curator Nicolas Serota (1946 –) some years earlier that the Tate should mount a major show entitled *The Trajectory of Art 1850-2000* (Latham 1997?). The show would describe the trajectories of art and science converging into his totalising theory, or as he explained in his 2002 letter to Kinley:

> the trajectory of art has delivered a numerate, inclusive cosmological concept, an umbrella function for all histories and cultures.

That Event Structure had arisen through his practice as an artist explains his claim that it has been delivered through the trajectory of art. As the title of his 1991 exhibition at the Museum of Modern Art, Oxford, *Art After Physics,* suggests, Latham asserted that his theories pick up where physics leaves off (at a point of failure roughly determined by the discovery of Heisenberg's uncertainty principle)[8]. His objective, as the letter outlined, was to offer a physical system that is also inclusive of the human experience, art, and culture.

The Kinley letter is poignant. Latham was eighty-one and his handwriting in the unrelated notes he has made at the bottom of this draft letter is shaky and barely discernible. In response to Isham's tentative crediting of his ideas he was qualified in his response:

> SWH [Steven Hawkins] has not cottoned on to 3D time. Isham and Savvidou were just getting there when the shift from orthodox 'gravity' became too much for their orthodox training to make sense of.

Latham asserts that the struggle mainstream science has had to include the force of gravity within a complete cosmological model had distracted Isham and Savvidou from pursuing their foray into time as a potentially independent variable within various physical systems, an avenue of research he felt would lead to a mathematical underpinning for his theories. However, reading the original essay, Isham and Savvidou's description of how this concept might work within classical physics was more an interesting bit of book

[8] As well as an explicit counter to Joseph Kosuth's 1969 Essay *Art After Philosophy*. (Harrison, C. and P. Wood (Ed.) 2003, P.840)

keeping for a theoretical physicist than a serious attempt to engage with Latham's cosmology[9].

With little elaboration by the artist on what he meant, and no indication that Kinley was deeply familiar with his theories, it is interesting to ponder whether Kinley would have understood the point Latham is trying to make.

That Latham appeared in a science paper around the time Carter appeared in a gallery *may* be largely coincidental. However, this temporal, if not physical collision of two men making interdisciplinary transitions does neatly punctuate their somewhat symmetric trajectories that took one outsider scientist into the gallery and one gallery artist into the world of outsider science.

Latham

John Aubrey Clarendon Latham was born in 1921 near the Zambezi river in what was then Rhodesia. Son of a British ex-pat couple, his father, a First World War veteran, was

[9] The essay, published in May of that year in an edited edition on the subject of time, produced to accompany a Darwin Lecture course at Cambridge University, gives an overview of the development of our understanding of time through the translation of various philosophical theories of time into simple statements about time's role within physical systems. Thus they draw Aristotelian, Augustinian and other theories of time into simple statements about the working of physical systems adopting these various approaches. This leads on to outline how, reciprocally, recent developments in physics have led to new approaches to understanding time, relating this back for comparison to the established theories they have already surveyed. In following this development, Isham and Savvidou describe time in relation to dynamic systems, as the ordering parameter in Newtonian mechanics before going on to describe how time operates within special and general relativity. Along the way they note an important moment of evolution: that when time becomes 'dynamics independent' i.e. becomes treated by physicists as a separate value in and of itself, described independently of a linear dynamic system. A section of their essay is devoted to the representation of time in this context and Isham and Savvidou express their surprise that such attempts to represent this non-dynamically dependent time have only been recently discussed, as a result of the demands of quantum theory.

Following the development of an independent notion of time for the purposes of advancing quantum theory, they note it was only as recently as 1999 that Savvidou herself went back to explore how such a dynamic independent representation of time might work within a classical (i.e. non-relativistic) model. It is in concluding this description of the representation of time in this context that Latham is credited and an image of the Flat-Time Roller reproduced [fig 2.]:

> It came as a great surprise to us to discover that the central idea behind the two types of time transformation had to some extent been anticipated by the artist John Latham. In a series of works known generically as 'time based rollers' he has presented a graphic representation of these ideas. (Ridderbos, K., (Ed.) 2002, P.17)

the local district commissioner. Growing up, Latham would have enjoyed a privileged background as one of the ruling elite, still preserving an Edwardian lifestyle of servants and class boundaries. From 1929 when he was eight onwards he was largely apart from his parents, at various boarding schools in the South East of England, finally entering Winchester College aged thirteen.

Winchester, one of the top 'public' schools, offered a robust but old fashioned curriculum, heavy with classics, history and mathematics, in none of which Latham was to excel. His real passion was for natural history, studying species of plants and animals, an interest which crossed over into his art classes, where his aptitude for drawing was clear. He relished the opportunity to paint the waterfowl that he pursued on nearby waterways. Winchester, the town and the school, were a world away from the centre of London, though just under an hour away by train, and the young Latham would have been largely insulated from the privations and sufferings that the depressed 1930s were wreaking on wider society (Walker 1995, p.7).

After leaving Winchester and enrolling without commission in the Royal Navy during World War Two, he was to try his hand as an illustrator of birds, expressing admiration for the bird paintings of the naturalist Peter Scott (later knighted) (1909 – 1989) son of the Antarctic explorer Robert Falcon Scott (1868 – 1912), and the sculptor Kathleen Scott (1978 – 1947). Latham befriended Peter Scott on a torpedo training course during his service, and cannot have helped being struck by Scott's war record that mirrored in a grander style Latham's own. During the War, Scott, as well as serving like Latham in the North Sea fleet, had put his artistic talents to use designing camouflage for battleships, including a design that was eventually used across the entire Royal Navy[10].

However, by the time he arrived at Chelsea School of Art in 1947 Latham's work had become more experimental and we see him attempting work in a variety of styles

[10] an art-'enabled' development for the advancement of wider society that perhaps anticipates the formation of the Artist Placement Group more than two decades later.

common to contemporary British painting at this time. For example, Latham's paintings immediately prior to the inception of his cosmological project are strongly redolent of Francis Bacon's in composition, theme and gesture: works like *Praying Figure* (1953-54) [see fig 1.4]. Yet whilst certain spiritual themes have begun to emerge in his work and there is an obvious preoccupation with depicting the human form, there is nothing to anticipate his radical departure from the corpus of contemporary 'avant-garde' London painting of the time through the instigation of his cosmological project that was to follow.

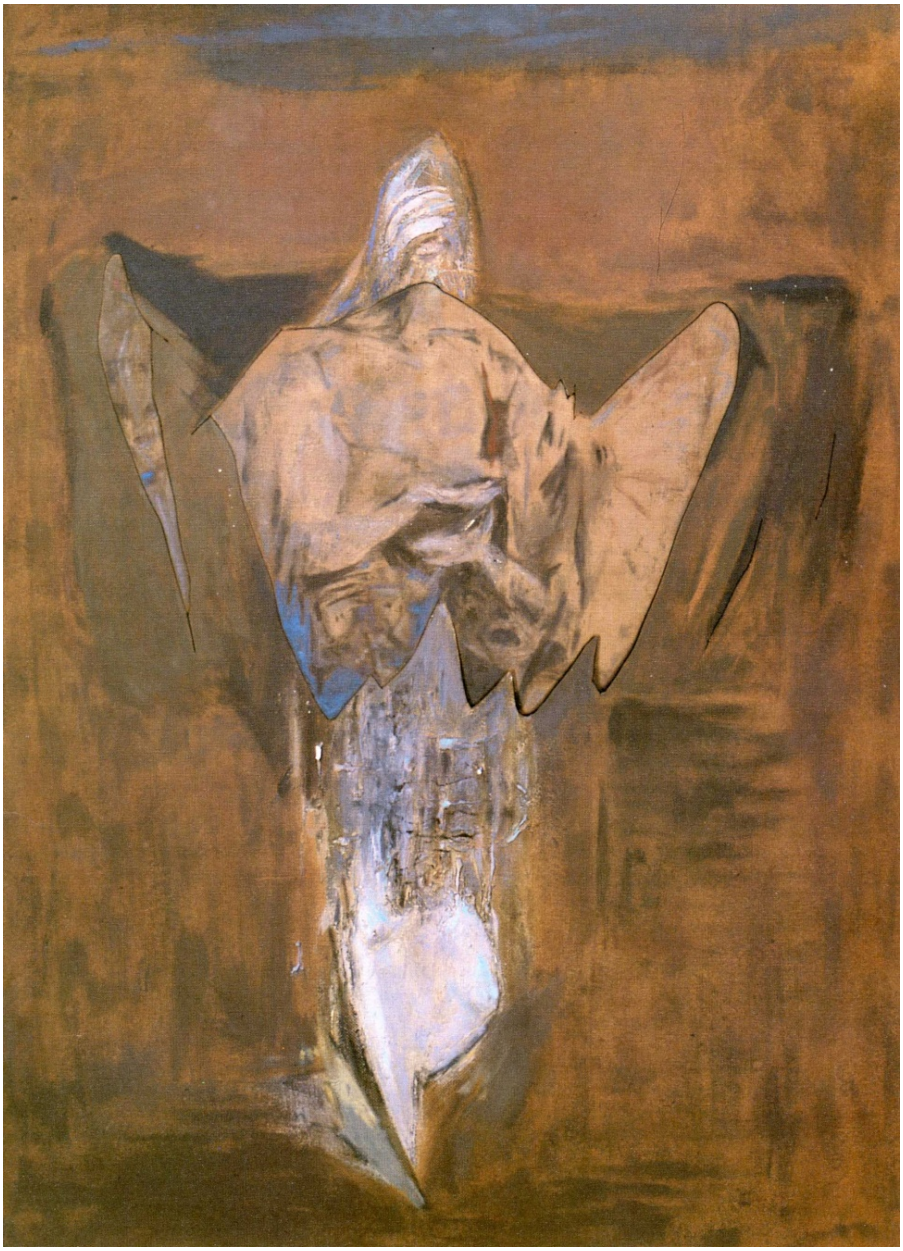

Fig 1.4: *Praying Figure*, Latham, 1953-54, oil on gesso, 121 x 89.5cm

Carter

James Carter was born over two decades after Latham in 1944 in the small town of Buckley in King County, Washington. The son of a farmer, he grew up only a few miles from the trailer park in Enumclaw where he lives today. The America of Carter's childhood was aglow with the potential of technology, attending his local White River High School in the 1950s as the American establishment was stepping up a gear to match the early Soviet lead in the space race. Pursuing his early interest in the physical sciences, Carter enrolled at the Pacific Lutheran University at the start of 1963 to read physics. His mid-academic year start date meant that Carter missed the primer courses for physics, so to fill time until his next opportunity Carter joined psychology and public speaking courses as well as the mandated religious studies course, spending his time verbally sparring with his fellow freshmen. However, the physics course was not to be. Carter realised by Spring Break that year that 'to do work on an original theory could never be done in a university setting' (Wertheim 2011, p.109) and by the end of 1963 he had left the university to pursue his theories independently. Over the subsequent decades, whether to make ends meet or just to satisfy his curiosity, he would occupy himself largely with practical projects.

One early such project was the search for the Port Orford Meteorite. Carter had read about the meteorite in Argosy Magazine, a long running American pulp serial. Intrigued by both its scientific value ‘in the science of Cosmology’ and learning it was worth ‘over two million dollars’ Carter decided to go and look for it (Carter 2016, pp.3,4). Carter had the brainwave that he might find it using infra-red photography; expecting the rock to have some of the latent heat of its fall to earth (Wertheim 2011, pp.110-113). The attempt was ultimately unsuccessful, but during his exploration he learned of a pool in one of the local rivers that had apparently never been entirely emptied by gold prospectors, owing to its depth and the size of its boulders. Gold, Carter reasoned, was denser than rock, so particles washed down the local streams would collect in the deep pools beneath waterfalls. Detailed in his autobiographical account A Summer of Gold (2016), the

summer of 1964 was spent in backbreaking labour as Carter tried to get to the gold he believed lay at the bottom of this pool, the 'Blue Hole'. Over the summer of 1964 Carter diverted the stream and, with the aid of a number of Heath Robinson contraptions and a few companions, emptied the huge waterfall plunge pool of rocks and gravel. Unfortunately for Carter and his friends, they found only a few small nuggets of gold. Discovering the bottom of the pool was perfectly smooth, he reasoned high flooding periodically sluiced the hole clean (Wertheim 2011, pp.114-126). For Carter though, this has been a success of sorts: he had solved the 'mystery' of the Blue Hole. Moreover, he had had plenty of time over the summer to speculate on the nature of the universe, from the meteorite's arrival from the heavens, to the eruption of gold from the earth, and had spent long nights discussing his burgeoning theories with his companions.

Before settling down as proprietor of the Green River Gorge Resort trailer park in 1976, Carter worked in machine shops and sawmills, as well as a decade spent scuba diving for abalone. Carter is intimately involved in every practical aspect of the sprawling upstate site: building drains and hooking up power lines; organising labour to pick rocks and cut brambles; and, like most of the residents, fixing up cars. It is here that he has done the heavy lifting on his theories, publishing his books and building his models, and it is here with his wife Linda, that he still lives today.

The Living Universe

Like the contemporary science whose discontinuities and paradoxes Carter aims to rectify, The Living Universe is itself made up of a number of discrete concepts, whose interactions are not always fully described. For this reason, it is hard to give a concise summary of its operation and much will remain to be elaborated on later in the thesis. However, the following provides a basic introduction. As explored in Carter's 2010 textbook The Other Theory of Physics, *Circlon theory* describes the physical building blocks of The Living Universe. The basic circlon is a torus structure formed by a circular helix; these are the components of the crystalline structures illustrated by his periodic

table. Circlons are made up of positive matter in a ‘line or “string” [that] is wound into a complex series of coils that has a circlon shape... there are no fields within the circlon particles at all and all interactions result from physical contact between the particles at different levels of their structure.’ Circlons range in scale ‘over a size range of over 32,000,000 from the electron radius to the Lyman series of photons’(Carter 2010, p.8). All matter, he believes is assembled up from this array of interlocking circlons of various sizes, whose orientation and interactions predict, according to his theory, all of the observable and measurable physical data that experimenters have produced to date within mainstream physics [see fig 1.5].

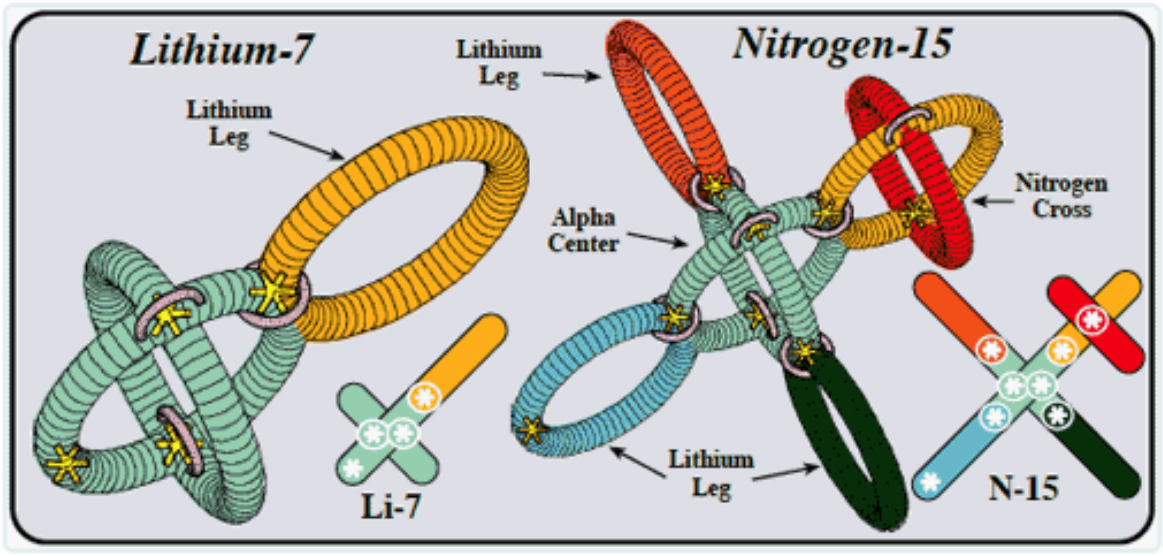

Fig 1.5: Graphic showing the addition of ‘Lithium legs’ to an ‘alpha centre’ to build up the nuclear structure of Lithium and Nitrogen. The smaller stars and pink circles represent protons and neutrons (Carter 2010).

This claim is laid out explicitly in the preface to *The Other Theory of Physics*. Speaking of the Standard Model (mainstream physics) versus his circlon system he says:

> Because the foundation of both models are so intimately connected at their most basic level, they usually make identical predictions for the values of physical measurements, However, the explanations of the underlying mechanics to these values are usually quite the opposite.(Carter 2010, p.4)

Carter builds a *mechanical* system for the universe, which he claims is able to reproduce precisely all observed scientific data; it does so however by taking a fairly consistently contrary view to mainstream theories.

Just as he proposes circlons as entirely mechanistic building blocks in the face of mainstream field theories, in building his system he turns on its head every other pillar of contemporary physics. The attractive force of gravity, for example is in fact the effect of the simultaneous and proportionate expansion of every element in the universe. The principle of absolute motion, a core constituent of the system, is 'the opposite to the theory of Special Relativity' (a notion 'fairly nonsensical to a physicist in the first place'). Essentially, unlike the universe of Albert Einstein (1879 – 1955)'s theories, where time and space can vary independently, the principle of absolute motion fixes their relation absolutely. Unsurprisingly, Carter's '*assumption of synchronicity'* is essentially the opposite of the Heisenberg uncertainty principle'(Carter 2010, p.9)[11]. These *anti-orthodox*, mechanical laws and concepts make up a system which Carter uses to explain everything from the beginnings of the universe to the behaviour of chemicals, and to speculate on subjects as diverse as interstellar travel and the bending of light.

Flat Time Theory

In contrast how does Event Structure work? Latham sums up the workings of this system in *the basic (T) diagram,* a graphic which explains the operation of the *Time Base Roller*. *The basic (T) diagram* explains the Time-Base spectrum, illustrated along the width of the roller. This stretches from the 'least event', 'An occurrence of not-nothing on a state of nothing, for a least instant' or around 10^{-23} seconds (the amount of time it was once thought for light to pass the diameter of an electron), and the 'Planck event' a frequency approximately equal to the age of the universe (Latham 1976, p.4, Keiner 1992, p.42)

[11] that the uncertainty principle is observable is down to 'the nature and limitations of measuring devices'

[see fig 1.6]. These ‘events’. moments of experience that occur over the Time-Base spectrum at different frequencies, constitute the building blocks of Latham’s system.

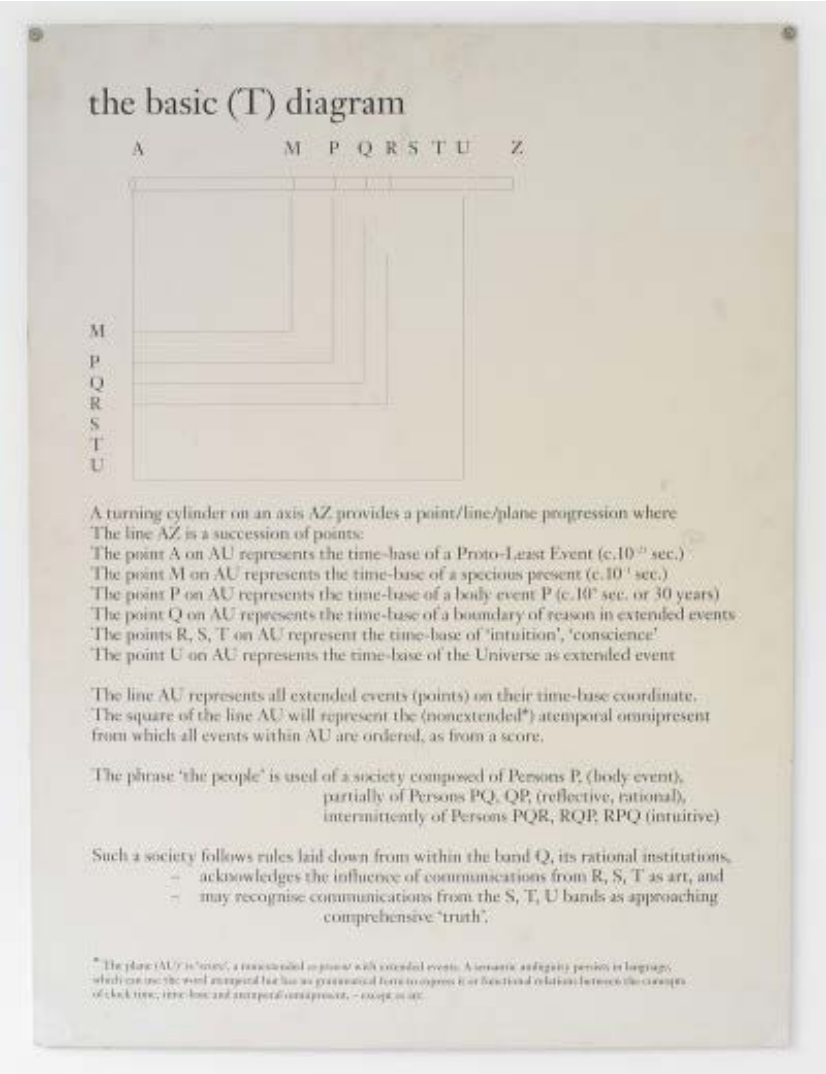

Fig 1.6: *The Basic (T) Diagram,* Latham, 1992, explains the operation of the Flat Time Roller. (Latham 1976, Keiner 1992)

Photo Ken Adlard

When experienced by the individual, these moments of experience can be understood as a sort of phenomenological data stream. Some things have lower frequencies like emotional experiences, and some higher, like moments of insight. ‘Events’ are not restricted to psychological phenomena so could be as simple as looking at a bird, or hearing its call. They can also be experienced simultaneously.

The turning of the *Time Base Roller* [see fig 1.7] reveals a continuously changing strip of canvass to the viewer, and the marks on the canvass at that moment correspond to the events being experienced. However, as already described in the Isham article, in Event Structure time is removed as a constant variable, internalising the ‘passage of time’ within an individual’s relative experience. Different people experience the same phenomena in different ways; depending on how ‘receptive’ they are to different frequencies of events. It is this problem of human experience that, Latham argues, is the chief failing of the current systems for describing the world (physics and language). To describe the world with a system that fully accounted for all of our different points of view, would allow us to function more harmoniously as a society.

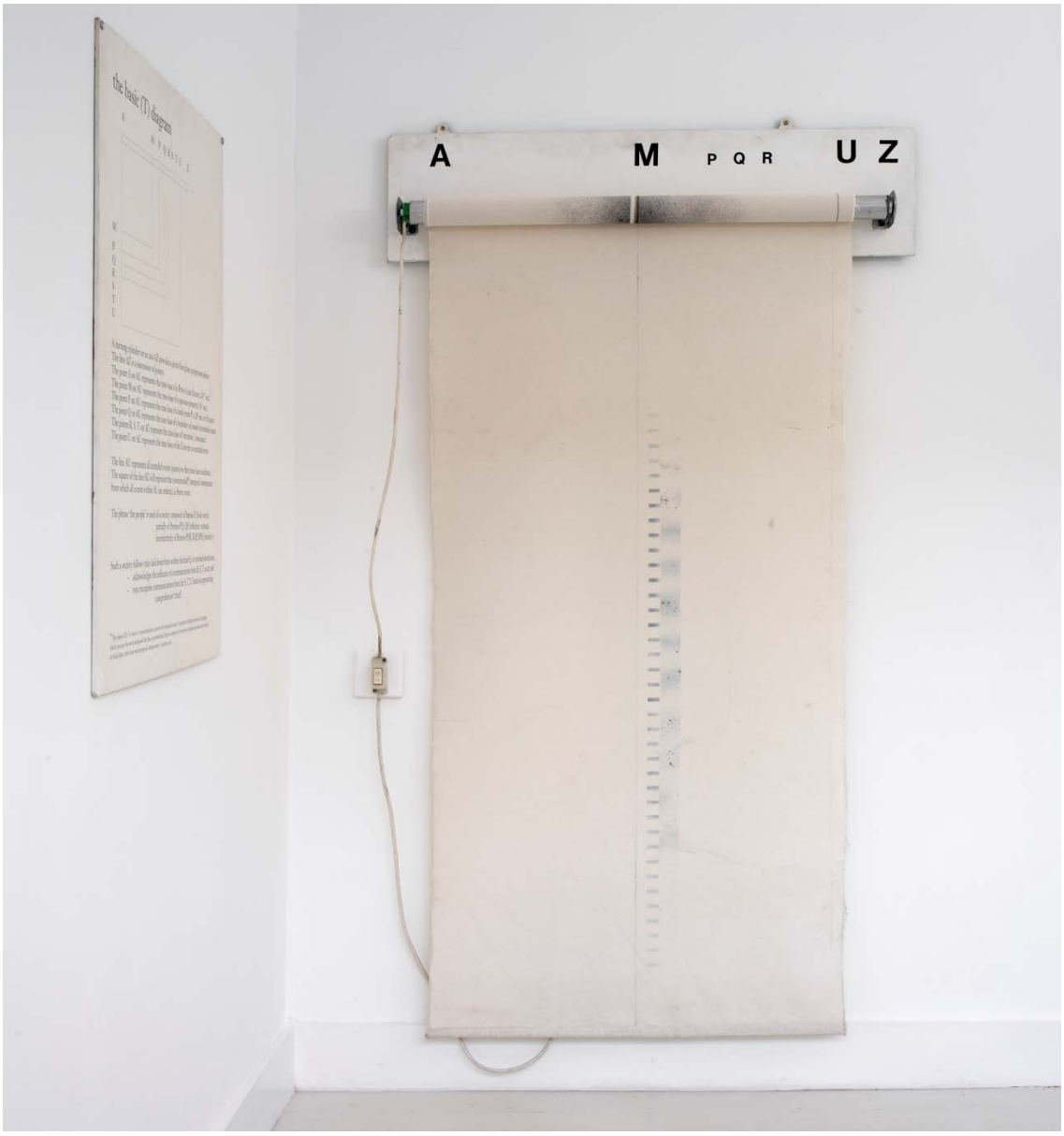

Fig 1.7: *Time-Base Roller with Graphic Score,* Latham, 1987, shown with *T-diagram* in the front gallery at Flat Time House.

A physical model too can be built from moments of experience, with the individual noticing an object or point in space. Three such ‘events’ can describe a plane, much as three points do in Cartesian space, although it should be noted Latham does not develop the functioning of physical systems very much further than this within Event Structure.

It is important to address the legibility of Carter and Latham’s ideas at this stage. Whilst we will go into considerably more detail into facets of their systems in future chapters, you should not be surprised if you are ultimately baffled, and

understandably frustrated by the ideas above. It is also not unreasonable to imagine that perhaps it is unfair in a chapter rooted in an art historical field, to judge Carter's circlon system, for example, in its treatment of spacetime. Perhaps if we were physicists or if we had the time and mathematical literacy to unpick his ideas we might find them to be coherent and compelling? Indeed, particularly as reading Carter is syntactically and aesthetically much like reading a physics textbook that is beyond one's comprehension.

However, these systems are in this thesis and not in Nature for a reason. As we will see, as *science* at least their ideas are incoherent and either not adequately explained to make them testable, or despite their claims, simply out of line with the experimental observations of 100 years of modern physics.

Artistic Outsiders

In Physics on the Fringe Wertheim categorises Carter as an 'outsider scientist', urging for this category's inclusion in the gallery as a subset of the much broader field of outsider art. As we continue to explore these two men's histories and theories, we will consider the utility and accuracy of this definition. This is not to dispute Wertheim's account per se, which she uses as a foil within her critique of complex, intuitively challenging, science and its relation to wider culture, but to develop a richer understanding of the operation and goals of Carter's and Latham's projects and to explore some of their motivations.

First, we will deal with Wertheim's use of 'outsider', particularly as she explicitly seeks to include examples of her 'outsider science' category within the wider field of outsider art. There is a substantial body of scholarship in the field of outsider artist and it worth briefly exploring whether either James Carter or John Latham might seem to be on track for inclusion in this bracket by any existing criteria.

The genealogy of outsider art is well charted, in his excellent book on the subject Outsider Art, Spontaneous Alternatives (2000), Colin Rhodes offers a history of the development of

this term since the early twentieth century that is worth briefly reiterating. Art Brut, as defined by the French Artist Jean Dubuffet in the 1940s was an attempt to discover a 'new' art outside the bourgeois 'coat' of 'occidental culture' which does not fit him any more (Rhodes 2000, p.23). This is best explored through the 'primitive man' who:

> Has rather an idea of weakness of reason and logic, and believes in other ways of getting knowledge of things. That is why he has so much esteem and so much admiration for the states of mind which we call madness.(Dubuffet 1951, quoted in Da Costa 2006, p.114)

Perhaps catalysed by wider cultural fascination with psychoanalysis in the early part of the twentieth century, this leads Dubuffet and others to seek out primitive, 'true' art in the asylum, following artists of a previous generation who had pursued similar goals through a vogue for primitivism. Artists such as Paul Gaugin (1848 – 1903) and Pablo Picasso (1881 – 1973) for example, sought an authenticity in artefacts and aesthetics borrowed from cultures in Africa and the South Pacific

This fixation with psychology and madness (which had similarly been equated to absolute freedom within the Surrealist movement of earlier decades), also pointed the weary bourgeois painter of the 1940s to the asylum for inspiration and renewal. Whilst by extrapolation this Art Brut truth might also be found in the works of children, or of westerners who had been shielded from mainstream culture by geography, class or religion, it was the collection and dissemination of the art of the insane which principally shaped the early development of the notion of outsider art, particularly the vast collection of art amassed by the German art historian turned psychiatrist Hans Prinzhorn (1886 – 1933) after the First World War, and the collection and documentation of works undertaken by Dubuffet himself.

Considering outsider art as a contemporary phenomenon, Rhodes proposes a taxonomy of sorts to subdivide the field of outsiders. Alongside the maker (or architect) excluded from mainstream culture by class, education or health (mental or physical), Rhodes includes the reappraisal of post-colonial artefacts, not as an extension of the primitivism of a century ago but in recognising the legitimacy of these makers as having practices

potentially equivalent to but insulated from the Western art world (so worthy of 'gallery' rather than museum dissemination). He also includes: Mediumistic Art; Art created overwhelmingly in response to a specific experience or crisis; the art of prisoners (where this is distinct from the above); and the naive art of the simply un-art world educated (although Dubuffet would have vehemently objected to the latter[12]). Finally, the Market has become a distinguishing factor in determining outsider-ness, although Rhodes is frank about the difficulties of this distinction, particularly where the artist is still alive and having been 'discovered' then participates in the mainstream world of the gallery and institution.

It seems fairly clear at this stage that Latham is unlikely to qualify as an outsider by any of these criteria. Attending art school might plausibly launch an outsider artist's journey only if some trauma, or social estrangement then disconnected the artist from the mainstream art dialogues of the day. Latham however has been remarkable in his ongoing and evolving role in the British avant-garde, and if this wasn't enough to certify his insider credentials, he has taught in various capacities at a number of UK art schools, most notoriously St Martin's in the 1960s where, with students, he produced perhaps his best known work: *Still and Chew: Art and Culture* (1966) [see fig 1.8][13]. Perhaps suggesting a desire to position himself as, if not an outsider, then at least an anti-establishment rebel, Latham has claimed he was dismissed from St Martin's for the creation of this work, which involved the destruction of the original copy of the American art critic and theorist Clement Greenburg (1909 – 1994)'s Art and Culture(1961) from the department's library, although

[12] Saying: 'I must stress that this Art Brut to which I am alluding is not to be confused with that form of activity.. which is known as "naive art" or the art of Sunday painters.' (Dubuffet quoted in Rhodes, C. 2000, P.140)

[13] Whilst the 1960s marked some of Latham's most varied and experimental works, including filmed works based on book assemblages, mechanised suitcases, the first of his burnt book 'skoob towers' and mixed media performances involving nudes, fans and polyurethane foam, *Chew and Spit: Art and Culture* marks itself out as a simple conceptual statement, executed in a slick and portable manner, perhaps explaining its early inclusion in the collection at MOMA in New York. Even other simple book works of this period, such as *Mechanical Bride by Marshall McLuhan*, ca. 1969, lack some of Chew and Spits' user-friendly conceptual neatness, having the outline of an erect penis cut out of all the pages.

this account has now been called into question[14]. More likely the spirit of humorous defiance against the hegemonic voice of Greenburg and the prevailing American avant-garde at the time became harder to justify in subsequent decades, leaving Latham searching for some self-determining value in this now-emblematic work (which in itself does little to advance his theories).

Fig 1.8: *Still and Chew: Art and Culture,* Latham, 1966

To be anti-establishment and avant-garde is not to be an outsider, and Latham's position in the Artist Placement Group (APG), constituted in 1966 and containing such luminaries of the British art scene as Barry Flanagan (1941-2009), Jeffrey Shaw (1944-) and Stuart

[14] Most comprehensively in this article by writer Stewart Home (1962): https://www.stewarthomesociety.org/art/latham.htm

Brisley (1933-), cements him (with hindsight) within the mainstream development of art (even if his longstanding relationship with the Lisson Gallery and Tate could be ignored!).

Carter is more of a typical outsider by Rhodes' criteria. Whilst he does not appear to have been excluded from mainstream culture by any force majeure of mental or physical incapacity, colonial barbarism, or trauma, he has certainly lived a life seemingly untouched by the developing conversations of mainstream visual culture. It would perhaps be controversial to suggest that his years spent diving for abalone or running his trailer park in a small community upstate Washington alone satisfied the criteria for outsider, and even more so if this were qualified in light of a lack of exposure to a metropolitan artistic discourse. However, whatever the geographical realities of his history, there is no evidence in his writing or interviews that he has ever paid much attention to the art world. As a man self-consciously involved in the development of science, not art, why should he? There is certainly no evidence that the conceptual developments in the art of the last fifty years would have been seen by Carter as relevant to his project.[15] In this way Carter's life, seemingly untouched by the mainstream art world, probably does qualify him as an outsider artist within Rhodes' definition.

However, Wertheim is effectively seeking to *add* the category of outsider scientist to the Rhodes taxonomy, not simply to include Carter within its existing criteria. Whilst Carter might qualify as an outsider in the art sense, Wertheim uses 'outsider' to describe his science, not some aspect of his biography. If he was simply an institutional outsider who had made an impact on mainstream science, he might join figures such as George Green (1793 – 1841) a miller who made substantial contributions to theories of Electricity and Magnetism or Forest Mimms (1944-) a USAF officer with no science qualifications who has invented devices to measure ozone in the atmosphere and has been published in many mainstream peer reviewed journals. Neither of these men would fit Wertheim's

[15] In recent discussions with me he has explicitly stated that the dissemination of his ideas through the gallery is in no way helpful finding his desired audience.

criteria however, despite being 'outsiders' by Rhodes'. Wertheim asserts The Living Universe is outsider science because as a theory it is not endorsed, discussed, or even widely known about within the institutions of mainstream science. It is for this reason, not any more generic qualifications or personal circumstance or biography, that Carter, according to Wertheim at least, is an outsider scientist.

Scientific Outsiders

In order to better understand contemporary outsider science, Wertheim dedicates a chapter of her book to the history of various other scientific outsiders, first introducing the reader to a Victorian compendium of 'wrong' theories (paradoxes) and their proponents (the 'paradoxers'): A Budget of Paradoxes(1872) by Augustus De Morgan (1806 – 1871), a British mathematician. In the Budget, De Morgan rubbishes several hundred theories stretching back to ancient Greece in densely written, anecdotal tones. Contrary to Wertheim's assertion that De Morgan 'never resorts to derogatory remarks' the text is notably barbed at times: 'This is a ridiculous attempt which defies description'[16] (Wertheim 2011, p.80). This is often particularly unfair, given the recipients are often building their theories in a pre-scientific revolution context where alchemy and alchemical logics determine the development of natural philosophy, rather than the empiricism embraced by the *enlightened* Victorian author. Wertheim is interested in why these cases occur, but as she explains, De Morgan never addresses the motives of these outsiders, other than to excuse them the accusation of lunacy: 'It is a weakness of the orthodox follower of any received system to impute insanity to the solitary dissident', she goes on to paraphrase De Morgan suggesting that 'It is an excess of integrity rather than a lack of it that drives the outsider theorist' (Wertheim 2011, p.94). Wertheim then sets out her own approach to

[16] Entry number 93 in the Budget. Elsewhere De Morgan is dismissive of Francis Bacon (1562 – 1626): 'Bacon threw science aside, from ignorance..' (number 127) and rather damning of Alexander Maxwell The Plurality of Worlds (1820): 'He had peculiar notions, which he was fond of discussion with his customers. He was a bit of a Swedenborgian.' (number 174).

understanding Carter's project, as a specific example of a counterpoint to the professionalization of science:

> In order to have a clear class of paradoxers there must, by definition, exist a well-accepted orthodoxy.(Wertheim 2011, p.97)

However, gathered largely from history, De Morgan's paradoxers are not really outsider scientists, as writing in the mid Nineteenth century the term scientist itself had only recently begun to take its contemporary meaning, and without a clearly defined set of 'insiders' it is hard to be labelled an outsider, a point Wertheim concedes. De Morgan himself planned to write an accompanying volume demolishing the ideas of contemporary theorists, especially those within the burgeoning academy of science. This illustrates that De Morgan was writing at a turning point, where 'science' and its institutions were coalescing into some kind of coherency. Wertheim sets up a genealogy, from the Budget through to Carter and his contemporaries, placing the 'outsider scientist' outside the consensus and institutions of post-scientific revolution science.

However, despite her attempts to disambiguate the two, there seems to be extensive cross over between those outside of science's institutions and those scientists simply outside the general consensus of science. Carter is a good example of the former whereas many of the examples in her book, like Irwin Wunderman, who has a Ph.D in electrical engineering, are in fact scientists by training who have become preoccupied with developing a theory in a field often other than their own[17].

This problem becomes even more complex if you consider that many contemporary 'outsider science' theories were actually once very much mainstream science; views held by luminaries from the history of science. Indeed, there is much in common between Carter's circlon theories and those developed by Dr Peter Guthrie Tait (1831 – 1901), physicist, mathematician and professor at the University of Edinburgh, who in turn based his ideas on the work of the German physicist and physician Hermann von Helmholtz

[17] As we will see in chapter three, the majority of the Natural Philosophy Alliance, the organisational umbrella for outsider science, are qualified, and often active researchers in related fields.

(1821 – 1894). Helmholtz predicted the behaviour of whirling vortices of fluids forming relatively stable ring shapes (Wirbelbewegungen) and Tait built on these predictions to construct an apparatus to produce examples of such vortices: what we would now call smoke rings. The stability of the rings impressed Tait and he introduced the apparatus to his friend and colleague Sir William Thompson, Baron Kelvin (1824 – 1907) who makes a note of its construction in a letter to Helmholz in 1876[18] [see fig 1.8].

'Just now . . . *Wirbelbewegungen* have displaced everything else, since a few days ago Tait showed me in Edinburgh a magnificent way of producing them. Take one side (or the lid) off a box (any old packing-box will serve) and cut a large hole in the opposite side. Stop the open side *AB* loosely with a piece of cloth, and strike the middle of the cloth with your hand. If you leave anything smoking in the box, you will see a magnificent ring shot out by every blow . . . you will easily make rings of a foot in diameter and an inch or so in section, and be able to follow them and see the constituent rotary motion.

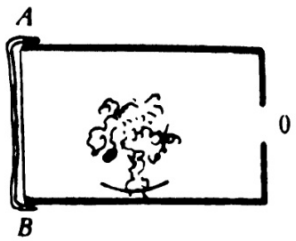

Fig 1.9 Baron Kelvin writes to Helmholz. The apparatus we see described here almost exactly matches that which James Carter would 'invent' more than 100 years later to demonstrate his own version of the stable vortices theory.

Thomson and Tait who are exploring concepts of electromagnetism in relation to a theory of luminiferous ether[19] (a kind of all permeating liquid from which all matter and energy interacts) alight on the idea of a matrix of interlinked Wirbelbewegungen as a

[18] William Thompson to Hermann Helmholtz, 22nd January, 1867. Quoted in Smith, C. and M. N. Wise (1989). Energy and Empire, A biographical study of Lord Kelvin. P.418

[19] The theory of an (a)ether, which had its origin in Plato's complex creation myth the Timaeus(c.360 BC), was a staple of the medieval alchemist and was later resurrected by Nineteenth century natural philosophers as a luminiferous ether through which light is transmitted, as a way of trying to reconcile the essentially mechanical rules of Newtonian physics with the well-established science of optics. The theory lapsed within mainstream science with the adoption of Maxwell's equations and the field theories of electromagnetism early in the twentieth century, however many contemporary proponents of alternative models of physicists use an ether (or aether)-like cosmological matter with many and varied properties as a key component in their systems. A good many of these individuals can be found listing their interests and publications on the website of the Natural Philosophy Alliance, which we will return to in chapter three. '(Luminiferous) ether' is typical spelling for the term as used by Victorian Natural scientists, whereas contemporary outsider scientists and alchemists tend to prefer 'aether'. Spelling used follows reference.

potential model for how the 'hard' atoms of solid matter are expressed from the fundamental ether:

> If there is a perfect fluid through all space, constituting the substance of all matter, a vortex ring would be as permanent as the solid hard atoms assumed by Lucretious. (Thompson 1867, quoted in Smith and Wise 1989, p.418)

Thompson is so enthralled by the idea that 'atoms' and indeed all matter could be formed of circular vortices in the ether, that before he has done the mathematics to prove that such an interlocking matrix of vortices would indeed be stable, he publishes the idea, as well as including it in correspondence to other luminaries of the physical sciences such as George Stokes (1819 – 1903)[20]. Increasingly confident in his theory, Thompson extrapolated these stable toroids to all manner of equally stable knotted forms, providing a rich mathematical palette with which to construct a new universal theory uniting, as he believed possible: gravitation, the kinetic theory of gasses, the dissipation of energy, and wave motion in elastic liquids and solids[21].

Was Tait an outsider for exploring a now defunct theory? Hardly, for if by this criterion he is an outsider, so is Thompson, Baron Kelvin, one of the central minds of Victorian physics and engineering. However, these men were exploring this theory as a potential route to explaining a range of phenomena inconsistent with the prevailing scientific models of the day. According to the American historian of science Thomas S. Kuhn (1922 – 1996), such theorising of anomalies between a theory and observable data is a key part of the development of science:

> Discovery commences with the awareness of anomaly... It then continues with a more or less extended exploration of the area of anomaly. And closes only when the paradigm theory has been

[20] Thompson to Stokes, February 1867, K372, Stokes correspondence, UCL, mentioning the 'very promising' vortex atoms and their vibrations. (Quoted in Smith and Wise 1989, P.419)

[21] Satisfactorily for Thompson, and for Tait the mathematician in particular, these knotted forms were readily interrogated by challenging new mathematics. Moreover, they were orderable, forming groups with common properties and, much to the satisfaction of his Victorian instincts, Tait created a taxonomy of hypothetical knots, forming the basis for a mathematical theory of knots that would last long after ether theories has fallen out of the mainstream to this day Tait's knot theories provide a mathematical toolkit for a wide range of other applications, from structural complexity analysis to modelling DNA molecules.

> adjusted so that the anomalous has become the expected.(Kuhn 1962, p.52-53)

For Kuhn, Tait and Thompson are exploring the inconsistencies between the essentially mechanical theories of Newton that underpin their physics, and the increasingly hard to reconcile experimental results emerging from the field of electromagnetism. Any investigation of observed anomalies with new theories is a key part of the wider development of science (although he would distinguish between this activity and the business of gathering and analysing of data through experimentation that was predicted by existing theories, which he calls 'normal science'). So if Carter and Latham are just proposing new theories to explain anomalies in the results of today's normal science, is it fair to label them as outsiders, simply because they exist outside of any institutional framework? Whilst the departure from the theories of normal science that the two men's theories propose is dramatic, it is worth reflecting for example how little Newton's theories explain the phenomena of electromagnetism, which had been demonstrated and theorised extensively at the time of the exploration of the Wirbelbewegungen, not least by Kelvin and Tait who had contributed significantly in both experimental and practical terms[22]. The eminent physicist A.J. Leggett (1938 –) goes even further describing the question of electromagnetism within the original Newtonian scheme as being: 'merely philosophical'(Leggett 2006, p.15). So the discovery of a very stable formation, the Wirbelbewegung, that can be derived from mechanical principles within fluid dynamics, but which might explain how the physical properties of matter arise from the background ether, was a compelling notion and one which Tait and Thompson might have been expected to pursue.

The departure from the science of Kelvin and Tait to the modern fields of relativity and quantum mechanics is plausibly as dramatic a leap as those proposed by Carter and Latham are from the Standard Model today. So why is it that their theories cannot be

[22] Kelvin was to design the first successful transatlantic telegraph cable.

treated like the Wirbelbewegungen, as part of science yet to be proved, or perhaps even if we are satisfied they are wrong, a now redundant part of the history of science[23]?

Firstly, Tait's Wirbelbewegungen entered the history of science as they were used to potentially explain anomalous observations in the prevailing paradigm of their day. If Carter and Latham's theories are to measure up as potential paradigms in waiting, they need to propose answers to anomalies in today's science and offer a testable alternative that can better predict experimental outcome.

Firstly, the anomaly: as we will explore in more detail in chapter three, both men would cite various problems as the requirements for a new theory: the problem of wave/particle duality and the role of quantum mechanics in the Standard Model; Heisenberg's uncertainty principle (although this is in fact a very 'certain' and testable theory); and the unification of all of the forces, including gravity, within a single model[24]. Despite these claims, neither take specific experimental results and show how their theories would better account for discrepancies with the current theory. Kuhn is specific that the progress of science proper and the shifting of paradigms is catalysed by these specific incidents. The problems cited by Carter and Latham are typified as problems within the interface of current theories explaining the behaviour of the universe at different scales, not specific experimentally observed deviations from them. This lack of specific experimental deviation that their new theories can claim to explain calls their validity within Kuhn's description of science into question.

Ultimately, failed attempts to build satisfactory mathematical models and contradictory experimental observations led Kelvin to abandon the vortex theory. Tait, however, would adopt the vortex theory almost evangelically, attracting opprobrium even at the time of

[23] Whether or not these theories once disproved constitute science proper is a separate question. Kuhn doesn't concern himself with this definition but as the abandoned theories are part of his overall account of the development of *science,* it seems likely he'd be comfortable with an appropriately qualified use of that term.

[24] the principle anomaly for which string theorists propose solutions.

publication for his The Unseen Universe(1875), a metaphysical extrapolation of the vortex theory. In this book, the vortex forms do not just constitute the atoms they were originally conceived to represent, but are extrapolated to a fundamental component of the working of the universe, invoking a hierarchy of ever smaller, ever more stable vortices emerging from the ether, ultimately linking the physical construction of man with the eternal; a satisfactory and not entirely metaphorical allusion to God, appropriate enough for a good Victorian Christian. What is more surprising though is that Carter, discovering *de novo* the stability of circular vortices in the second half of the twentieth century, should use it in a similar fashion, its form becoming the building block, not just for atoms, but as the predominating structure in the universe (more in chapter three).

Carter was not aware of Tait and Thompson's work when he invented his system but since learning of it has happily referenced it in his own work. Indeed, in the opening salvo of The Other Theory of Physics, he uses this point of commonality to offer an olive branch, not to mainstream science, but to that other long abandoned theory intrinsic to Tait and Thompson's ideas, that of the ether, opening his book with 'A Note to the Aether People' (Carter 2010, p.3) an attempt to bring other scientific outsiders exploring an ether theory on board behind his own circlon approach (more in chapter three).

Wertheim largely focuses on the circlon theory in her book, and this is understandable. Of all of his sprawling output, this element is the most intuitive and produced the most striking graphical output. However, his system sprawls far beyond just the cirlon structure. It is a real, if flawed attempt to address more than just physics. The Living Universe also contains its own theories of the consciousness, gender, and god, along with other concepts designed to oil the wheels of this imaginary system. Indeed what is most striking about this system is its universality. Much of his later books like The Other Theory of Physics and The Living Universe are structured as histories of the universe from its start, in some ways more redolent of creation myths than science text books. In his own words: 'The Living Universe is a story about the evolution of the reality that we call the universe'

(Carter 2010, p.16), and there is a whole chapter on ‘A Place for God in the Living Universe’, in which he explains:

> The external god is separate from this arena of matter and energy. This god is not made from matter and energy like us, it is made from an all pervading space like material that can best be described as a universal consciousness that can become so concentrated at locations like here on earth that it can communicate with the consciousness of human beings and maybe even animals, plants and rocks. (Carter 2011-2012, p.32)

Unlike most of the outsiders Wertheim introduces, who focus on one theory, or ‘hole’ in the scientific system and try to correct it, Carter, and as we will see Latham, purport to offer a *complete* alternative model and one which they claim can predict the business as usual observations of science: accounting not only for radio waves, gravity, the behaviour of matter and so forth, but also for consciousness, the experience and mechanics of time, and spiritual or parapsychological effects. It is this comprehensive re-imagining of the whole universe that unites Carter and Latham’s projects, and it is on this basis that the term ‘outsider cosmologist’ will be proposed later in this chapter.

The Origins of Event Structure

Fig 1.10: *Valley of Bones*, Latham, 1948, Oil on canvas 61 x 92cm

To better understand the claims made by Latham for Event Structure, it is worth expanding upon its origins. Although it is important to note the substantial evolution that occurs in the system in the decades after its inception (more in chapter three), the ideas at the heart of the system stay the same.

Following his post WW2 demobilisation and studies at Chelsea Art School, Latham moved to Church Crookham in Hampshire, near his mother; in 1950 he married Barbara Steveni (1928 –), and established a market garden to support his life as a newlywed artist. Latham's paintings of the time give little hint as to the events that would follow which lead to the formulation of Event Structure. The expressionistic painting *Valley of Bones (*1948) [see fig 1.10], shows an abstracted scene of brightly coloured figures bathed in a storm of bright light, in a nightmarish landscape. Whilst it might have some kind of spiritual or metaphysical concerns, it in no way presages the largely monochrome, sprayed works that followed the 'discovery': the spray gun and the inception of Flat Time [see fig 1.11].

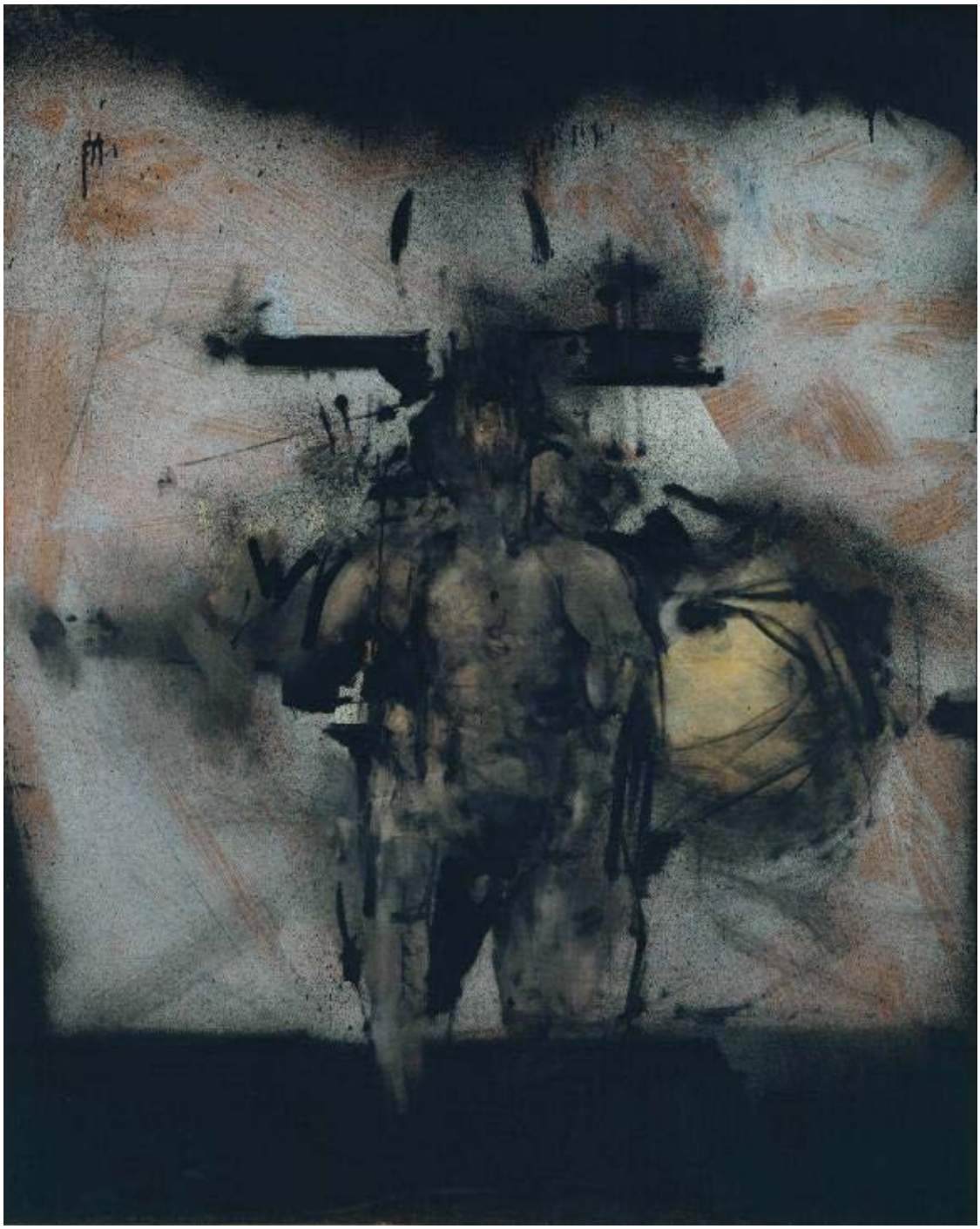

Fig 1.11: *Man Caught Up with Yellow Object*, Latham, 1954, oil on board, 122 x 97.7cm

It was in Church Crookham in 1954 that Latham met another recently married couple, Clive Gregory (1892 – 1964), an astronomer and Anita (neé Kohsen) (1925 – 1984) a psychologist. Clive and Anita Gregory were an unusual couple. Anita had been born in Germany in the 1920s to Jewish parents and, fleeing the rise of the Nazi party in the late 1930s with her family, she had spent some time in a convent in Belgium before moving to

London and studying languages at Birkbeck College. After the War she returned to study at St Hughes College, Oxford where she read a combined humanities course with politics, psychology and physiology. It was towards the end of this course, in 1949, that she met the reader, Dr William Brown (1881 – 1952) and developed a longstanding interest in the parapsychical: the scientific exploration of psychic phenomena[25]. It was with Dr Brown that she discussed the controversial Austrian physical medium Rudi Schneider (1908 – 1957) [see fig 1.12].

Fig 1.12: Harry Price and Rudolph Schneider (left to right) wired up as part of a parapsychic experiment (1930).

[25] Parapsychic research had garnered much mainstream respectability through the investigations of the Scottish author and physician Sir Arthur Conan Doyle (1859 – 1930), and stage illusionist Harry Houdini (Erik Weisz, 1874 – 1931) and by institutions like the College of Psychic Studies in London, founded in 1894 (of which Conan Doyle was Chairman), and the Society for Psychical research, and had enjoyed a century and a half of borderline scientific respectability; indeed the image above of Scheider and Price was originally published in an article in the Scientific Journal Nature.

Schneider's psychic powers had been investigated by a number of authorities between the wars, most notably in the UK by the short lived National Laboratory of Psychical Research (1925-1934) and his case would have been familiar to Kohsen from the publicity generated during her childhood. Some twenty years previously, these researches had been widely disseminated through the popular press, most notably by the Laboratory's founder and director Harry Price (1881 – 1948), who issued a public challenge to any stage magician who could replicate Schneider's performance, with a prize of £1000. Brown had become involved in this public debate, on one occasion calling the Daily Mail at one in the morning to announce his belief, at the end of a particularly impressive séance, in the veracity of Schneider's claims[26]. Kohsen's longstanding interest in the parapsychical cannot be lightly dismissed, as late as the 1970s she was still publishing articles on the subject (Kohsen 1977)[27].

A generation older than Kohsen (his second wife), Clive Gregory came from a background of mainstream astronomy, establishing and then serving as director of the University of London Observatory. He would have retired from academia at a time when the new physics of the 1920s and 30s, ideas like relativity and quantum mechanics, were becoming mainstream amongst younger scientists, and the field of astronomy was being rewritten in terms of space time and neutron stars. We can only speculate this had left the

[26] Dr Brown, a medical Doctor, had tangled publically with Price as well as earning Brown a good deal of ridicule from his academic colleagues. Whilst some two decades previous to his meeting Kohsen, it seems clear from her later book Anatomy of Fraud Harry Price and the Medium Rudi Schneider, that Brown was still preoccupied with this humiliation (Kohsen, A. 1977). Kohsen was obviously deeply affected by the encounter with Brown and maintained a long standing interest in the parapsychic and this episode in particular. In 1974 she was to publish a lengthy critique of Harry Price's research methods, implicitly supporting the case for Schneider's talents and by extension restoring posthumously some of Brown's lost pride (it seems however that much of the opprobrium at the time was for the means by which he had disseminated his belief in the Medium, not the belief itself).

[27] Later Latham would usually refer to Kohsen as a 'graduate in animal ethology and psychology', rather than an expert on the parapsychical, suggesting a deliberate desire to keep this facet of the origins of his theories under wraps, E.G.: Latham, J. (unknown). Letter to Terry Measham. Flat Time House, the archive of John Latham. **Box 1**.

scientist stranded at his retirement, as many older academics are, behind the tide of progress and thus perhaps all the more receptive to unconventional intellectual projects.

It is not for now to speculate what might have brought together this unlikely pairing, but by the time that they encountered the young Latham couple, Gregory and Kohsen had already catalysed a joint project, resulting in a book published around the time the Lathams moved to Hampshire: Physical and Psychical Research, an analysis of belief(1954)[28]. Kohsen and Gregory were interested in reconciling the parapsychical with the physical within a new scientific model; a goal somewhat neglected by the theories of general and special relativity that had so transformed Clive Gregory's field prior to his retirement.

It was in Church Crookham that Latham began pioneering the use of the spray gun in his painting (see fig 1.11), having been struck by its graphic potential whilst applying creosote to the prefabricated house they were staying in.

Latham was not the first artist to use spray paint in his practice, despite his later claims, but it is reasonable to assume he would have been unaware of other artists using spray guns at the time, such as the 1930s Mexican muralist David Alfaro Siqueiros (1896 – 1974)[see fig 1.13]. For an artist whose subsequent development showed him quick to grasp new ways of working, the visual novelty alone of the sprayed would likely have led him to experiment further, regardless of the key role the sprayed mark came to have in Event Structure.

[28] It may seem surprising that a successful scientist like Gregory should have been keen to participate in such an undertaking with Kohsen, particularly given his substantial seniority in years but Gregory had had his own part to play in the saga of Schneider and Brown, long before the couple met, a fact which may also have helped the otherwise unlikely pair become intimate. Explored further in Anatomy of Fraud Harry Price and the Medium Rudi Schneider(1977(and Alex Owen's The Place of Enchantment : British occultism and the culture of the modern(2004).

Fig 1.13: *America Tropical: Oprimida y Destrozada por los Imperialismos* — or "Tropical America: Oppressed and Destroyed by Imperialism.", David Alfaro Siqueiros, 1932 (detail shown as digitally enhanced visualisation of the recently restored work)

The first recorded time that Latham used the spray gun for art was for a mural, requested by Gregory and Kohsen to mark a Halloween Party at their house. The work is now lost but Latham had also conceived of the idea that the speckles of paint it produced might recall stars - the atomisation of pigment caused by the gun would, he thought, generate constellations - a negative image of galaxies- that would appeal to a Gregory, an astronomer. Kohsen, he believed, would find in the central motif he planned for the mural, a black triangle within a black and white surround, would suggest an eye, reflecting her ongoing interest in the mind (Transcript of tape recording between John Latham and his son Noa 1979 quoted in: Walker 2008, pp. 8,10).

In fact, Gregory and Kohsen found something quite different in the mural, something that was to change Latham's practice in a profound manner and instigate one of the most distinct projects in post war British Art.

The Gregorys quickly decided that the sprayed marks were a graphical representation of the parapsychic model they had been developing. This ability to illustrate their ideas visually led to Latham’s involvement in the further development of their theories. Latham suggests that Anita provided the 'social/human science' perspective and Clive Gregory the 'physical science' perspective, commenting later that his own 'contribution' to Event

Structure, as this model was to become, was as a 'third pillar', offering a non-verbal means to describe and explore the theory, which explicitly rejects verbal and mathematical languages as being insufficient to elucidate a 'true' model of the cosmos. Together, they set up the Institute for the Study of Mental Images, to further develop their ideas[29].

It is worth noting at the time that Gregory and Kohsen had already established a three legged approach to their 'research' with a very different 'third pillar'. In Physical and Psychical Research, an analysis of belief, the co-authors had already begun to develop some of the key ideas and terms that they elaborated in The O Structure, the 1959 introductory text to Flat Time theory that Latham would later claim to have influenced (Gregory and Kohsen 1954,1959). Physical and Psychical Research, an analysis of belief had already noted Planck's 'quantum of event' for example, which becomes the 'least event' in Event Structure, and included a critique of Freud, as applying an approach to the methods of psychology too influenced by engineering, which is also reiterated in The O-Structure. Unlike The O-Structure however, where explicit reference to the parapsychic has been largely excised, Physical and Psychical Research, an analysis of belief, places the parapsychic, not the potential of the language of visual art, as the third leg of the project.

The contents page alone gives a clue as to the central role of the parapsychic in Event Structure:

III Relativity- Belief in the Physical Picture of the world

IV Psycho-analysis-belief in the psychological Picture of the World

V Psychical Research- Belief in the Paranormal

[29] The foundation date of the Institute for the Study of Mental Images is unclear, but it seems to post-date the publication of Physical and Psychical Research, an analysis of belief which is published by The Omega Press. The O-structure, on the other hand, is published by the Institute for the Study of Mental Images

Essentially The O-Structure tries to address the same problem as Physical and Psychical Research, an analysis of belief: that of explaining the difference in experience of different people experiencing the same physical phenomena.

Alongside this, the utopian goals of Event Structure are clear right from the start. In the opening pages of The O-Structure, the status quo, as Gregory and Kohsen would have it, is laid bare:

> But how, to-day, when so much is already known, can the ordinary man expect to find out for himself anything significant about the world?
>
> We think the only answer is that he cannot; and that he cannot has two very serious consequences which, when expressed in their crudest form, are threat of war and mental illness.(Gregory and Kohsen 1959, p.1)

They go on to divide mankind up into five archetypes, presaging the three 'brother's' that emerge as Latham develops the theory in subsequent decades. Essentially however, the theory remains the same: A failure of languages (mathematical or otherwise) to fully represent the world has led to a disconnect between what is experienced and what is described. This makes people look for answers in divisive things like political theories and religions. Thus it follows by their rationale that only by finding a new universal way of explaining the world can these divisions be overcome. Also, as we will see in chapter three, buried in here is a deep-seated discomfort with the science of the day, notably the theories of Einstein (possibly stemming from Gregory's professional experiences).

Despite the metaphysical and political ambitions of the theory, it does also claim to be a system which can offer a quantifiably accurate account of the physical universe. What better example of this could there be than Latham proposing to the British Labour Cabinet minister Peter Mandelson (1953-) and others in January 1998, that the Millennium Dome, controversially yet to have its contents decided upon, should house amongst other things a pair of supercomputers running a model of Event Structure fed by real data (Latham and Macdonald-Munro 1998) [see fig. 1.14]. Latham suggested that this installation, might

generate ‘wholly new agendas of process modelling, deduction, analysis, art work, and research’.

By 1963, Latham had been convinced of the value of his theory and following the death of his collaborator Clive Gregory, decided to make it his life's work to expand and promote their cosmology. Over the next decades, regardless of the twists and turns in Latham's 'chameleon-like oeuvre', the development of his cosmological model would underpin and inform most of his studio output (Harten, Brooks et al. 1975). As it develops, Latham becomes increasingly engaged in a dialogue with science (principally physics) and the parapsychic and mediumistic origins of the project are quietly sidelined.

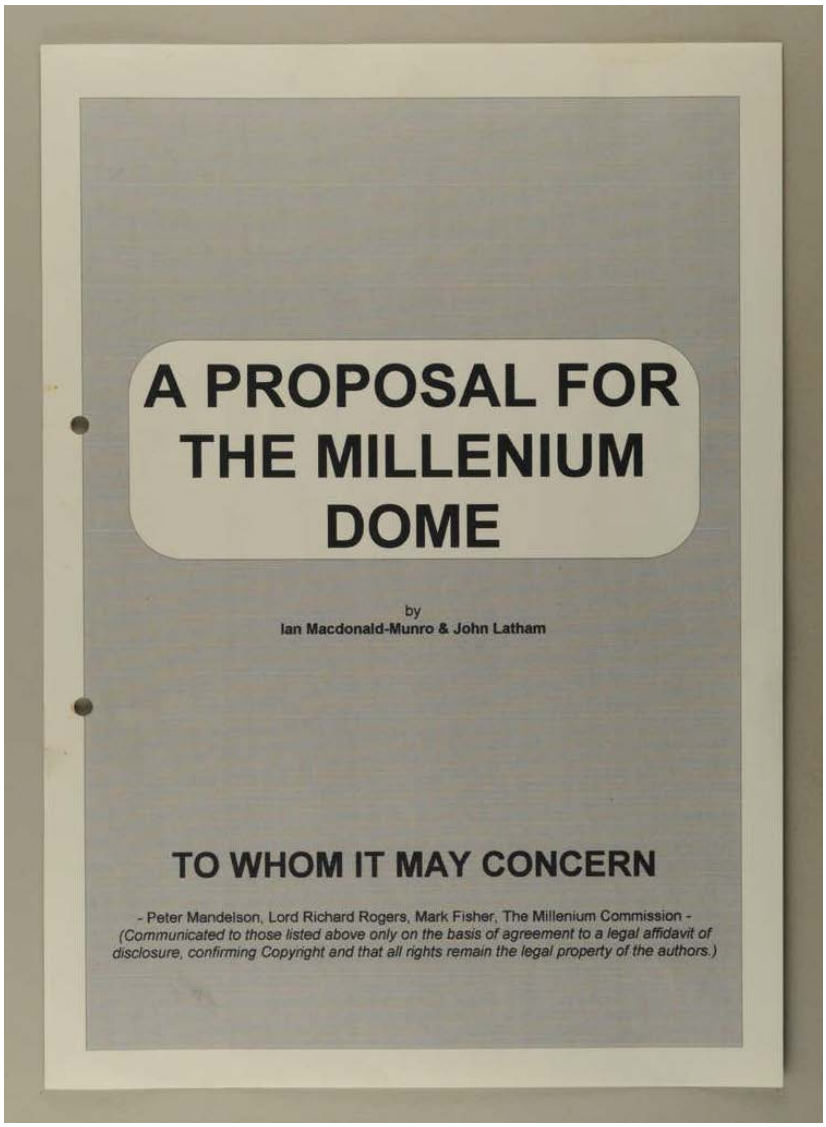

Fig. 1.14: Cover of *A Proposal for the Millenium Dome*, Latham and Macdonald-Munro, 1998

Outsider Cosmologies

Event Structure and the Living Universe claim to make quantifiable predictions about the universe. Whilst the Millennium Dome proposal is probably the closest Latham comes to suggesting an experiment that might practically demonstrate this (and the full text offers little more detail that that given above), Carter proposes a number of actual experiments in his theories, indeed a recent publication is called Pure Experimental Physics Without Theory: Four Definitive Experimental Tests of Quantum Mechanics, Special and General Relativity and the Big Bang Theory (2013). Despite this title, it largely reiterates theoretical material from previous publications, including a number of 'experiments' that he claims will prove his theories correct.

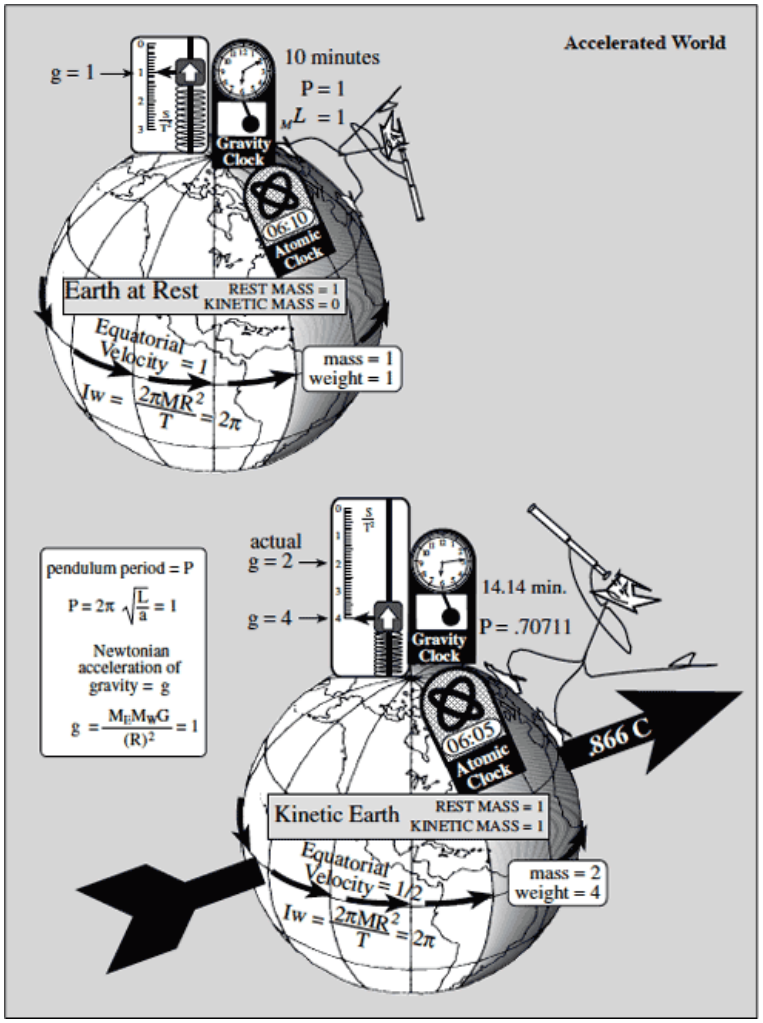

Fig. 1.15: Diagram explaining 'Time and Mass on an Accelerated World', Carter, 2012.

In ‘Time and Mass on an Accelerated World’ [see fig 1.15], he imagines a number of different types of clock placed at different points on the globe[30]. These clocks should be compared to similar clocks *on another earth*, this time one accelerating through space at 88.6% of the speed of light (Carter 2010, p.108-109.). It is clear that such an experiment is impossible.

In the ‘orbiting chains’ experiment [see fig 1.16] he imagines a ring of chain orbiting the earth; this model allows him to discuss his gravitational theory. Forces experienced in this chain, if compared to results predicted by his theory of gravitational expansion and the same chain modelled through Newtonian gravity would show, he claims, the fact they both correctly predict the same results (Carter 2011-2012, p.106). However, Carter offers no record of these calculations and besides, such a chain would be almost impossible to construct and measure, so even if forces within it would be the same under his proposed system *and* in a Newtonian model, there is no experimental dataset to verify his claims[31]. Even if there were such a chain, and Carter’s theory provided enough detail to calculate a set of predictions to compare with the experiment, by his own admission it would do no more than add another potential explanation. This illustrates the neat trick of claiming to predict all the existing results in physics: rather than prove his theories superior to the mainstream, he hopes to offers a more palatable/elegant explanation of those results.

[30] This image and those that follow have developed through subsequent versions of Carter’s books where this theory is discussed. I have cited/ reproduced the most recent.

[31] An orbiting chain would be subject to relativistic effects so it is unlikely either a simple Newtonian calculation OR Carter’s theory would correctly predict the forces, even if as he claims, his model’s outputs match the Newtonian.

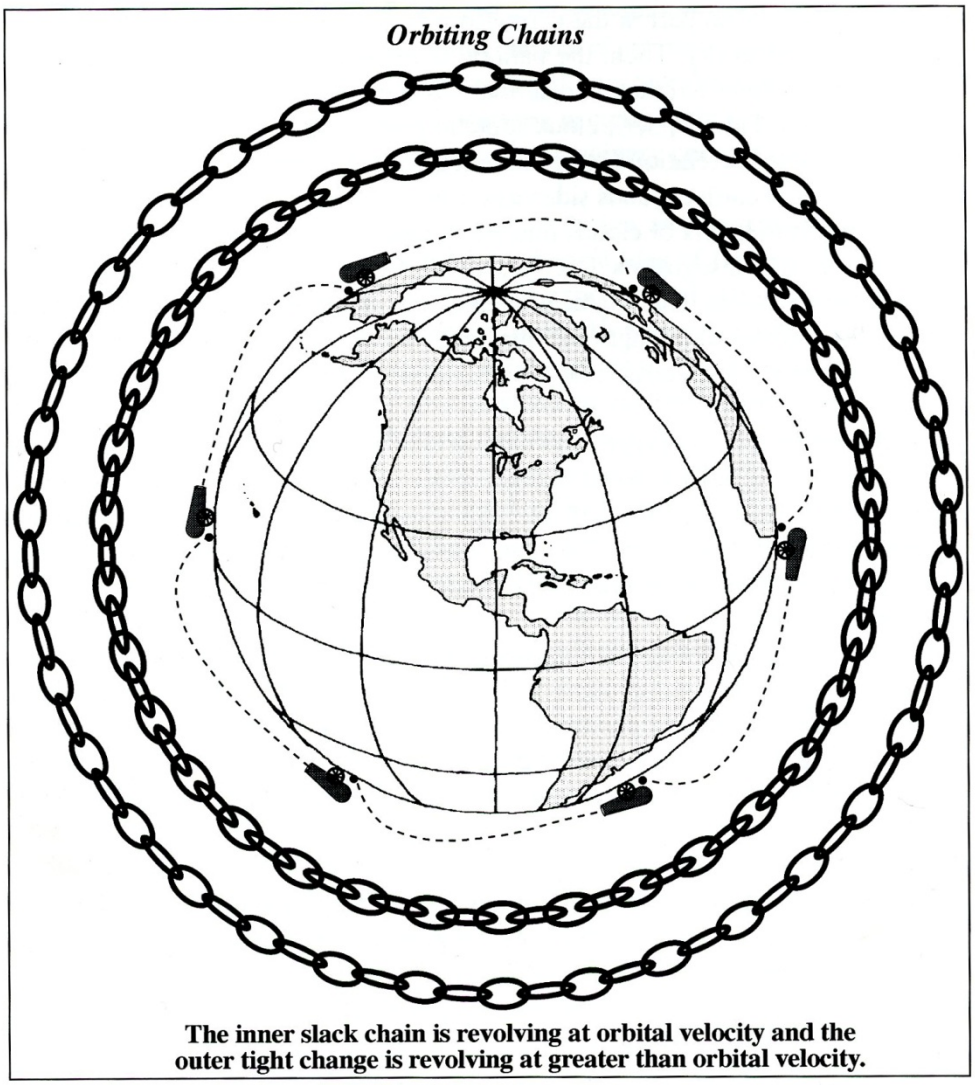

Fig. 1.16: Diagram explaining 'Orbiting Chain Experiment', Carter, 2012

There is one experiment he proposes which is practical (sort of) and, he claims, would demonstrate that the principles of his theory are *more* correct than that of the standard model: the 'Gravity Cannon Experiment' [see fig 1.17]. This experiment, however, must be done in space and, typically, the powers that be have not responded to his suggestion that it might be carried in the space shuttle. It also requires a gold cannon ball (Carter 2011-2012, p.112).

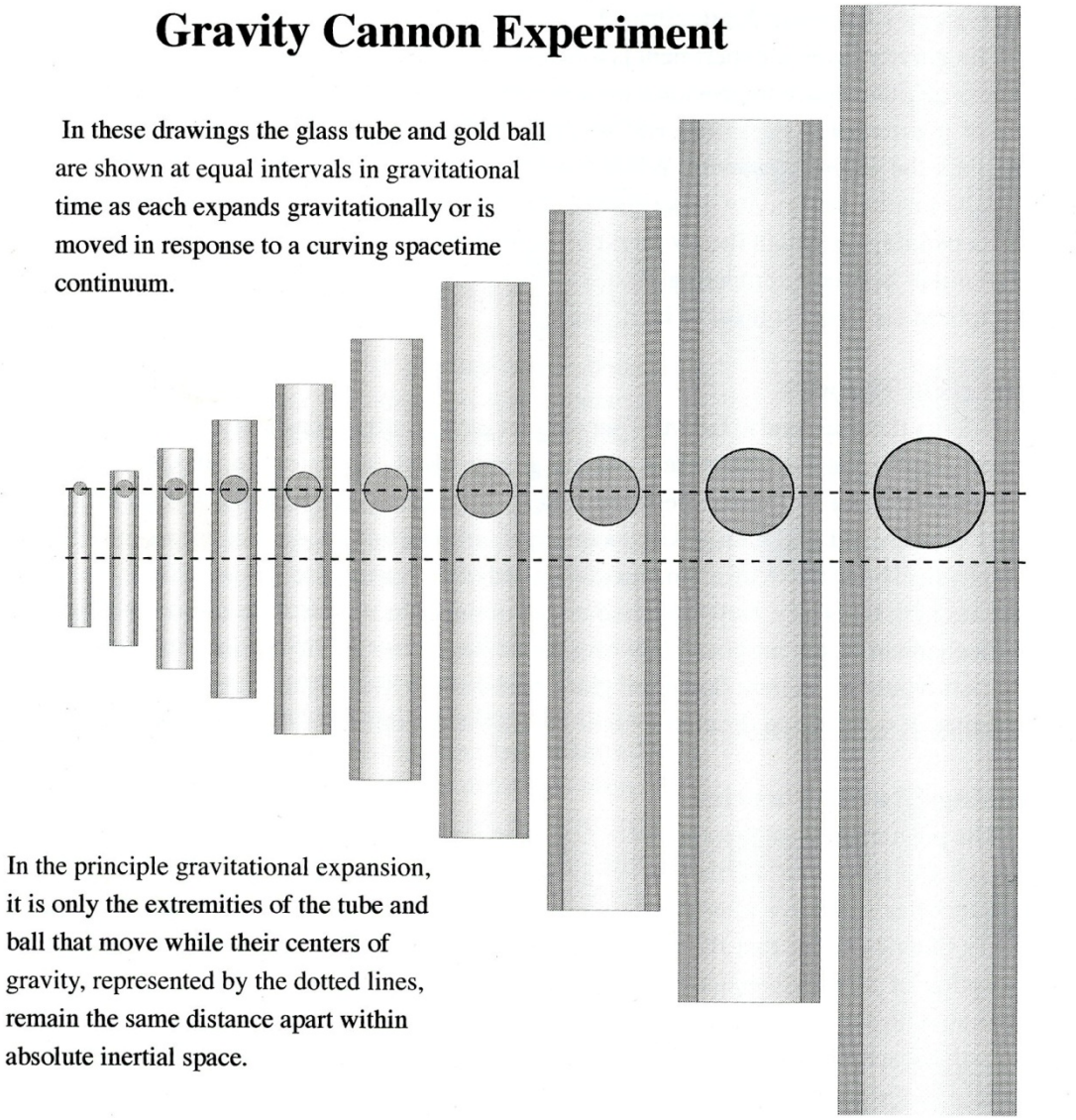

Fig. 1.17: Diagram explaining 'The Gravity Cannon Experiment', Carter, 2012

The Gravity Cannon Experiment essentially offers a route to falsifying Carter's theory of gravity, though again, the frustrating lack of detail would make this a largely qualitative exercise. It is about as close as Carter comes to offering a plausible test of his ideas. In contrast, Latham never proposes an experimental basis for 'testing' Event Structure other than the Millenium Dome proposal and a couple of similar attempts to secure funding for computer modelling-based explorations of his approach. Isham challenged Latham explicitly on this during some email correspondence between the two men as they were putting together a NESTA grant application for a joint project. Latham had drafted the

following: '…a Basic (T) diagram developing the Roller concept outperforms recent Consistent Histories Theory in respect of the quantum theory.' Isham responded:

> With respect John, this is complete nonsense. Again I have to ask you: how can your diagram possibly 'outperform' the scientific theory in respect of quantum theory? … If you really think this is true then, once again, I challenge you… to actually do a real calculation with your diagram to convince me that it can 'out-perform' the scientific theory as a scientific theory.(Isham 2000)

There is no evidence Latham responded to this or to other attempts to get his theory to perform in a meaningful sense, ie predicting actual measurements in the world.

Why is this potential for falsification important? An alternative account to Kuhn's of the criteria for a scientific theory is given by Karl Popper (1902 – 1994). For Popper, falsifiability is a key criteria of a scientific theory. Popper famously met Kuhn for a debate at the former Bedford College, University of London on the 13th July 1965. In this encounter, the two men would debate their contrasting theories of the nature of the scientific; Popper after a long and varied life in Philosophy, and the much younger Kuhn, a historian of science, having laid out his claims in the recently published The Structure of Scientific Revolutions. This encounter became symbolic of Popper vs. Kuhn, the struggle between the dominant theories of science in the late 20th Century. If our theories do not hold water by Kuhn's determination or by Popper's definition of science, we will struggle to deem them in any way scientific (Fuller 2006, p.12). After some qualifying preamble, Popper states: 'One can sum all this up by saying that *the criterion of the scientific status of a theory is its falsifiability, or refutability, or testability'* (Popper 2002, p.48). On this count then, as well as Kuhn's, as we have seen, both Carter and Latham's theories fail to be included within science.

So back to Wertheim's term 'outsider science': we have established that she does not mean 'outsider' in the art sense, where the individual is estranged in some way from 'mainstream' practice. Her criteria has more to do with the theory itself, and as we will find in chapter three, there is a healthy community of outsider scientists trying to offer

falsifiable solutions to specific problems in the cannon of mainstream science. These theories are 'outsider' as they carry no institutional validation or widespread adoption, but they are at least *science* by the criteria we've just established. However, as we've seen, by neither the standards of Kuhn or Popper are Carter and Latham's theories 'scientific', and like the relationship between art and outsider art (where the latter is a subset of the former), if it's definitely not science, I'd argue, it can't therefore be outsider science[32].

It is also apparent that for Wertheim, Carter's role in the gallery (and that of other outsider scientists) has very little to do with the actual merits of his ideas.

In an interview on the Australian ABC network's National Radio's Science show she explains why she thinks these outsiders are worth studying. She explains that just as we wouldn't judge outsider artists in the same terms as a Picasso, we shouldn't judge outsider scientists in the same terms as Einstein. In her own words they are worthy of study because: 'what does it [outsider science] tell us about our society's relationship to science?(ABC 2014)'. She rather misses the point here: of course we wouldn't judge an outsider artist like Adolf Wöfli (1964 – 1930) for example, in the same critical terms as Picasso, but neither do we study Wöfli simply because of what his works can tell us about society's relationship to *Les Demoiselles d'Avignon*(1907). It is this underlying motive and perhaps misunderstanding of the purpose of the field of outsider art, suggested by Wertheim's categorisation, that makes her adoption of 'outsider science' projects into the field of outsider art particularly difficult.

In the closing chapter of Physics on the Fringe she expanded on her theory that these outsiders are of interest as they tell us about society's 'relationship to science'. Wertheim recounts how she attended a string theory conference, and even as a PhD physicist she

[32] This is not to discount the impact of Kuhn on either of these men, for whom the 1965 Structures of Scientific Revolutions would have provided on some level a validation of their counter 'normal science' approach, and in Kuhn's coining of 'paradigm' in this context, a useful label for their endeavour. APG were also preoccupied with the notion that their work might catalyse 'paradigm shifts', but it was clear this was a metaphorical adoption of Kuhn's term to wider social changes, rather than an attempt to improve on science per se.

was unable to follow much of the content. String theory, she explains contains 1^{500} different legitimate variations. For 99.99% of people, string theory, a world of multidimensional knots (curiously evocative of Tait's attempts to mathematise Helmholtz's Wirbelbewegungen), is more coherent to a wider audience as a series of metaphorical constructs and stories, than as a bit of 'useful' science (as society might understand utility). She explains that complex science is essentially nonsensical to the layman, but in the telling we feel some kind of credible narrative, and she quotes Lewis Carrol's Alice reflecting on the nonsense poem Jabberwocky: "somehow it seems to fill my head with ideas- only I don't know exactly what they are" (Wertheim 2011, p.277). If real science can be enjoyed like this she argues, then why not the imaginations of outsider scientists? However, if this is the case, why not simply exhibit string theorists in the gallery? I'd argue this is because string theory and other elaborate mathematically complex branches of modern physics are precisely the opposite of Carter and other's projects. It is notoriously hard to grasp even the basic elements of non-Newtonian physics, and even undergraduate students of physics and mathematics struggle for years to get an intuitive sense of relativity or multi-dimensional algebra. Wertheim leaves the string theory conference buzzing like Alice with ideas and images because she has a PhD in physics and is already initiated into this world. For most, the material is so inaccessible that rather than semi-coherent stories of monsters 'whiffling through the tulgey wood', all they would get from such a conference is a headache and an inferiority complex. Carter and Latham are compelling precisely *because* their systems purport to be the opposite: intuitive and decipherable by all (more in chapter three), however untrue this is in practice. Their outputs function upon the premise that they *are* to be deciphered by the general viewer, rather than the initiated.

Secondly, Carter and Latham are clearly not attempting to critique complex science and its relation to society, they are sincerely attempting to supersede it, and the specific and

comprehensive nature of their theories are far more intriguing as such, rather than as a handy illustration of the challenges of doing science outreach if you're a string theorist.

We have only just started to examine Carter and Latham and their systems, but within this thesis, they will be viewed for what they actually are, and not for what their creators, or other commentators have claimed them to be. Regardless of their established 'unscientific-ness', they attempt, in a seemingly ordered way, to develop and elaborate a detailed model of the workings of the universe. Whilst Carter and Latham achieve a granularity and pseudo-scientific operability that sets them apart in many ways, their categorisation is more usefully considered alongside other large, *non*-scientific, cosmological systems.

Rather than outsider science, this thesis proposes the Living Universe and Event Structure as a particular kind of *outsider cosmology*. The term cosmology has a spectrum of meaning from its use in mainstream scientific discourse to a usefully woolly wider cultural meaning[33]. There is a *comprehensive* sense to the term, a key facet of Carter and Latham's theories. Cosmology is also acceptable to use in a religious or spiritual sense, which will become more important as we continue to discuss The Living Universe and Event Structure.

It is for these reasons that in chapter two we will explore these projects in relation to the development of alchemy, another comprehensive, non-scientific cosmological system.

[33] Within science the term is typically used to mean research into the underpinning mechanics and concepts of physics, usually, but not exclusively where this intersects with the theorising of space and the origins of the universe.

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Chapter Two: Outsider Cosmology and Alchemy

> It is easy to forget that both science and religion are both preoccupied with justifying beliefs.(Fuller 2006, p.16)

In Chapter One we introduced Carter and Latham, our protagonist outsider cosmologists, through an overview of their histories, and discussed their oeuvres in light of various definitions of outsider; specifically, the use of the term 'outsider scientist' by Wertheim. In this chapter, through a comparative reading of alchemical systems, we will discover several commonalities between Carter and Latham: the importance of a catalysing moment of revelation, rooted in an experience of real materials; the extrapolation of their systems through drawing and diagrammatic rationales; and the need to account for a human perspective or the central role of mankind within the workings of the overall system.

Alchemical Systems

These two men exist in a world where mainstream science is an established and immutable part of our cultural fabric. Regardless of how we class their cosmologies, both men explicitly reference mainstream science to underpin or counterpoint their investigations. However, to better understand the development of their systems, it is illuminating to consider the evolution and characteristics of the antecedent of modern science, alchemy.

The research underpinning this chapter was conducted to support the generation of a new work, *Dreams of Homunculi*, at the Museum of the History of Science in Oxford, but the discovery of a much closer relation between the cosmologies of Carter, Latham and alchemy that it hinted at, justifies the more thorough exploration of the topic that follows.

For many in the world of 'outsider science', and indeed within the wider field of outsider art, alchemy is a key source of ideas and images, often explicitly explored and built upon

in their works. As we will see in the following chapter, for example, a whole section of the outsider science community base their investigations on theories of the aether, an idea nearly as old as the practice of alchemy itself. Many outsider artists like the Bostonian architect, writer and painter of futuristic schema, Paul Lafolley (1935 - 2015) also draw their conceptual systems explicitly from alchemy. This is clear in Lafolley's 1972 paper, The Principles of Alchemy (reproduced in Laffoley 2013) in which, starting with an Aristotelian earth/air/fire/water square, he extrapolates a pyramid through a point above this plane, describing this new vertex as the ether (or Quinta Essentia- the fifth element), forming the basis for his whole cosmological system [see fig 2.1][34]. In comparison Carter and Latham make little or no direct reference to alchemy in their theories.

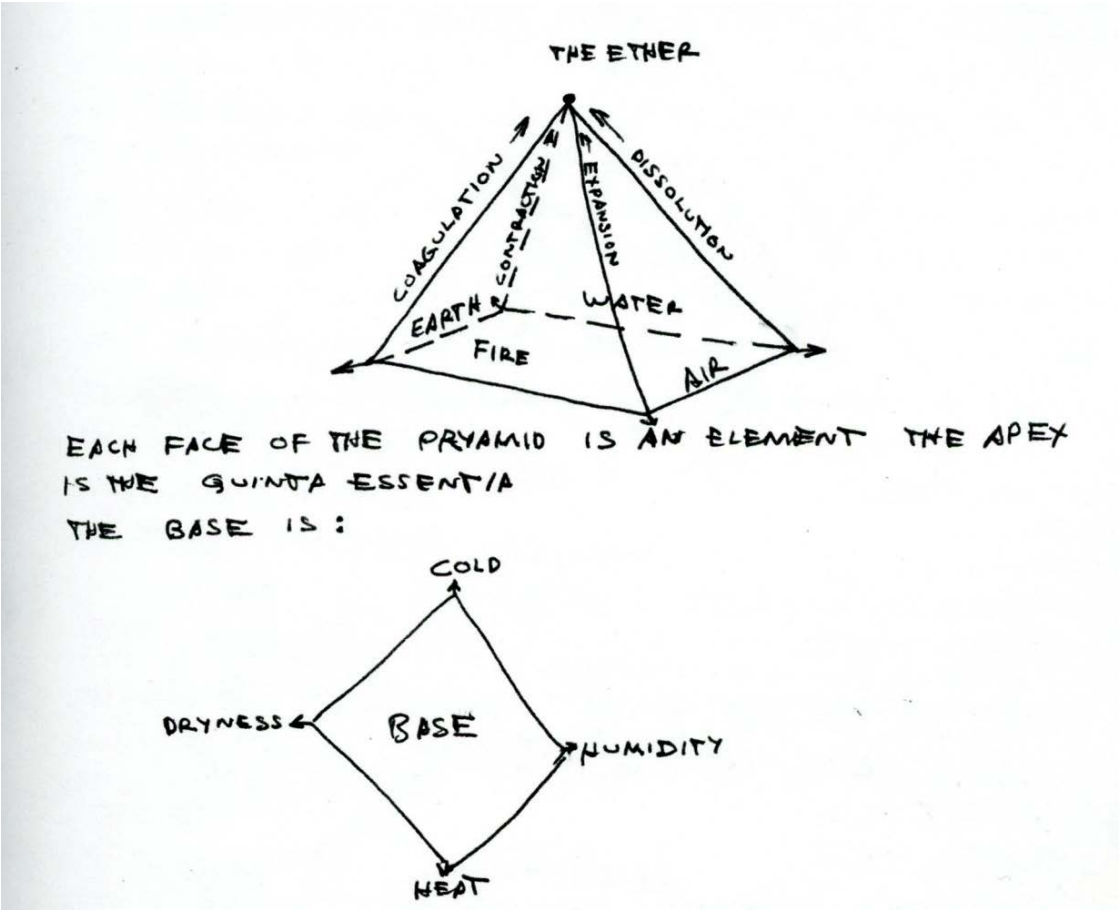

Fig 2.1: From The Principles of Alchemy, Laffoley, 1972

[34] An act of diagrammatic extrapolation consistent with ideas explored later in the chapter.

The influence of alchemy on the history of art has been relatively neglected until recent years. As Jan Bäcklund and Jacob Wamberg explain in their introduction to *Art and Alchemy*, an edited collection of papers on the subject:

> The reasons for this are probably manifold, but part of the explanation is the somewhat suspicious aura of quaintness and amateurishness, if not direct humbug, in which alchemy has been shrouded, since the Enlightenment and the positivist Nineteenth century discovered the 'true' principles of scientific investigation and relegated alchemy to the area of aborted sciences[35].(Wamberg 2006, p.9)

However, as Wamberg's collection itself demonstrates, this neglect is being redressed and the subject is increasingly well researched[36] from the depiction of alchemists themselves [see fig 2.2] to specific histories such as the impact of alchemical developments on the material histories relating to the development of art[37]. In a wider sphere, alchemy can trace its ongoing influence through cultural echoes of this pre-scientific natural philosophy in other systems of the occult, psychoanalysis and literature, which have continued to influence artists even after alchemy was displaced as the primary means of accounting for the physical universe[38].

[35] Bäcklund and Wamberg also cite Carl Jung's appropriation of alchemy within his ideals of Common Archetypes and the reasonably longstanding disfavour this psychoanalytical theory has been held within its field.

[36] Along with Wamberg, Astrology, Magic, and Alchemy in art(2007) by Matilde Battistini and Alchemy in Contemporary Art(2010) by U. Szulakowska which includes explorations of specific works by contemporary artists including Yves Klein (1928-1962), Joseph Beuys(1921-1986) and Anselm Kiefer(1945-).

[37] See: Carvalho, D. N. (1998). Forty Centuries of Ink or, a chronological narrative concerning ink and its backgrounds, introducing incidental observations and deductions, parallels of time and color phenomena, bibliography, chemistry, poetical effusions, citations, anecdotes and curiosa together with some evidence respecting the evanescent character of most inks of to-day and an epitome of chemico-legal ink. Chapter 9.

[38] For a localised but excellent study of this see: Owen, A. (2004). The Place of Enchantment: British occultism and the culture of the modern.

Fig 2.2: *The Alchemist*, Pieter Bruegel the Elder, c.1558[39]

As we will see, alchemy is a 'non-scientific' system par excellence, full of its own distinctive rationalities and intersecting theories. Many of the greatest thinkers of both the western and eastern worlds engaged with this evolving theory, from the Roman physicians like Galen of Pergamon (AD 129 – 217), to medieval, middle-eastern mathematicians like Avicenna (c980 –), to luminaries of the early modern scientific

[39] Bruegel's depiction of the Alchemist is typical of the Early modern stereotype of the alchemist as *Betrüger*: swindler and fraud, bringing destitution on his family (who are seen through the window ultimately taken to the poor house). Bruegel's work suggests that this is a universal perception of the Alchemist in the society of the time, yet it is clear that some alchemy and alchemists enjoyed ongoing patronage and success of sorts. This is well elaborated upon by Tara Nummedal in chapter two of her book Alchemy and Authority in the Holy Roman Empire(2007) where she argues that the scholastic figure at the right of the image may represent the true 'learned' alchemist ambiguously either goading the *Betrüger* alchemist on, or pointing out his follies. Depictions of alchemists are also explored in more detail in the final two articles in Art and Alchemy (Wamberg)Ed.), 2006)

evolution like Francis Bacon (1561-1626), and Isaac Newton (1643-1727) who wrote over a million words on the subject[40].

Alchemy originated in the early centuries BC in its Greco- Egyptian period, as artisans and priests tried to reconcile early Greek ideas about the nature of matter and the workings of the physical universe with their increasingly evolved abilities to transform and manipulate material through craft. This early theorising was heavily influenced by local traditions of magic and religion, themselves largely contiguous at the time. These early ideas were adopted by and built upon by the Byzantines (third to ninth century), the Islamic civilisations of the early middle ages (eighth to fourteenth century) and finally rediscovered and co-opted into western medieval (twelfth to fifteenth century) and early modern (sixteenth to early eighteenth century) thinking. Alexander Pope's (1688-1744) famous Epigram concerning Newton suggests that alchemy died out as the principle system for explaining the physical universe at the advent of the scientific revolution with the bringing together of mechanistic and empirical thinking:

> Nature and nature's laws lay hid in night;
> God said "Let Newton be" and all was light.

However, as Newton's own substantial engagement in alchemy would attest, its theories and systems were only incrementally displaced by the *new* science over the subsequent centuries.

Evolving out of an intersection of mysticism and the development of material and artisanal exploration in ancient Egypt, it appears, even in its origins, a project about building a universal system for understanding the material and spiritual world. Whilst this is undeniably the case for certain alchemists, it is worth noting that throughout its history alchemy has been many things to many people. One of the earliest texts in alchemy which dates to Hellenistic Egypt in the third century BC certainly supports a less

[40] Newton's contribution to alchemy has only recently garnered much academic attention with a project to comprehensively review and publish his writings on the subject online now underway at Indiana University, led by William R. Newman: http://webapp1.dlib.indiana.edu/newton/index.jsp

cosmological reading. This text is titled ‘Physika kai mystika’, typically *physical and mystic things*, but is probably better translated as ‘physical and secret things’ (there being no sense of the word ‘mystic’ at that time) (Principe 2013, p.12) and is simply a manual for artisans in gold, silver, gems and dyes manufacture/ preparation. If this alchemical system then rapidly expanded to include spiritual and theological rationales, could this not be as it was simply because these were the only systems of thought that existed to co-opt into making sense of the transformations and observations from the alchemists’ (and indeed conventional artisans’) workshops? Whilst this rationalisation of artisanal transformations is certainly a driving strand of early alchemy, it does not discount the subsequent rich interactions between the development of alchemy, the history of hermetic and other mystical hermeneutical endeavours, and the more explicitly occult or magical systems that have evolved around it over the centuries. At the root of this development has been a grand interlinking of ideas: an attempt to relate these developing fields and account for the whole cosmos in a single theory.

Alchemy stood therefore, as an attractive project for minds like those of our two protagonists, searching for a total schema to understand the universe. That is not to say that it didn’t also function as a toolkit for an array of thinkers, artisans, swindlers and dabblers with more eclectic or specific objectives, as Tara Nummedal illustrates in her exploration of alchemists and their social and economic role in the Holy Roman Empire: ‘clearly there was a wide variety of practitioners of alchemy, with diverse backgrounds and varied goals.... The market for alchemy – in terms of the consumption of alchemical techniques and secrets – supported all the varieties, from the pharmacist offering to distil an *aqua fortis* for an alchemist friend to the most learned natural philosopher’s treatise.’ (Nummedal 2007, p.38-39).

Alchemy is a vast subject spanning over fifteen centuries and this chapter does not attempt to offer a complete account of its development[41]. Instead, we will consider several moments in alchemical thinking: the Pythagorean conception of a 'music of the spheres'; The Compound of Alchemy (and specifically the wheel diagram appended to this text) by the Elizabethan alchemist George Ripley (1415-1490) [see fig 2.3]; the development of theories of vegetation of metals; and the development of the Aristotelian elements diagrammatically into the complex cosmological schema of the early modern alchemists. We will find in these examples, and with reference to a broader account of alchemy, three system-building strategies common to the alchemists that read across into our contemporary outsiders: the extrapolation from an immediate material experience to a universal truth; the use of diagrammatic and syntactical constructions to establish pseudo-rationalities; and a determination to account for the human, or human consciousness at the heart of the overarching system.

[41] An excellent synoptic text of the whole history of alchemy is The Secrets of Alchemy(2013) by Lawrence M. Principe

Fig 2.3: *Wheel,* George Ripley, The Compovnd of Alchymy (London, 1591)

A Moment of Inspiration

Contemporary scholarly consensus on Pythagoras of Samos, the Greek mystic of the 6th Century BC, describes him very differently from the practical mathematician one might imagine from his eponymous theorem. He was in fact most likely:

> ... a shamanistic figure, a charismatic spiritual leader and organiser perhaps (like Moses perhaps) who exercised a great influence on the civic life of Magna Graecia, but who contributed nothing to mathematics or philosophy.(Kahn 2001, p.3).

In fact, it was the ideas and traditions associated with his followers, rather than Pythagoras' own legacy, that was of significant interest to later alchemists and early cosmologists. These ideas, preserved through the writings of Porphyry and Iamblichus, were appropriated into Neoplatonism and influenced the development of the profoundly Neoplatonist cosmological systems of Nicolaus Copernicus (1473 – 1543) and Johannes Kepler (1571 – 1630) in the 16th and 17th century. Ironically perhaps given Kepler's triumph in superseding the innately Pythagorean notion of the circular orbit, he was a man singularly attached to the numerological profundity of nature, first explicated by the Pythagoreans. We know from secondary sources from the centuries following the recorded life of Pythagoras himself, that his followers, a numerological cult of secretive vegetarians, believed in a cosmology of cosmic harmonies based on certain explicit numeric proportions, determined by the subdivision of a venerated triangle of 'ones', the Tetractyl [see fig.2.4]. It was this belief in the primacy of numerological patterns in nature (and specifically to cosmological proportions) that led Charles H. Kahn in his book Pythagoras and the Pythagoreans: a brief history to describes Kepler as 'the last Pythagorean, but a true Pythagorean'(Kahn 2001, p.171). Kahn explains that the numerological systems upon which the Pythagoreans based their understanding of the universe had their direct descendent in the geometric reasoning of Kepler. Patterns in numbers and the primacy of the basic geometrical forms were central to the construction of the Pythagorean celestial harmonies (as we will see). The nesting of numerologically determined perfect solids was at the root of all future western explanations of the movement of the celestial bodies until Kepler's calculations, initially based on this assumption, led him reluctantly to conclude that the orbits were elliptical.

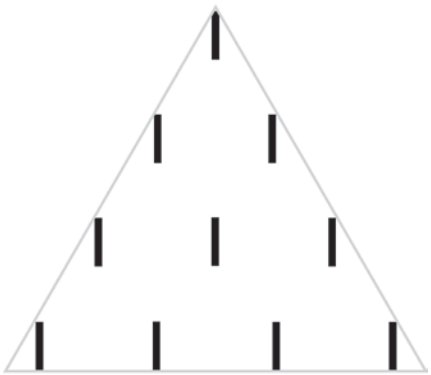

Fig 2.4: Tetractyl – showing how the 'ones' make up a 'four'- sided equilateral triangle

So how had the Pythagoreans made the leap between numbers generated from a pattern of ones, to the arrangement the planets? The answer is hinted at in an apocryphal tale. Pythagoras[42], walking past a blacksmith, heard the sound of the anvils 'chiming' at different pitches under the hammer blows of the craftsmen. He determined that these pitches were in proportion to the size of the anvils[43] and constructed a series of experiments to further explore the link between pitch and proportion.

Observing many of the ratios divined from the Tetractyl (or related geometrical forms) generated identifiable musical intervals [see fig 2.5]; the notion of cosmic 'harmony' was born. In reality, this theory had much to do with the organisation of behaviour and knowledge, giving a greater degree of order and hierarchy to the Orphic cult which the Pythagorean thinking displaced, but for Western thought it left a long and profound legacy in the ordering of the universe through numerologically elegant ratios and neat configurations of the basic geometric shapes or platonic solids. If the anvils made a sound proportionate to their size, and one can observe that a moving object makes a pitched hum as it passes through the air, then surely the stars and planets too made a pitched sound. It seemed clear then, that in divining how the universe might order these bodies, one might assume it would be to place these sounds within a musical chord. One might

[42] Who was also reputedly able to exist in two places at once, and to have a thigh made of gold: D.L VIII.11,Porphyry Vita Pythagorae 28 (thigh) DK 14.7 (bilocation)
[43] This is in fact not true in the case of anvils, but is true for certain other specific objects.

say: *just as* the anvil makes a note in proportion to its size and the arrow makes a sound as it flies through the heavens, *so* the stars and planets have a harmony predicated on their position within a celestial scale. This was the powerful ideal which Kepler ultimately drove to its breaking point in establishing his laws of planetary motion[44].

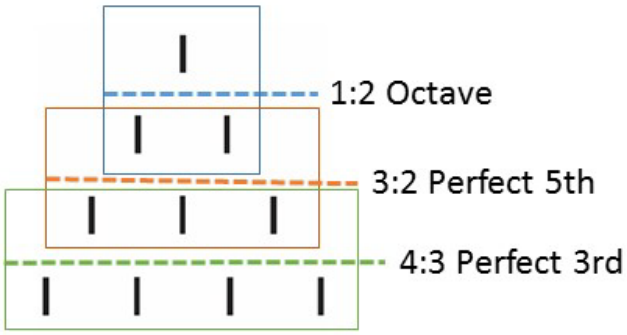

Fig 2.5: The Tetracyl and some of the ratios from the monochord that give musical intervals. This was extrapolated using other configurations of 'ones' to encompass nearly the whole major and minor scales as we currently know them.

This ideal of scaling up from a moment of observation or experience in the real world (listening to anvils), through a quasi-logical process, into a cosmological insight (harmonic working of the universe), is common in the subsequent development of alchemy. It is perhaps this Pythagorean legacy to the early alchemists as well as the importance of the numerological (which formed part of many early mystic traditions), that is their most significant conceptual contribution.

In another example of inspirational observation leading to universal concept, we might imagine the discovery of the alchemical tree by the seventeenth century alchemist Eirenaeus Philaletes (or one of his predecessors). In his historical analysis of alchemy, The Secrets of Alchemy, Lawrence Principe describes this particular moment of material

[44] Kepler acknowledge that his elliptical model of planetary motion was at odds with the Pythagorean sphere, but he still selected it from the possible options he had devised owing to its geometric elegance, rather than because it was a better correlate to the available data.

experience. Principe has been interpreting the writings of Philaletes, the nom de plume of George Starkey (1628-1665), an American alchemist living in London. Trying to reconstruct a recipe for preparing the philosophers stone, a substance that would allow the alchemist chrysopoeian to transmute lead into gold, Starkey instructs, for example:

> Take our Fiery Dragon that hides the Magic Steel in his belly, four parts of our Magnet, nine parts, mix them together with torrid Vulcan... throw away the husk and take the kernel, purge thrice with fire and sun, which will easily be done if Saturn sees his form in the mirror of Mars.[45]

Working carefully through these coded descriptions of the process, where substances are named by their signifying planets (or Gods) interacting in metaphorical 'roles' in a human mystic/sexual drama, Principe reconstructs the chain of experiments Philaletes has started to describe above. Finally, like Starkey before him, Principe seals (Hermetically of course- from Hermes Trismagistus) the compound in a glass vessel, approximating the 'philosophical or hermetic egg' in which the final stages of the transformation are supposed to occur. He heats the compound over several days:

> Finally... I arrived at the laboratory one morning to discover that the mixture had taken on a completely new – and extraordinarily surprising – appearance overnight. Only a gray amorphous mass lay at the bottom of the flask the day before, while a glittering and fully formed tree filled the vessel on the following morning.
>
> My first reaction to this sight was utter disbelief, and then - after becoming relatively certain that I had not taken leave of my senses – a sense of awe and wonder.(Principe 2013, p.165)

Even a modern academic like Principe, who could have suspected some kind of reaction might occur, is transported by this vivid encounter with an unexpected material transformation. We can only imagine the impact this encounter might have had on Starkey/ Philaletes. The recipe is so obscure and the steps taken to reach the tree so specific, that to encounter this metallic tree [see fig 2.6] in the glass egg would have been, for this seventeenth century alchemist, an extraordinary vindication of their experimental and intellectual efforts. We are reasonably certain Starkey was not the first alchemist to

[45] And so on (from Principe, L. 2013, p.162), the recipe from Philaletes is carefully decoded in this chapter and is an excellent example of one of the many layered systems of hidden meaning within medieval alchemy that we will return to consider in chapter three.

stumble upon this metallic tree but whoever did would have felt its significance as a symbol of the wider functioning of nature, as much as its clear indication that a process of material change in the reagents was really underway. This more universal truth about matter the Tree evinced is the real legacy of its discovery.

Fig 2.6:. Alchemical tree as recreated by L. Principe

This 'Tree of Hermes' as it is called by some writers, is one of the most potent examples of what is theorised in alchemy as the 'vegetation' of minerals[46]. In an attempt to explain the natural processes that generate metals, early alchemists were very influenced by the

[46] Other vegetative reactions stumbled across by the alchemists included the Arbor Dianae: a dendritic amalgam of crystallized silver, obtained from mercury in a solution of silver nitrate and what is now called a 'silica garden': a reaction of silica and metal salts quickly producing an organic-like profusion of growths, within a vessel. It is worth noting that for the early modern alchemist, producing the reagents in sufficient quantities and purities to perform any of these reactions would have been no mean feat.

experiences of miners[47] who had experienced in real time the regeneration of minerals encrusting mine walls (often deposited by vapours), which led to alchemists theorising metals 'grew' and transmuted beneath the earth, 'ripening' to silver and gold from the base metals. This was also supported, for example, by the often intermingled deposits of silver and lead found in European mines; the 'Tree of Hermes' would have been a categorical endorsement of this theory to the first alchemist who stumbled across it. The language of vegetation and the idea of an organic process of change in metals has thoroughly infected alchemy, with arboreal imagery and processes occurring throughout the system. For example Jean Colleson, an early seventeenth century mercurialist, writes of a "seed" of gold and describes how to "make gold vegetate and germinate"(Principe 2013, p.164). If such an encounter with a surprising material transformation could have such a profound effect on the development of alchemy, it is not surprising that material revelations of different sorts should similarly have impacted the development of our outsider cosmologists. In Physics on the Fringe, Wertheim pieces together the origins of the outsider scientist James Carter's circlon theory of atomic structure that we started to explore in chapter one.

A young Carter was making fireworks for the fourth of July and has been experimenting with tipping gunpowder into plastic bottles and lighting a fuse. Carter "wasn't exactly sure what might happen" but he was certainly unprepared for "the miracle that occurred" [48]. "As the plastic bottle exploded with a very loud bang, a perfectly formed smoke ring rose up out of the blast site and floated off into the sky" (Carter 2015, p.95).

> Lying on his back in the grass, watching the ring for what seemed an eternity, Jim couldn't believe what he was witnessing: "How could such a beautiful and complex unit of order and symmetry come out intact from such a violent explosion?" (Wertheim 2011, p.157)

[47] It is no co-incidence, argues Tara Nummedal in Alchemy and Authority in the Holy Roman Empire, that alchemy thrived in particular in the early modern age within the Holy Roman Empire, whose princes and dukes had built their fortunes on a pioneering age of mining (p. 79-85).
[48] Wertheim quotes Carter

Later that night, pondering the formation of these stable vortices of smoke, Carter had “a delicious little dream” and all of a sudden he formulates his theory of nuclear structure, based on these toroids, which become the building blocks of his whole cosmology.

These moments generating smoke rings in his back yard [see fig 2.7] and leaping to cosmological insight certainly recall Pythagoras’ encounter with the anvils, as well as Philaletes’ encounter with the unexpected tree of Hermes. As we will see, this leaping from a moment of material encounter, to a cosmological conclusion also applies to the other outsider cosmologist artist in our investigation, John Latham.

Fig 2.7 Smoke rings in Jim Carter’s yard

As we learned in chapter one, Latham had been asked to make a mural for his neighbours, Clive Gregory and Anita Kohsen. Armed with the spray gun loaded with paint, he experiences for the first time the effect of black paint being sprayed against a white surface.(Walker 2008, p.19-21)

> It was the first time I'd ever used this instrument for visuals, and so I was just experimenting on what would happen with wet paint in point marks, and what happened if you drag a dry brush across it and force, you know, an immediate wind-type force, which could be brought into it. So an informational connection system was immediately coming into view which was also associated with a cosmological image. (Latham 2001, p.8)

It is in the direct encounter with the material itself that he starts to piece together his model of the cosmos[49]. In his monograph on Latham, John Walker elaborates this *revealing through making*, as Latham executes this first sprayed work:

> ... he perceived the ground as a state zero, and the first black spot of paint as the first sign of action, of something dynamic. ... A single spot of pigment exemplified a microscopic occurrence of 'a least event', while the containing canvass represented the macrocosmic context within which all such events take place. Once there were three spots of paint, a 'geometry' emerged, that is, a set of points enabling subsequent judgements of relatedness, size and distance to be made. As spots accumulated, ever more complex 'events' were suggested. A hierarchy of levels (or meta-languages) also came into play. In effect, the evolution of spray painting re-enacted the evolution of the cosmos. As the latter evolved in time, more sophisticated levels of understanding became possible: indeed, through human thought, the cosmos became conscious of itself.(Walker 1995, p.23)

Walker relates this directly to Latham's Flat Time theories that we outlined in the first chapter, but it is important to underline the fact that it is through this moment of material revelation within a making process that these ideas were first brought into focus.

We will see later in the chapter that Carter will go on to produce thousands of ring models to help him expand upon this moment of revelation. In the same manner Latham would produce iterative series of one second spray paint blasts to explore his ideas [see fig 2.8].

[49] heavily influenced in this case by the developing O-Structure theory that his hosts, Gregory and Kohsen had been developing, partially in conversation with John and Barbara Latham

Fig 2.8 John Latham *One-Second Drawing (17" 2002) (Time Signature 5:1),* 1972 one of sixty drawings in the series.

In summary, to draw some common threads between the alchemists and our artist/ outsider cosmologists: direct experience and inspiration are closely linked and moments of surprising revelation are not to be stepped back from and tested, but embraced as pivotal visions of the fundamental operation of the cosmos. In the alchemists' case, if a certain preparation of mercury can yield something that looks like a tree, then other elements of 'tree-ness' must also have a role to play in the operation of the alchemical cosmos. This comes out of a deep desire to interrelate and a syncretic urge to account for experience

within a single coherent system. Crucially, it is the direct encounter with the materials at hand that is key both in the case of alchemists and our contemporary outsider cosmologists.

Diagrams and Geometries

Developing on this idea of revelation and extrapolation, we come to the notion of diagrammatic exposition, exemplified in alchemy by George Ripley's Wheel of Inferior Astronomy appended to his 1591 book The Compound of Alchemy [see fig.2.2] and much reproduced by subsequent writers [see fig 2.14].

Sir George Ripley was a minor noble, Augustinian canon and author of a prodigious number of alchemical texts. He was remarkable in that he did not hide behind a pseudonym like many alchemists, including his seventeenth century commentator, George Starkey, whom we have already met, and explicitly addressed his texts to a wide audience, indeed openly dedicating The Compound of Alchemy to Queen Elizabeth I. Ripley achieved a good deal of fame in his own time and had a lasting effect on European alchemists, being read by Robert Boyle (1627 – 1691) and Isaac Newton[50].

Amongst the many illustrations of apparatus, busy alchemists, metaphorical characters interacting in potentially revelatory ways and frankly bizarre dream sequences that pepper alchemical texts, it is perhaps the diagrammatic schema of the cosmology of materials, aethers, spirits, biles and other working elements that appear most contemporary to the modern reader. At the end of The Compound of Alchemy, having addressed each of the

[50] His noteworthiness was such that his name was used as a shorthand for an alchemist in Elizabethan drama:

> SUBTLE: What's that?
> A Lullianist? A Ripley? *Filius artis*?
> Can you sublime and dulcify? Calcine?
> Know you the sapor pontic? Sapor styptic?
> Or what is homogene, or heterogene?
> ANANIAS: I understand no heathen language, truly.
> Jonson, B. (2008). 2.5 lines 8-12 p.254

twelve transitional processes in Alchemy (as he sees them): Calcination, Dissolution, Separation, Conuinction, Putrefaction, Congelation, Cibation, Sublimation, Fermentation, Exhaltation, Multiplication, Projection; or twelve 'gates'[51], he appends a complicated cosmological schema in the form of The Wheel.

The whole of the work is in a riddled verse, or 'Writt in a verse pithily' as a potentially fictitious prefacer has it, but it is clear from the introductory sections that are embedded in the text, is in fact a process for creating the philosophers stone (Ripley 1591, p.10). Indeed, each of Ripley's twelve chapters and processes takes the reader through the experiment, culminating in the final step of testing the ultimate potency of the transformational substance[52].

As the reader advances through the text following these steps, he metaphorically gains access to a twelve-gated castle. However, the wheel which illustrates this procession does not follow this metaphor explicitly, but instead offers an elegant construction of text and line: concentric circles and symbols.

That the cosmos was fundamentally ordered by regular geometrical forms had been assumed by alchemists and thinkers ever since Pythagoras' insights into the ratios of numbers, pitches of notes and circulation of the heavenly spheres. So the ordering of substances' relationships through geometric constructions became a valid way not only of mapping the development of new ideas but vitally, to extrapolate potential new paths and test their validity. Indeed, breaking out of this model to develop the elliptical orbits that underpin his laws of planetary motion was probably the most profound leap of intellectual

[51] He expands on what are typically seven apparently lifting the conceit of twelve from an earlier text the *Scala Philosophorum* (see Rampling, J. M. (2013). "Depicting the Medieval Alchemical Cosmos." Early Science and Medicine **18**(1-2): 45-86. P.49 for more detail). The twelve gates are also the metaphorical entry points to the inner circle of the 'castle' of knowledge he is revealing.

[52] The philosopher's stone is used in a variety of ways as a reagent to turn 'baser' metals to gold (or silver), in some cases it is simply added to the molten metal to be transformed, but often more complicated procedures are recommended. For more detail see Principe, L. 2013, pp.113-114.

imagination that Kepler made, believing as he did so fundamentally in 'the regular geometric features from which the universe is constructed'(Keppler 1611, p.95)[53].

These geometric forms underpinned even the earliest western cosmological models, often building from the Aristotelian square of elements: earth, air, fire and water. Galen of Pergamon, a Roman physician whose ideas on the health of the human body and healing techniques had a lasting influence in western medicine until well into the scientific revolution, overlaid this square [fig 2.9] with the Hippocratic theory of humours [fig 2.10] to generate the more sophisticated and geometrically developed form [fig 2.11].

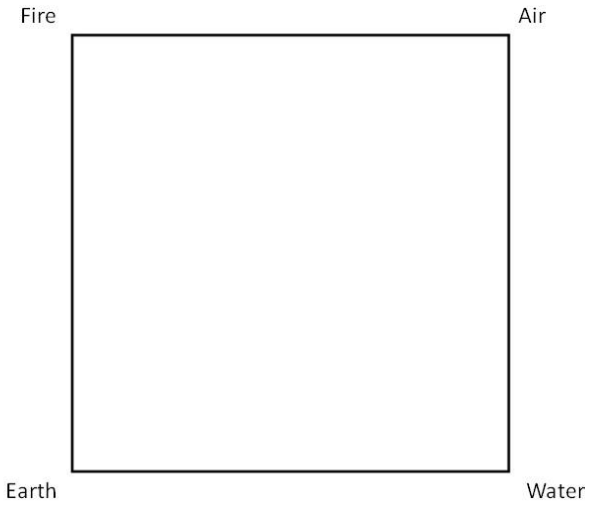

Fig 2.9 Aristotelian elements

[53] It is worth noting that Kepler only settled on the elliptical model as the force of gravity (which at this time was un 'discovered' but implicit within his rational) which he likened to magnetism, would have explained the operation of the system. He had constructed other models that described as accurately the astronomical data he was trying to decipher but they offered no such mechanism. It is also important, looking ahead to chapter three, to note that Kepler considered that the mathematics he employed was not simple a 'model' for describing the data, but itself fundamental: 'Here, then, Kepler was clearly announcing that this astronomy was not merely abstract mathematics for use in practical calculations, but was presenting a physical account of the way the world really worked.' Henry, J. (2002). The Scientific Revolution and the Origins of Modern Science. P.21

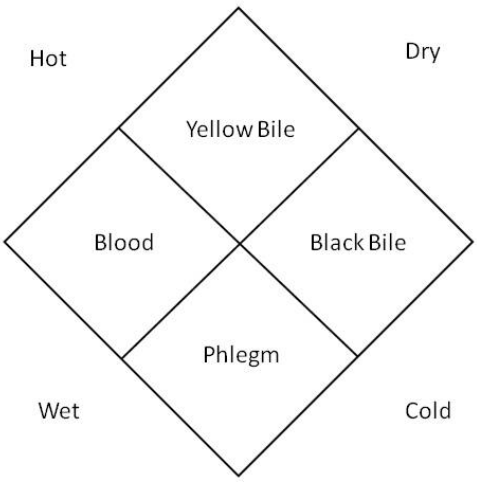

Fig 2.10 Hippocratic humors

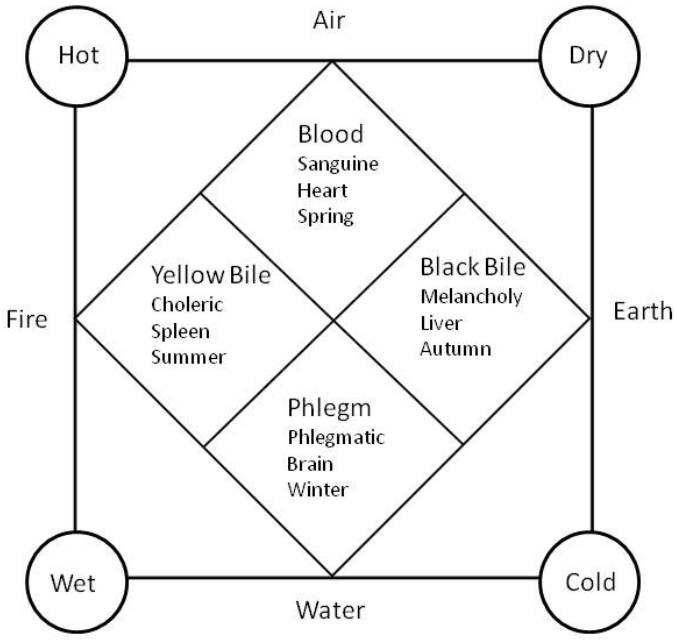

Fig 2.11 Galenic system

It is tempting to assume that the theory of four biles was ‘discovered’ independently of that of the four elements, but as the system develops it is clear that the expanding symmetry and regularity of the geometrical map is determining the possible pathways for its evolution. It is this same principle that leads Lafolley to extrapolate his Aether vertex by building the basic square into the pyramid.

The four-cornered Aristotelian diagram is still apparent in many alchemical texts as late as the seventeenth century. For example, a woodcut from the German alchemy manual Theosophische Darstellung zur Alchemie(1598) still features the four elements at the corners of the diagram, in this case with an equilateral triangle appended to the centre of the square, [see fig 2.12]. This triangle is then filled with a circle, which has at its centre a further equilateral triangle. The orientation of the seven pointed star (describing in this case the seven-fold transformations of matter in this version of alchemy) is determined by the initial geometrical constraints of the basic Aristotelian square, with the first three corners: anima, spiritus and corpus, corresponding to the Aristotelian elements (and in the case of corpus, the combination of earth and water).

Fig 2.12: Alchemical cosmology from Theosophische Darstellung zur Alchemie

The Ripley wheel, some fifteen centuries after Galen, is the most highly evolved descendent of the early ideograms. Just as in the Galenic diagram, the loss or gain of 'hotness', for example, might move a substance between AIR and FIRE, so the wheel describes a material cosmology ordered in the twelve-fold transformations of his text. The layered geometrical development of these maps therefore determines a pathway from one substance to another and back again, as, importantly, this wheel can move both ways. In her paper "Depicting the Medieval Alchemical Cosmos", Jenny Rampling explains that it is this circulation through distinct processes that transform metals in nature, giving a mechanism for the generation or vegetation of different metals in the earth's crust that we

have described, through the natural cycles of the processes in the wheel. She quotes the Majorcan Mystic and polymath Raymon Llull (1232 – c.1315) explaining through use of this cycle the regeneration of metals in the earth:

> When they are [taken from] their mines, Nature contrives through corruption to go back by circular motions, undoing and generating them a second time, and with another turn, such that they attain a new generation through digestion in their mines... just as the generation of flesh happens in the body of an animal through digestion of food and drink. (Rampling 2013, p.51)

This is a further elaboration on our moment of material revelation. So thoroughly has the (eventual) circularity of the system been accepted geometrically, that what started as an Aristotelian 'square' is now not merely visually a circle, like many reaction pathways in modern science [see fig. 2.13], but operates in reality *like a wheel*, in that just as it will turn one way, so can be made to turn the other[54]. So a visual observation: it looks like a wheel, imparts a specific cosmological revelation: the transmutation of metals can proceed in both directions. This wheel is not merely a hypothetical reaction pathway, it is being used, based on no direct empirical evidence, to construct a theory for the operation of nature at large, in particular the generation, or *vegetation* of matter within the earth[55].

[54] Rampling also notes that this transition constitutes a 'squaring of the circle' a long standing mathematical problem (how to construct a circle with the same area as a square of a given dimension using just the kinds of geometric extrapolation that is used in developing new links and nodes in these evolving cosmologies. She cites Ripley's own couplet which is inscribed in the around the innermost ring of the Wheel of Inferior Astronomy:

When thou hast made the quadrangle round
Then is all the secret found

[55] Llull is by no means the earliest alchemist to extrapolate their systems to the functioning of the geological formation of metals. Indeed, these systems are used to explain (and are evidenced by, in their authors' opinions) volcanoes, geysers and other natural phenomena.

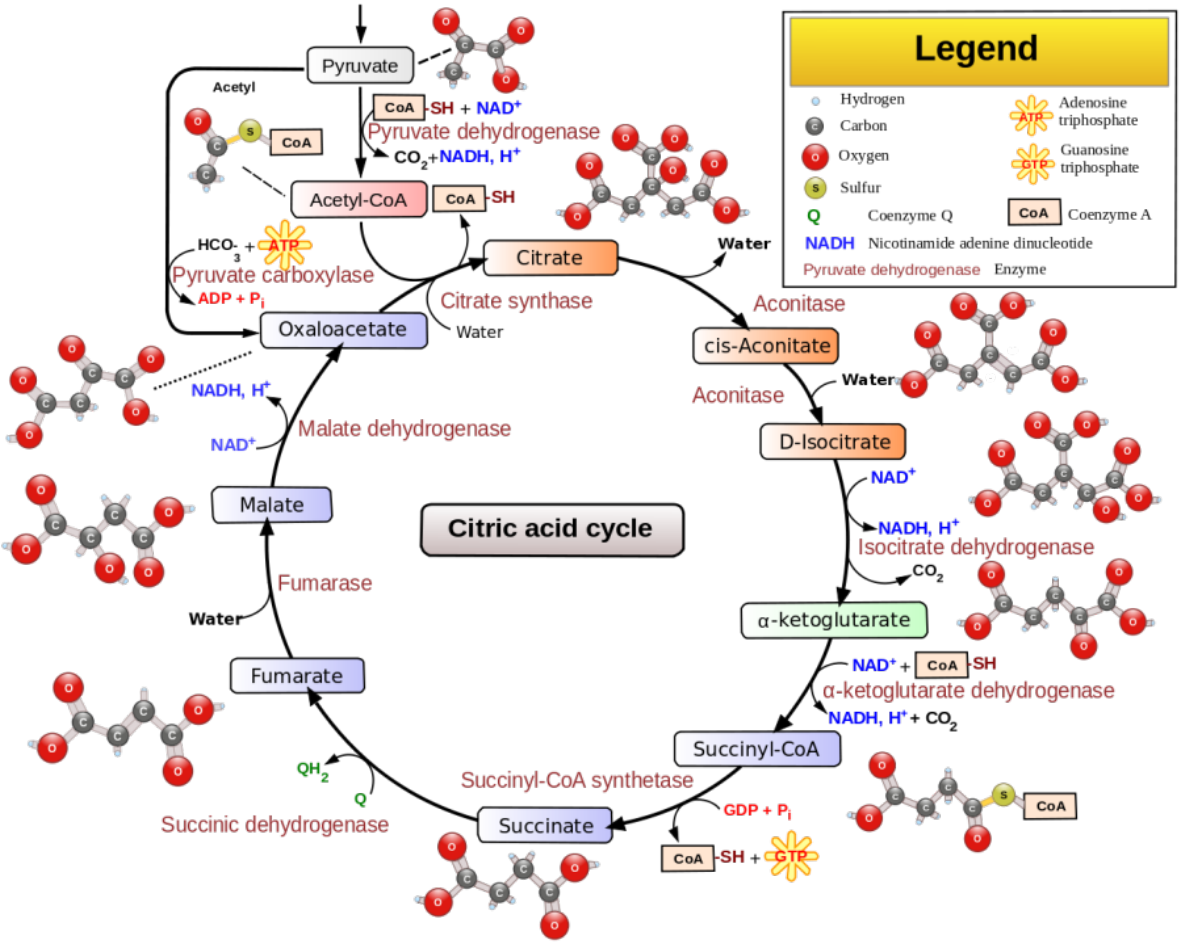

Fig 2.13: The metabolic pathways for the oxidation of acetate, the citric acid, or Krebs cycle. Like the Ripley diagram, this appears to be a wheel; however, other than the fact the process recycles some elements of the molecules involved back into the starting compounds, it has nothing else in common with a wheel and unlike the Ripley, could equally be laid out as a rectangle or triangle, and certainly cannot proceed backwards.

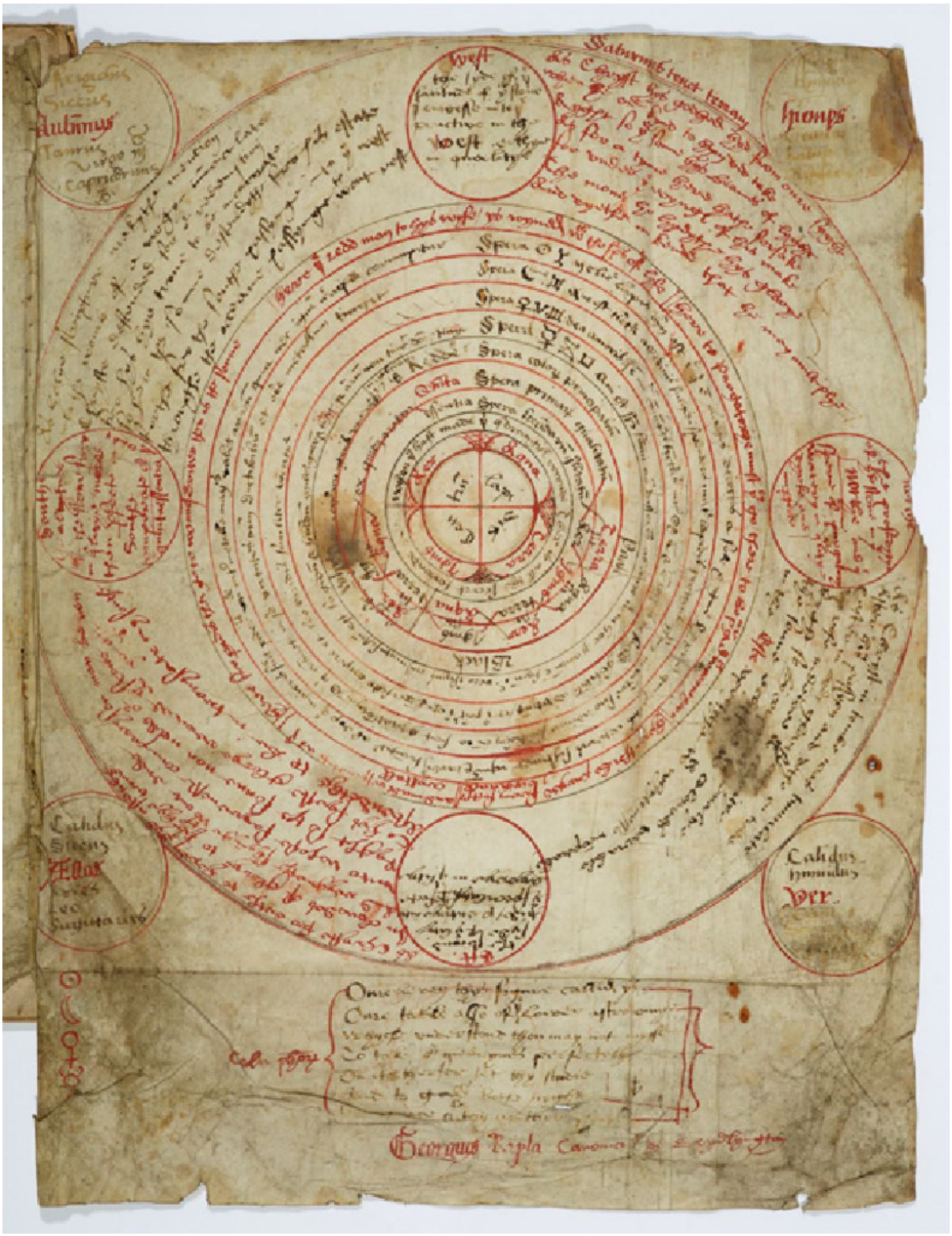

Fig: 2.14 Thomas Knyvet's Wheel.

Llull has also used another kind of extrapolation, or pseudo rationalisation, through the logically ambiguous term 'just as'. The circular system he described is linked to well understood, more intuitive physical phenomena, that of eating and digesting. Whilst this

may simply be an analogy, alchemical authors frequently predicate leaps of reasoning to the functioning of parallel systems, typically everyday biological or social experiences, often in doing so placing the human at the centre of the workings of the universe[56].

Now this may all sound a long way from the exploding bottles and spray painting of Carter and Latham, but exploring these outsider systems further, we can find some more surprising commonalities in the blurring of metaphorical and analogic relations, and the overriding syncretisms at work.

Following Wertheim's account of Carter's discovery we learn what happened next after his epiphanical dream of the vortexes. Carter has made a set of black rings out of hardboard to model his toroids, or circlons:

> ..Working in a pitch of inspiration, he took a piece of white card and hung one of the black rings in front of it. This represented the nucleus of the hydrogen atom, with atomic number 1. He photographed the ring, then he glued two rings together at right angles forming a little ball-shaped cross to represent helium, with atomic number 2. He photographed this and added a third ring to represent lithium, atomic number 3. Rapidly he worked his way through the succeeding elements, adding one ring at a time, in what seemed like an almost necessary sequence of forms. At each step he photographed the resulting model, until finally, at element 101, he ran out of rings.

It is only when he gets the film developed and pins the photograph of each successive 'element' to a periodic table that these efforts bear fruit. In the photos, each row in the

[56] This syntactic trick is explored further in the text accompanying the *Dreams of Homunculi* work submitted, another good example is found in Paracelsus' De Natura Rerum as he begins to explain the rationale behind the creation of the homunculus:

> In general, however, one could say that all things are born from the earth by means of putrefaction. For putrefaction is the highest step, and the first beginning of generation, and putrefaction takes its origin and beginning from a moist warmth. For the continual moist warmth brings about putrefaction and transmutes all natural things from their first form and essence, as also their powers and virtues. For *just as* the putrefaction in the stomach turns all food to dung and transmutes it, so also the putrefaction that occurs outside the stomach in a glass [i.e., a flask] transmutes all things from one form into another. quoted in Newman, W. R. (2004). Promethean ambitions : alchemy and the quest to perfect nature. Chicago, Ill. ; London, Chicago, Ill. ; London : University of Chicago Press. P.200

periodic table seems to have a specific extra diagrammatic layer of sophistication to the one above, with clear steps in the pattern development between subsequent rows. This ostensible correlation between the geometric development of the ring structures and the ordering of the elements surely proves the geometry of his circlon model is predicting the structure of the periodic table.

This diagrammatic elaboration leads directly to the foundation of his cosmology and the elaborate diagrams of elements we have seen in chapter one.

Carter then goes on to model the isotopes of the elements[57]. At first glance the number of neutrons in an element's naturally occurring isotopes seem to be arbitrary and don't fit into any obvious sequence or rule. Mainstream science has explained these numbers through the use of an elegant bit of mathematics which was developed to explain the size of rain drops, and looks at the stability of the mixture of protons and neutrons in these large nuclei in terms of their attractive and repellent forces and thus the tendency for the nucleus to split in two[58]. James Carter however returns to his model rings but finding he hasn't enough to model the different isotopes starts to draw them out as simple schema. '"to my great satisfaction" he wrote "I found that when I constructed the various isotopes for each element, the one [whose model] was the most symmetrical and balanced, inevitably turned out to be that element's most abundant isotope."..... He was twenty-seven years old and he had "discovered some kind of secret of the ages" '(Wertheim 2011, p.159)

We can see the alchemical parallels in Carter's thinking: if a geometrical elegance does not explicitly prove a system to be true, it certainly massively underlines its credibility. Furthermore, it is in the fabrication and handling of the wooden rings, a process of making, that allows him to initially elaborate his system: if a tangible and easily intuit-able material

[57] those stable versions of each element that vary only in the number of neutrons in their nucleus
[58] The basis of nuclear fission.

can be manipulated and perform in this way and seems to neatly describe a system, then the system has a greater claim to profundity.

As Carter starts to extrapolate this system beyond the elements, every deductive step is based on the ring shape as integral, and as he tries to explore their functioning, he calls upon other everyday materials to elaborate their properties. These toroids, we are told, are formed of some kind of 'wire' or 'string' and Carter duly sets about making them real by winding bailing wire around a broom handle (Wertheim 2011, p.161). Sub-atomic particles, boson and mesons, all become sprung rings, geometrically elegant yet make-able and handle-able in any garage workshop. If the heavens were the cosmological analogue of the material experiences and experiments of the alchemists, so the sub atomic world- the intellectual frontier of post-war science- is the analogue for Carter. However, as it developed, Carter's theory started to take in that which is above as well: the big bang being replaced in his cosmology by a 'grandfire' event originating not in a point, but also a ring structure. *Just as* and *just so* projecting the smoke ring onto the molecular and then up into the structures of the heavens. Furthermore, Carter's diagrams explaining these processes start to have some of the arbitrary geometric ordered-ness of Ripley's wheel, the *Joules of the Universe*, for example [see fig. 2.15], from the most recent edition of his The Other Theory of Physics (Carter 2010, 166). Carter doesn't need to wind this scale into a spiral but he does to make it fit more easily on the page. The spiral is then used in other diagrams where such scaling isn't required, becoming a feature of the system.

Joules of the Universe also contains one of the few explicit points of contact between Carter's and Latham's imaginative worlds. Near the centre, on the right hand side, you see the energy of 'a bumble bee at ½ C'. A bee also features in the O-Structure's fundamental spectrum explored in the following chapter. It shows the mass of a bee's brain relative to the micro and macroscopic scale of the universe [see fig 3.3](Gregory and Kohsen 1959, p.69). Fitting the whole universe on to one page like this reflects on the universal goals of their system building and is a clear extension of the diagrammatic process we have

described, while the bee, something perceivably 'small' within everyday human experience, brackets the lower end of the spectrum[59].

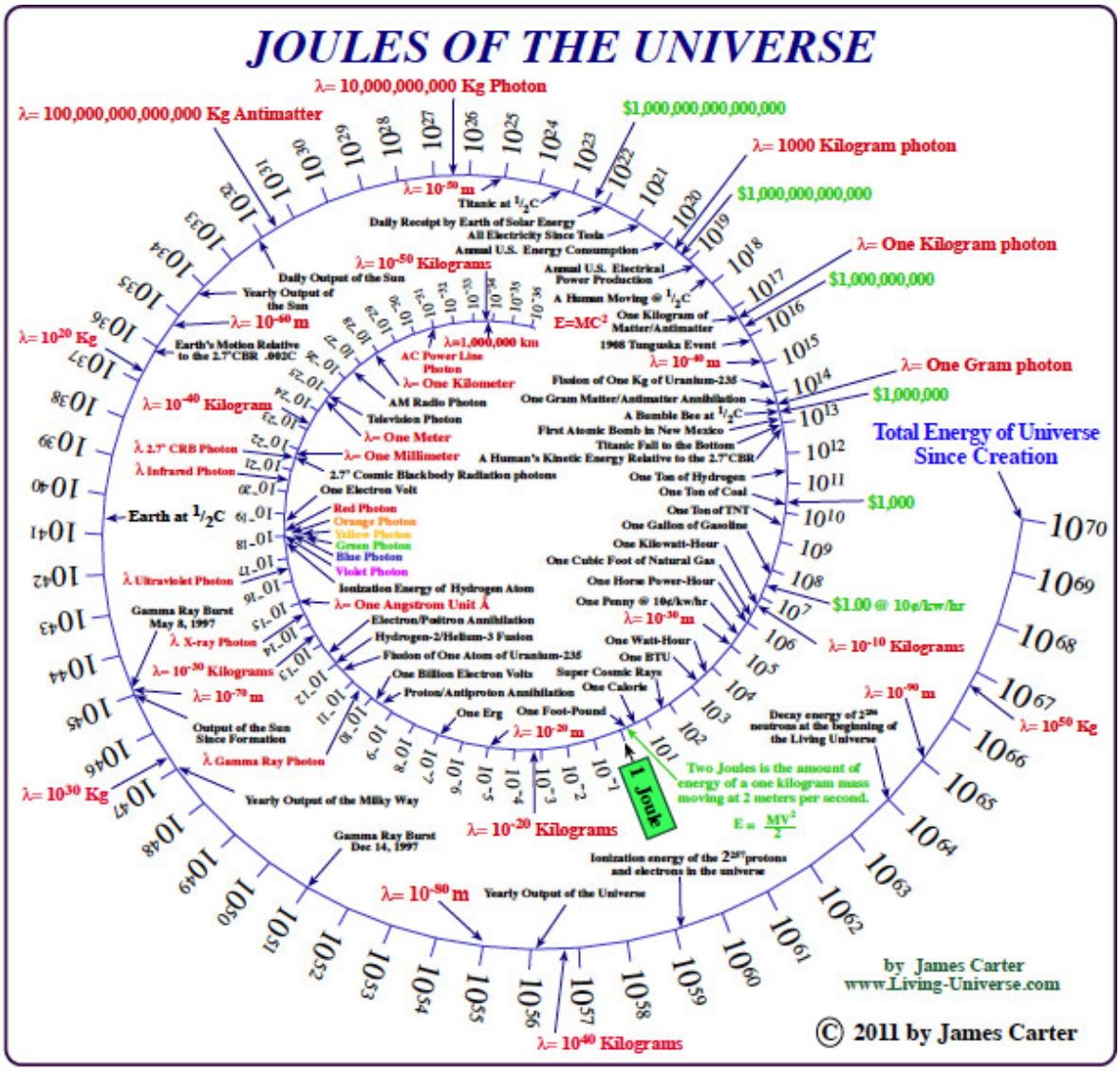

Fig 2.15 *Joules of the Universe*, Carter, 2011

There is some of the same urge to create a 'complete' diagram, containing a total account of a theory, in the sprawling periodic table at the heart of his system [see fig 1.2], annotated with countless digressions and explanations. Some of Carter's explanatory graphics become so over-annotated and dense as they develop from publication to publication that, like the *Wheel*, they become almost illegible [see fig. 2.16].

[59] Quite why Carter needs it to go at ½ the speed of light is not clear.

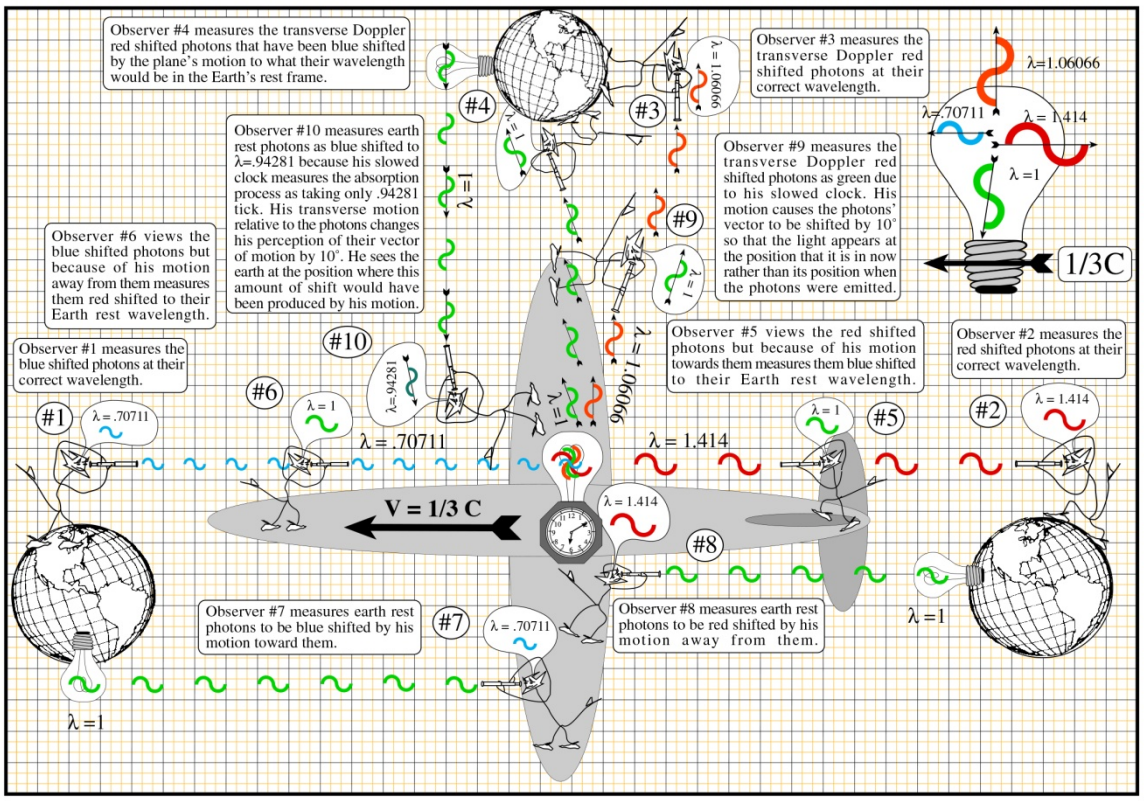

Fig 2.16 *Seven Binary Pulsars*, Carter, 2011

Over the subsequent decades, Carter goes on to model the circlon system using the evolving tool of computer graphics, visualising molecules in three dimensions as perfect synthetic skins, vibrating in the imagined space of the computer simulation: a diagrammatic extrapolation for the digitizing age.

Could it be said that Latham also develops his cosmology with the help of a diagrammatic logic?

The *Observer* series are a series of assemblages (I-V) on canvas with an 'unselfconscious *arte povera* aesthetic' (Hampton 2008/2009). The series was expanded with further works developing the theme, such as *Latter Day Observer* (1963). Constructed of books, wire, paste and paint, they were made between 1959 and 1960 [see fig 2.17, 2.18 and 2.19]. As mentioned in Chapter One, there are three different

‘types’ identified in Latham’s cosmology, each defined by their receptiveness to different ‘frequencies’ of events.

Fig 2.17: *Observer* I, Latham, 1959

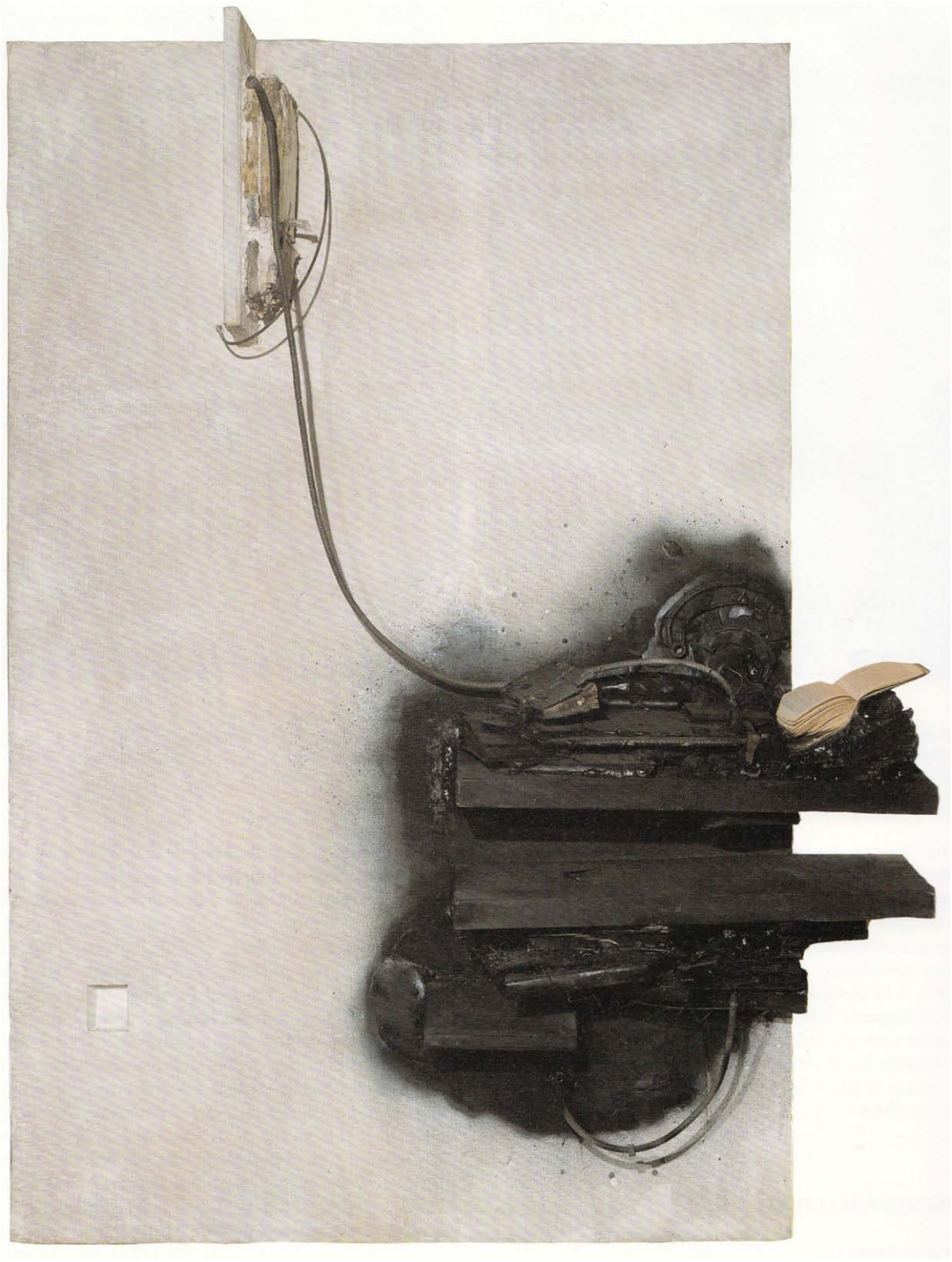

Fig 2.18: *Observer IV*, Latham, 1960

Fig 2.19: *Latter Day Observer*, Latham, 1963

Some years later, Latham would describe the three part composition of these works as an illustration of this element of Event Structure, and elaborate these three archetypes through the metaphor of the brothers in Fyodor Dostoyevsky's The Brothers Karamazov (1880).

Latham explains the three characters:

> There was a direct equivalent. Dostoevsky's novel The Brothers Karamazov was tremendously important. The brothers represented three distinct structured levels, mental resource, intuition and self-awareness. They cover all kinds as 'prototypes'. Alyosha, the third brother, is the intuitive one. In the reliefs, the relationship between the brothers' mentalities is represented in terms of a triadic structure. (Walker 1987, p.26-29)

The visual qualities of the three clusters in the *Observer* series are supposed to reflect aspects of the three types of individuals: Mitya is crudely assembled and disordered; Ivan, less so; Alyosha, smaller and neater still. Indeed, this distinction becomes yet more extreme as the *Observer* series develops; by *Observer IV* Alyosha is a small, perfectly square indentation, and Mitya a mass of blackened logs and books. By the later *Latter Day Observer* Alyosha has entirely dematerialised, but might be imagined sitting on the top of the central plinth structure.

We will explore these characters further in the following chapter, but the use of Alyosha, as the metaphor for the type receptive to a wide range of the time-base spectrum, becomes the Reflexive, Intuitive Organism (or RIO): the artist/visionary archetype (sometimes referred to as the 'Incidental Person' or 'Distant Observer') whose insight and ability to communicate across traditional boundaries makes him central to the utopian aims of Event Structure. As artist and unifier of culture and physics, it is clear that Latham identifies himself in this role.

It is significant when read against the ongoing development of Latham's cosmology that the works evolve in the way that they do; this is particularly apparent in the gradual development of the RIO, Alyosha. Latham's son Noa explains how the development of Alyosha out of its early manifestations as books, reflected on the RIO's independence from 'received wisdom'; crucially though, he notes that initially the development of the *Observer* works was likely driven by purely aesthetic decisions. Only later did Latham

realise the significance of the developments he was building into his works and how they developed his cosmology.[60]

It is clear that the production of these works and the evolution of their aesthetic and compositional logics directly catalysed the development of his cosmology. As Event Structure develops, Latham explicitly acknowledges this visual logic in the development of a distinctive diagrammatic language, *evenometry.*

Latham's preoccupation with the limitations of language is manifest throughout his career. He was to claim that the languages of mathematics and the physical sciences were not adequate in representing the world, quoting the mathematician and philosopher Bertrand Russell (1872 – 1970): 'What we need is a language which shall copy nature' (Latham 1976).

Through this concern with the limitations of language, Latham is constantly trying to reorient the way his works are read, presenting them as an alternative way of describing the operation of the universe. His early *Quantum of Mark* spray gun paintings were his attempts to translate an event (the spraying), and with it a period of time (the 'frequencies' of these events), into a two-dimensional space. John Walker explains:

> A key characteristic of Spray-gun painting was the fact that it was a direct result of the process of production employed. An event - the act of painting - became a two dimensional configuration; *time was thus translated into a geometry of space*.(Walker 1995, p.24)

We saw earlier in the chapter how the sprayed marks have a direct correspondence to the events within Event Structure and Latham saw the production of the spray-gun works as a real analogy of the overlapping and mutually related moments of experience that build up our perception of the world. This is the geometry that Latham means when he claims the 'Observer' series 'isn't intended as allegory but as geometry (*evenometry*) of the three basic

[60] Based on unpublished correspondence with Noa Latham. London, 2012-2015.

kinds of person'(Tate 2004). *Evenometry* is a schematic interpretation of specific two-dimensional spatial relationships representing specific corresponding relationships within elements of Event Structure.

To illustrate this further, in *Evenometry of the Reflective Intuitive Organism* from his paper 'Dimension – Framework of Event identified by Art' (1989), co-authored with the artist Ian Macdonald Munro, Latham explains one such schematic [see fig 2.20]. At the top of the page we see a two-dimensional ideogram with the letters P, Q and r composed not unlike the three clusters in the earlier *Observer* works and surrounded by, to varying degrees, a large number of apparently 'sprayed' pixels (the works has been produced on an early digital word processor).

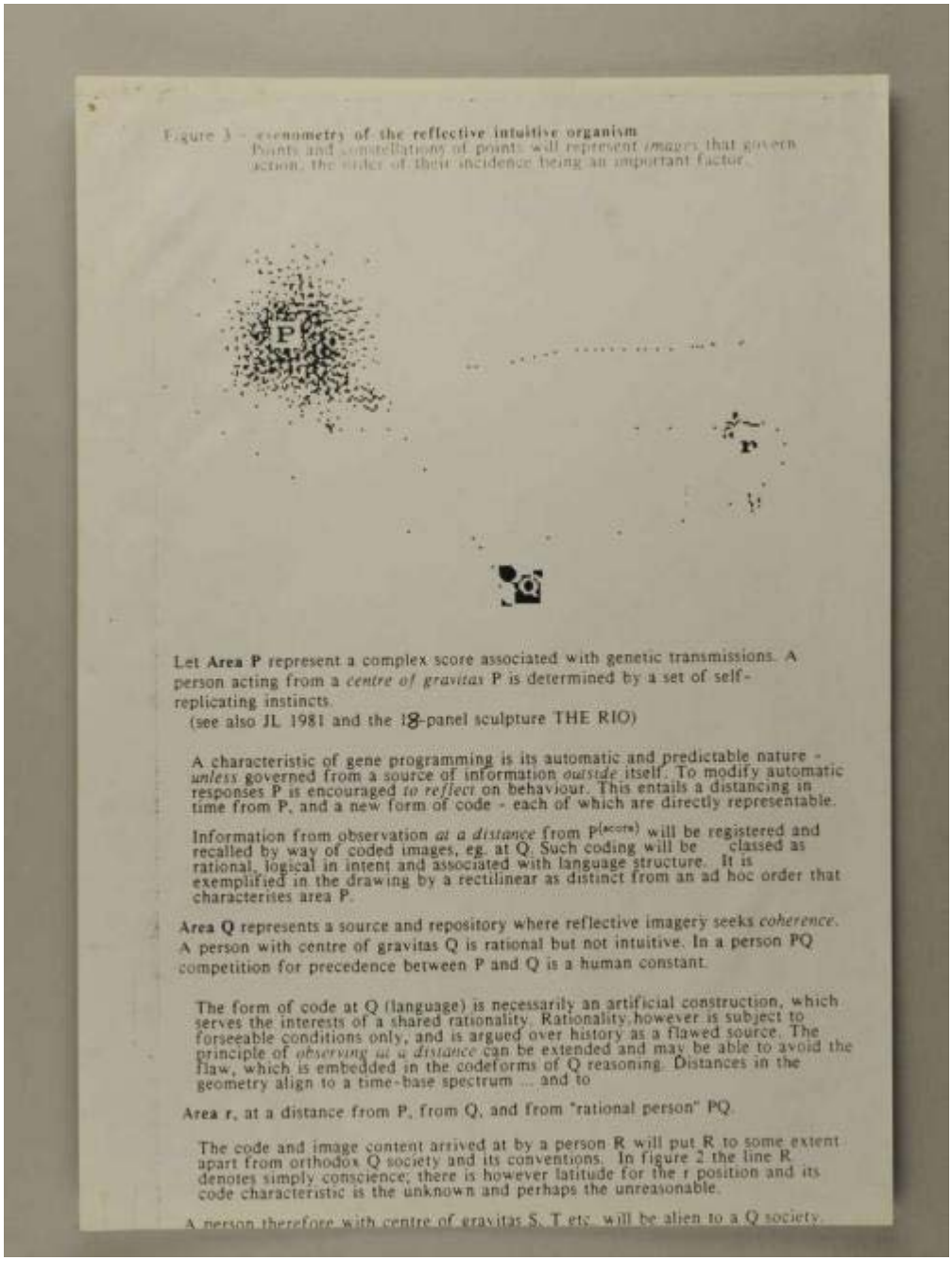

Figure 3 - evenometry of the reflective intuitive organism
Points and constellations of points will represent *images* that govern action, the order of their incidence being an important factor.

Let **Area P** represent a complex score associated with genetic transmissions. A person acting from a *centre of gravitas* P is determined by a set of self-replicating instincts.
(see also JL 1981 and the 18-panel sculpture THE RIO)

A characteristic of gene programming is its automatic and predictable nature - *unless* governed from a source of information *outside* itself. To modify automatic responses P is encouraged *to reflect* on behaviour. This entails a distancing in time from P, and a new form of code - each of which are directly representable.

Information from observation *at a distance* from $P^{(score)}$ will be registered and recalled by way of coded images, eg. at Q. Such coding will be classed as rational, logical in intent and associated with language structure. It is exemplified in the drawing by a rectilinear as distinct from an ad hoc order that characterises area P.

Area Q represents a source and repository where reflective imagery seeks *coherence*. A person with centre of gravitas Q is rational but not intuitive. In a person PQ competition for precedence between P and Q is a human constant.

The form of code at Q (language) is necessarily an artificial construction, which serves the interests of a shared rationality. Rationality, however is subject to forseeable conditions only, and is argued over history as a flawed source. The principle of *observing at a distance* can be extended and may be able to avoid the flaw, which is embedded in the codeforms of Q reasoning. Distances in the geometry align to a time-base spectrum ... and to

Area r, at a distance from P, from Q, and from "rational person" PQ.

The code and image content arrived at by a person R will put R to some extent apart from orthodox Q society and its conventions. In figure 2 the line R denotes simply conscience; there is however latitude for the r position and its code characteristic is the unknown and perhaps the unreasonable.

A person therefore with centre of gravitas S, T etc will be alien to a Q society.

Fig 2.20: *Evenometry of the Reflective Intuitive Organism,* Latham & Macdonald Munro, 1989

Latham explains this work using specific distances and areas within the image: the person's centre of gravity P is governed in part by a rational reflection upon his own behaviour from a point Q. R denotes a second point of self-reflection and self-observation - the conscience, whose 'characteristic is the unknown and perhaps the unreasonable'. Latham is not describing his three archetypes, but the balance of introspection, self-reflection and conscience of the RIO.

Area r is 'at a distance from P, from Q, and from rational person PQ', thus the internal workings of the RIO echo the *Observer* series illustration of the three archetypes, with the geometrical conceit PQ replacing the crude hoses and wires joining Mitya and Ivan[61]. Latham states: 'distances in the geometry align to a time base spectrum'; and thus relates the specific dimensionality of the diagram to meaningful dimensions within his cosmology.

We can see the innovation in the composition of the *Observer* works has become a codified element of the workings of his cosmology. Indeed, (whilst it is too substantial a topic for inclusion here) the development of *evenometry* itself, through which the artist justifies and explains many elements of Event Structure, is all an extension of this interplay between his diagrams and compositional relations within his oeuvre, which in turn drives the development, and description of his cosmology.

Can we ask what are the common characteristics of quasi-scientific outsider systems, the works of alchemy and those of our contemporary outsider cosmologists? Without over-rehearsing the similarities, they seem to exhibit the traits of being built on a moment of material revelation, iterative material experimentation and the building of seemingly rational diagrammatic deductions with self-reinforcing logic.

[61] A mathematical description of the line between points P and Q.

Fig 2.21: The red king and white queen enjoy some immersion in the bath, from the Rosarium Philosophorum (1550)

Finally, and perhaps most intriguingly, there is the inclusion of the human experience within both alchemy and these cosmologies. The Ripley Wheel is not just a recipe card, the wheel functions as a map. In the main text Ripley refers to elements of the wheel in terms of the compass points, but this is not a map of a specific domain, it is the realm in

which the 'red man and his white wife'[62] proceed along another journey. There are seasons in the wheel too, which both overlay metaphorically some of the material transformations but also reflect the stages in the metaphorical partnership of the red man. This is common to other alchemical texts where the progress of reactions follows the different states of a couple's relationship; *just as* two substances can react to create another, so can a couple (through sexual intercourse). If there is an obvious *just as* link at that moment, then why shouldn't other things that couples do together (like take baths[63] [see fig 2.21]), also tell us about the operation of the material world.

At the very centre of Ripley's wheel we also see the nested orbits of Pythogoras' celestial spheres. This conjunction of a material cosmology and an astronomic one might seem at first arbitrary, and there is certainly a case, given our earlier observation of diagrammatic rationales, that the circularity of the wheel's centre alone is enough to justify this inclusion. However, within alchemy the metallurgical and astronomical systems had overlapped long before Ripley's diagram. Perhaps this is best summed up in a text which appeared sometime in the ninth century and which was reputedly carved on an emerald tablet. The text has appeared frequently in alchemical writing ever since and is offered here in translation by Isaac Newton:

> That which is below is like that which is above & that which is above is like that which is below (Newton 2010)

The celestial architecture is not merely a metaphoric analogue of the material, with each metal corresponding to a planet, the moon and the sun, but in one system's functioning we

[62] An analogy both for gold and silver, iron and antimony, and the sun and moon, as well as various other pairings, used as part of the *cast* of alchemical metaphors writers used to both hide and reveal the recipes and operating systems they were describing.

[63] This is a popular metaphor/analogue as boiling substances central to many alchemical recipes. The woodcut shown in fig. 2.21 shows a generic king and queen, but the bathing of the Gods Mars and Venus (during their illicit courtship) is also a possible reading as this scene may have had a wider cultural familiarity having been depicted most notably perhaps in by the Italian artist and architect Giulio Romano (c1499 –1546) in one of his frescoes at the Pallazzo Del Te in Mantua, Venus and Mars Bathing (1526-28). This classical reading gives the scene another material as well as narrative reading, as the gods both represent different metals. Conversely, as depictions of this pair bathing are unusual outside alchemy, we might speculate whether alchemical texts had any influence on Romano's composition.

are seeing the actual function of the other. A later diagram [fig 2.22] shows this even more explicitly as it relates elements of Christian mythology, astrological symbols and even the organs of the body to the seven planets and their circular motion. So in nesting the celestial cycles within his material alchemical one, Ripley is not just elegantly filling a graphical and geometrical gap; by extrapolating his cosmology diagrammatically, he is reflecting on a profoundly syncretic and monistic approach to understanding the world, an approach endorsed by centuries of civilised thinking, influenced perhaps by the emerald tablet, and a significant reflection on the centrality of the human to the workings of the cosmos (and if the psychoanalyst C.G. Jung (1875 – 1961) is to be believed, the natural operation of the human psyche[64]).

Alchemical systems are intrinsically human-centric. Perhaps this is not unsurprising as most mature systems come from the later Western period of Alchemy where it was essential that these ideas could neatly overlay, rather than in any way contradict, mainstream religion. We have not dwelt on the role of God in alchemy yet, but key to all of these systems, as we will see in the following chapter, is the sense that the world is coded by a creator, and thus essentially decipherable. This fundamental creator, God, and by extension his relationship with man (mediated by religion) is therefore essential to the working of alchemy at some level and alchemical systems therefore evolve alongside religions ones, even where that relationship is antagonistic (for example where they touch upon forbidden or occult material). In all religious systems within which alchemy developed, man occupies a central role, and thus it is not surprising this centrality is maintained in the alchemy itself.

[64] 'In a preface to the Mellen catalogue of alchemical books written in 1944, C.G. Jung noted that many alchemical treatises have less to do with chemistry proper than a symbolic – even psychological – content, similar to mythology and folklore as examples of "archetypal contents of the collective unconsciousness"' Elizabeth K. Menon quoted in (Wamberg, J. (Ed) 2006). This idea is explored at length within Jungian psychoanalysis but is not of great relevance here.

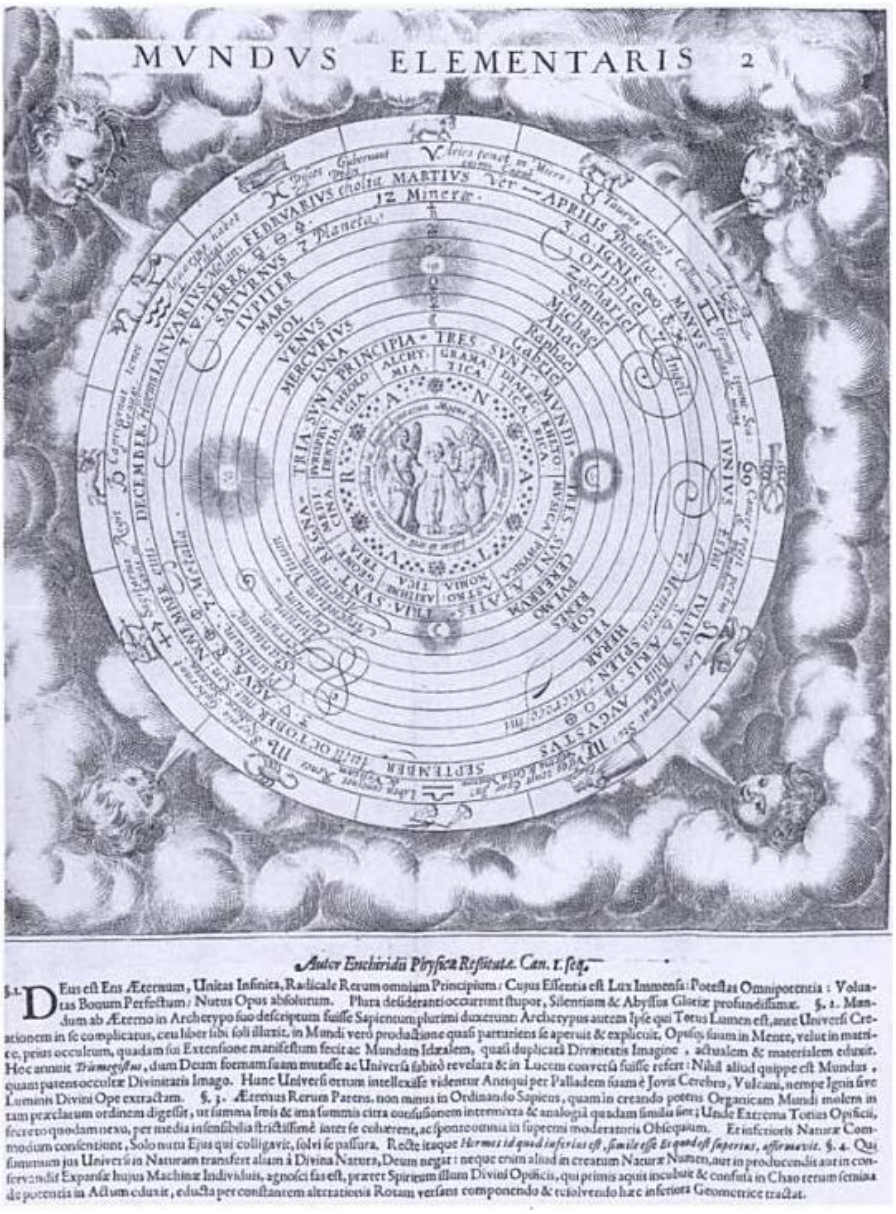

Fig. 2.22 Mundus Elementaris from Museaum hermeticum reformatum et amplificatum, 1678

Indeed, the overlapping of alchemical and religious systems is fundamental, and not unsurprising, as the syncretism we have already described in Alchemy also looked to the complexities of its contemporary theology for rationales and metaphors to borrow. As we see in fig. 2.22, the angels enter the alchemical schema, one for each planet and each corresponding metal: alchemists were all too happy to absorb from the wider Christian

conceptual canon[65]. Furthermore, mirroring a belief in *god-given* abilities like prophesy, there were ideas circulating that a gift for alchemy itself could be a quasi-spiritual or ordained, with alchemical knowledge being imparted directly from God to man, the *donum dei*[66] [see fig 2.23].

fig 2.23 An Alchemist receiving the *donum dei*, depicted by Thomas Norton, The Ordinall of Alchimy in Theatrum chemicum britanicum

[65] There are examples of conflicts between the two systems, not unsurprising given the centrality of the sun (gold) in the alchemical cosmos and the whiff of sun worshipping inherited through the historic links to Egyptian mysticism.
[66] This is explored more fully in Alchemy and authority in the Holy Roman Empire. pp.27-30

This clear centrality of the human is underlined by the consistent use of human metaphor within the system. Like the king and queen, the red man and the white lady and the relation of the cosmological system to a biological or emotional equivalent, Carter's writing is suffused by these moments of human simile, which step orthogonally away from the pseudo-scientific language and notation of the rest of his system. In 1988 he published another book, this time not seemingly related to his sprawling output on circlon physics. In The Four Sexes, Carter sets out his theories on reproduction and gender. Even in this field his desire for symmetry and order are not to be thwarted and like the alchemists he builds another symmetry into the human gametes. Just as there are two types of sperm (x and y chromosome) there are two types of egg (yin and yang). Between them therefore there are four possible sexes, and to make this more interesting still, each has certain personality traits and couples better with a specific 'type' of the other sex[67]. Alchemy explicitly genders nearly all of its mechanisms with the red king and white queen mirrored by the sulphur (male) and mercury (female) that were considered to be the constituents of all metals. "Alchemical texts often compare the production of the philosopher's stone to human pregnancy and birth" and Adam and Eve, or Christ and the Virgin Mary are often used in Alchemical writing to signify the perfection of these Alchemical gender-types (M. E. Warlick in Wamberg 2006, 103,104).

Most interesting perhaps, Carter tries to find a place for consciousness in the heaving mechanical system of interwoven springs he has created. He does this first by creating an internal and an external god (Carter is fond of dichotomies – he also has two kinds of time[68]); the external God is best described as a monistic force that has no impact on the

[67] Setting the oddly hetero-normative conventionality of this entirely abnormal system aside for one second, most of the 'traits' of these four genders are rooted in some heartily traditional stereotypes of men and women- yangs are better with machines and leadership and yins more emotional and creative, however, his system does apportion equal amounts of these types to each gender which Carter is keen to point out undermines the logic of traditional gender roles and suggests a route to a more productive society. More in Wertheim 2011, p.127- 136. This utopian belief that his system can underpin a *better* society is also a commonality with Latham.

[68] This has been touched on in chapter one and will be revisited in Chapter Three. Latham of course based his system ostensibly on a geometry of time.

physical universe but can be ‘so concentrated at locations like here on earth that it can communicate directly with the consciousness of human beings and maybe even animals, plants and rocks’. By contrast, it is the internal God that gives consciousness, also built from a pairing:

> When protons and electrons interact with one another a basic unit of consciousness is generated. Thus the basic unit of consciousness in the universe is not an external god but a hydrogen atom.

He develops this theory and with molecular complexity and ultimately biological complexity, this consciousness is ‘concentrated’ into our own human self-awareness (Carter 2010, 33).

As noted in Chapter One, it was the desire to account for human consciousness and experience within a physical model of the cosmos that instigated the development of the O-Structure theory, which is central to Event Structure. Carter’s elemental consciousness has strong echoes in Latham’s elemental moments of experience, in fact at the heart of all these systems is a desire to locate *our* experience of reality as a cornerstone. This human centrism is entirely explicit within alchemy’s social and sexual rationalities, and the inclusion of God and spiritual and mystical elements in its working all further underline the human’s central role. Resolving the disconnect between human subjectivity and the wider workings of the cosmos will be key in understanding Carter and Latham in light of the contemporary episteme, explored in the following chapter.

Having traced each of these three commonalities from alchemy through both Carter and Latham’s cosmological projects, we can draw some clear conclusions: first, their approach to understanding the world is rooted in the primacy of material experience. This is not unsurprising given what we already know of these men, a sculptor and a man whose life has been steeped in manual labour and practical projects. Secondly, it is apparent that Carter and Latham developed their projects through a certain kind of diagrammatic extrapolation and validation, a self-reinforcing iteration that seeks ultimately to map everything into a single diagram. Finally, that their projects are underpinned not just by an

urge to account for the human experience itself as central to the overarching structure of the universe, but through analogy, the universes they build profoundly reflect qualities of this human-centrism in their operation.

If alchemy is a cosmological project built of three thousand years of human intelligence and effort, then perhaps it is not surprising that our protagonists would find some of its habits attractive or even familiar, adopting them without being aware of it at the time. That they both seem to have so closely followed some of its defining characteristics is worth further exploration. The following chapter will narrow down these strategies for knowledge creation, and explore them in light of the epistemological theories of Michel Foucault.

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Chapter Three: A Discourse Analysis of Sorts

> It is, however, less risky and more profitable to regard Foucault as an intellectual artisan, someone who over the years constructed a variety of artefacts, the intellectual equivalents of the material objects created by a skilled goldsmith or cabinetmaker. We need to take account of the specific circumstance occasioning the production of each artefact in order to understand and appreciate it. But each artefact may also have further uses not explicitly envisaged by its creator, so that we also need to examine it with a view to employment for our own purposes. (Gutting 2005, p.6)

This chapter will consider Carter's and Latham's and projects in light of the ideas of the French theorist and philosopher Michel Foucault (1926 – 1984). We will see how the alchemical features of their cosmologies identified in the previous chapter read across into the four key forms of resemblance constituting knowledge, within Foucault's definition of the Renaissance episteme. Observing that Latham and Carter share certain ways of creating knowledge with Foucault's definition of the Renaissance episteme, we will follow Foucault's methodology to explore their writing more closely. Should we see their cosmologies as simply some kind of resurgence of a Renaissance way of thinking? Through a closer reading of some of their writing that Foucault might have loosely described as a discourse analysis, this chapter will explore their strategies and motivations, and suggest rather that their cosmology building is motivated in part by a dissonance with the contemporary episteme.

Systems of Knowledge

Foucault offers a history of systems of knowledge, principally laid out in The Order of Things: An Archaeology of the Human Sciences, first published in 1966, where he divides the history of thought into three distinct phases, or epistemes. In each episteme, structures within ideas related to the workings of the natural world, the functioning of language, and the working of the economy overlap through their adoption of certain strategies and resemblances, to create a system of conventions that set the parameters

for the creation of knowledge. Foucault maps these prevailing strategies of knowledge production, through a handful of examples in each case, but claims a certain degree of universality of epistemological approach within each loosely defined period. The *Renaissance*, which is exemplified in the medieval and early modern periods; the *Classical* which lasts from roughly the triumph of the scientific revolution through the Victorian era to the early twentieth century, to the contemporary era, which seems to emerge over the first half of the twentieth century, but can only really be said to be explored by Foucault within his own contemporary culture[69].

The Renaissance Episteme

Through the 'semantic web of resemblance' in which Foucault traces the structures of knowledge particular to the Renaissance episteme, he sets out four types of resemblances. These strategies typify the Renaissance approach to ordering the world and describe those routes taken by Renaissance thinkers to comprehending it (Foucault 2002, ch.2). He illustrates these four resemblances through a corresponding circle of signatures: legible 'clues' to be read from the book of nature that would have pointed the Renaissance thinker towards these resemblances. Owing to our subject matter, we will mostly focus on these resemblances where they apply to the ordering of the cosmos,

[69] I do not propose to offer a detailed critique of Foucault's analysis as my conclusions do not depend on his theory's success, but there are several common questions raised over his approach worth reiterating here. Owing to the relatively small number of examples and rare moments where he is categorical about transitions between epistemes, there is considerable vagueness as to his time periods; for example, the epistemic nature of science might shift between the Renaissance and the Classical epistemes out of synch with such a shift in economics or linguistics. Secondly, he doesn't discuss the universality of the adoption of his epistemes: are these approaches true throughout all organised cultural endeavours, do they allow for competing approaches to co-exist? Finally, his definitions of the contemporary episteme step away from the detailed examples he gives for the preceding two into a complex theoretical discussion of the challenges of contemporary knowledge creation. This leads the reader to suspect he defines the preceding two epistemes simply to warm up concepts and terminology to tackle specific contemporary questions, and as such his ideas about historical knowledge creation should be seen not as an attempt to offer a comprehensive analysis, but rather as one side of a comparative study, where cultural and intellectual habits that remain unchanged between epistemes (like many aspects of religion, folk culture, or non-western cultural norms), can be 'cancelled out' and omitted from the study of a contemporary crisis in epistemology that he is trying to solve. Helpfully discussed further in Gutting, G. (2005). The Cambridge companion to Foucault. Cambridge, Cambridge : Cambridge University Press.

although Foucault offers a parallel account of them both in the functioning of language and the economy.

The first resemblance *convenientia*, is a resemblance of adjacency. For Foucault, the Renaissance thinker saw physical or metaphysical adjacency as more than just an exterior property, it was somehow intrinsic. The idea goes beyond a localised example, like the moss growing on a shell having some intrinsic similarities with the shell on which it is found: the ordering by adjacency sets up a grand cosmic hierarchy of resemblance between every element of nature across cosmological scales: God: Matter, Heaven: Earth, Sea: Land. Here Foucault quotes Giambattista della Porta (1534 – 1615) the Italian polymath writing in his 1664 text Natural Magic: 'these links proceed so strictly that they appear as a rope stretched from the first cause as far as the lowest and smallest of thing, by a reciprocal and continuous connection'(quoted in: Foucault 1970, p.21).

Secondly, *aemulatio*, is the resemblance between things that are alike and the sense that nature is full of reflections of itself. This is an extension of the principle of the emerald tablet we encountered in the previous chapter: *That which is below is like that which is above & that which is above is like that which is below*. Here what is key is the reciprocity at work: it is not simply that the workings of minerals in the earth mirror the movements of the stars, the stars are also mirroring the working of the minerals. Vitally however, whilst there is reciprocity, there is not necessarily *parity,* as it might be quite clear for example that the human face mirrors the heavens with the human mind dwelling behind it and animating it, as a kind of weaker reflection of God dwelling behind the stars. As with convenientia, as this idea evolves it becomes something more than just a rationale for the resemblance of two otherwise unrelated phenomena, it starts to order the world, and the Mundus Elementaris explored in chapter two [see fig 2.22] is typical of its outcomes. Rather than a chain of adjacencies, this is a nest of concentric circles of observed or inferred relations, with the central role of man as key. As we have seen in Chapter two, elements of the material functioning of nature are explained and reflected in the workings

of the human body. Through aemulation by extension, through this reciprocity man can, through the altering of his thoughts and habits affect change in the functioning of the world. If a walnut looks like a brain and therefore can cure headache, so can a man with a headache expect to have his walnut crop afflicted. The conclusion of this ordering by aemulatio is the profound centricity of the individual in the ordering and functioning of their cosmology.

The third: *analogy* we have already encountered in the *just as*, *just so* relations of analogic functioning described in the previous chapter. This is not so much a direct reflection (as in the case of aemulatio), but a conceptual extrapolation. *Just as* plant is an animal living head down in the earth 'feeding' through its mouth, the roots; *just so* those things we would expect of an animal we might also observe in a plant. Again, writ large on the workings of the cosmos, this creates a potent role for the individual, as Foucault explains:

> There does exist, however, in this space, furrowed in every direction, one particularly privileged point: .... This point is man, he stands in proportion to the heavens, just as he does to plants and animals, and as he does also to the earth, to metals, to stalactites, to storms.... he is the fulcrum upon which these relations turn' (Foucault 2002, p.24)

Finally, *sympathy*: essential a resemblance of properties. Thus light things are attracted up to the heavenly ethers, and heavy things to the dense earth. Reciprocally, trees, which are thick and opaque, repel smaller plants which are light and translucent through an antipathy of properties that balances the otherwise inexorable collusion of matter. This is the root of the Aristotelian elements and their contrasting properties we met in chapter two. Earth, Air, Fire and Water and their essential properties, cold, dry, hot and wet, attract alike and repel the others, keeping the cosmos in equilibrium. The concept however, goes beyond the material and might equally apply to concepts like good and bad, or truth and falsehood.

Whilst Foucault sets about disambiguating these four resemblances, there are clear crossovers between them; indeed these resemblances themselves have reciprocal

readings in most cases. We might look to the convenientia to find the sympathetic, which in turn reinforces the convenientia, for example: clouds are found in the sky, sharing the qualities of lightness as they attract sympathetically, but also because they are adjacent. Foucault acknowledges this and the inherent problems it causes: resemblance is fixed only by its similitude which in turn relies on resemblances, including the original to be stabilised, thus 'the whole world must be explored if even the slightest of analogies is to be justified'.(Foucault 2002, p.34)

According to Foucault, what is also essential to the Renaissance episteme is the ultimate legibility of this cosmological system. '*Convenientia*, *aemulation, analogy* and *sympathy* tell us how the world must fold in on itself, duplicate itself, reflect itself, or form a chain with itself so that things can resemble one another. They tell us what the paths of similitude are and the directions they take; but not where it is, how one sees it, or by what mark it may be recognised.' Quoting Paracelsus: 'It is not God's will that what he creates for man's benefite and what he has given us should remain hidden'. Foucault explains how the Renaissance episteme sees the sprinkling of clues to resemblance, inherent in nature, as evidence that man should try, and be able to succeed, in deciphering the workings of the cosmos.

Carter and Latham as Renaissance Cosmologists

The crossovers we have noted between Carter, Latham and alchemy seem to share their epistemological strategies with the Renaissance episteme as described in Foucault's analysis. We will now follow this argument through with specific reference to Foucault's discussion of this period.

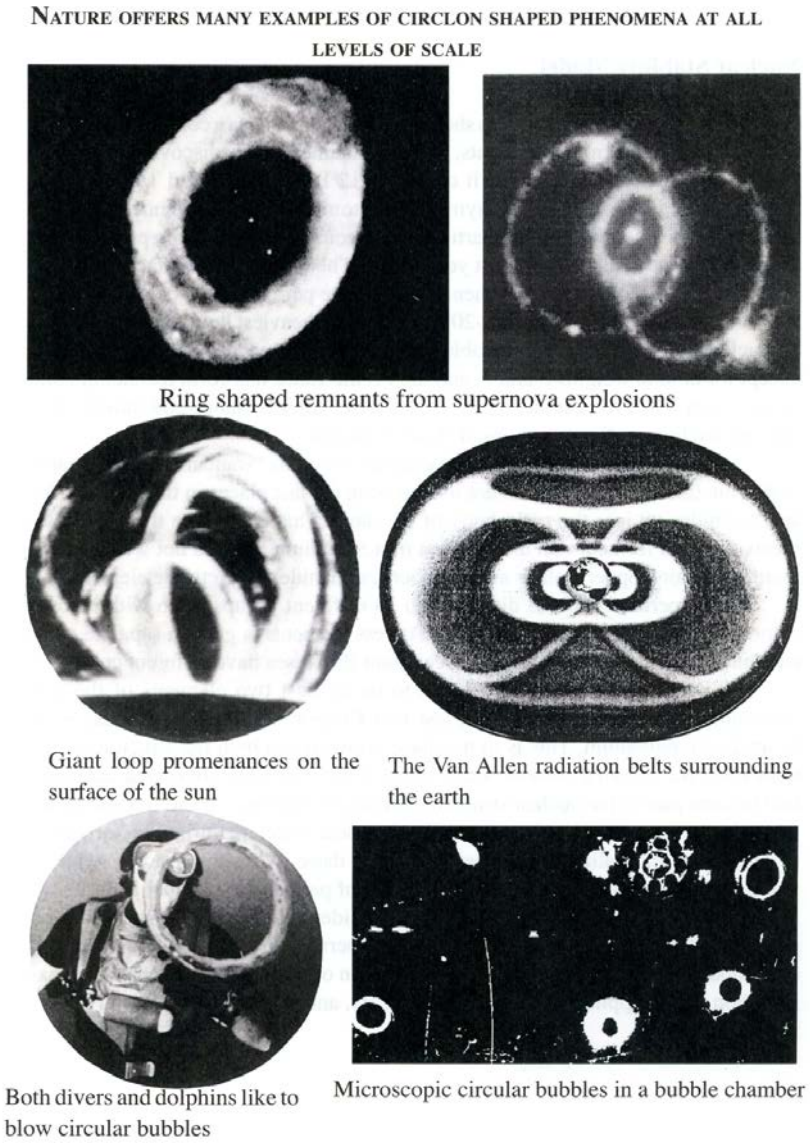


Fig 3.1: *Circlon Structures in Nature*, Carter, 2013

In both cases, Carter and Latham's cosmologies are underpinned by a belief in a fundamental spectrum ordering the universe. Carter describes a family of circlons, ranging from the size of photon up to the largest forms in the universe and stretching

through time from Carter's toroidal 'Grandfire event' that instigated the universe. He illustrates some of these toroids in The Next Great Impossible Discovery in Physics (2013), and other publications [see fig 3.1]; he also explicitly depicts this spectrum of scales in his section 'Electron vs Earth orbits', through its side by side illustration of the similarities between the subatomic and the celestial, and explicitly relates that which is above to that below [see fig 3.2].

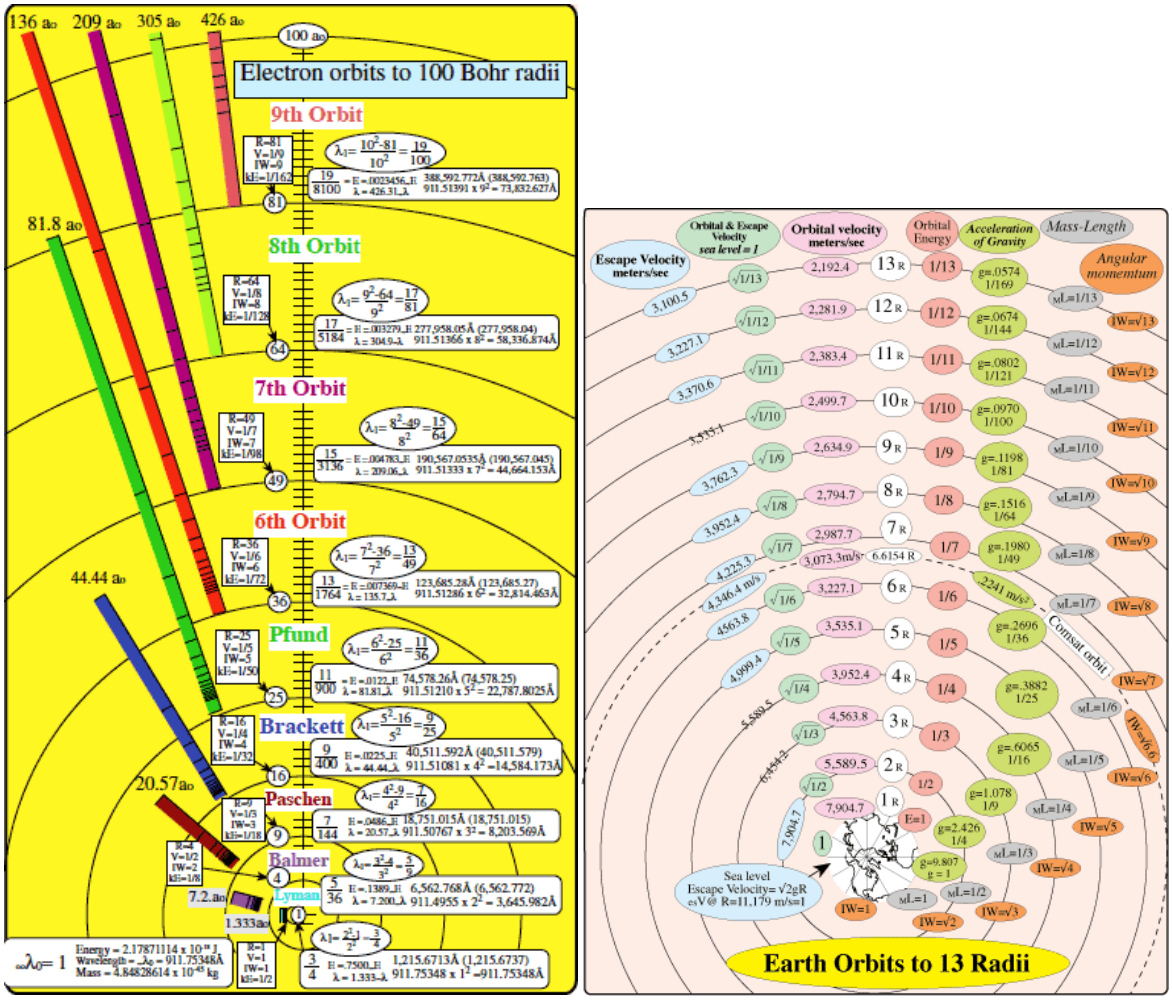
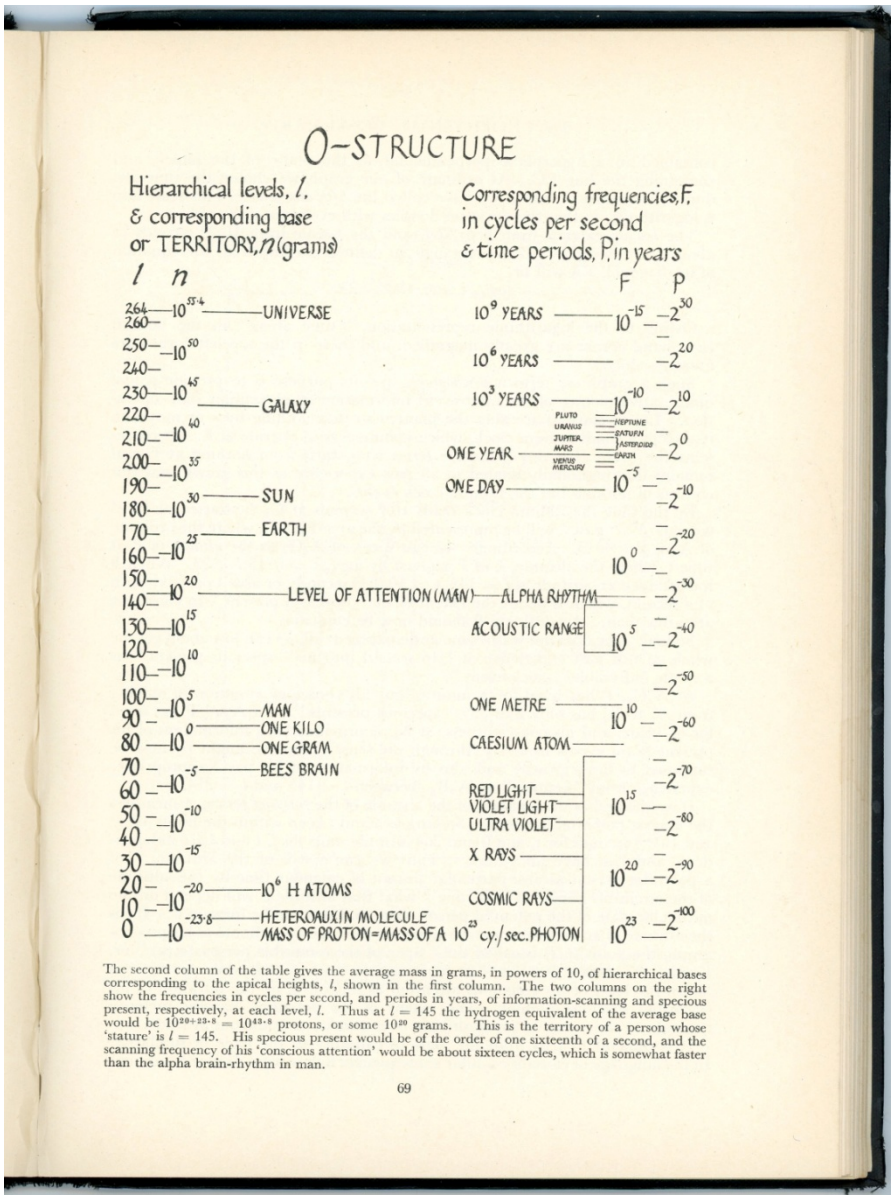


Fig 3.2 Electron vs Earth Orbits, Carter, 2010

For Latham, his cosmology is bound together by the rope of his Time Base spectrum which, as we have seen, builds a complete cosmology out of the full range of moments of experience from least event, to the age of the universe. In The O-Structure we see illustrated the original spectrum of scales from which Latham's time base spectrum is

derived [see fig 3.3]. The conflation of mass and frequency of different particles/ events is strikingly reminiscent of fig 3.2.



The second column of the table gives the average mass in grams, in powers of 10, of hierarchical bases corresponding to the apical heights, *l*, shown in the first column. The two columns on the right show the frequencies in cycles per second, and periods in years, of information-scanning and specious present, respectively, at each level, *l*. Thus at $l = 145$ the hydrogen equivalent of the average base would be $10^{99\cdot2-23\cdot8} = 10^{43\cdot8}$ protons, or some 10^{20} grams. This is the territory of a person whose 'stature' is $l = 145$. His specious present would be of the order of one sixteenth of a second, and the scanning frequency of his 'conscious attention' would be about sixteen cycles, which is somewhat faster than the alpha brain-rhythm in man.

69

Fig 3.3 The O-Structure, Gregory and Kohsen,

These structures flow out of a similar rationale to Porta's cosmic rope; everything is ordered according to a scale from the earthly to the heavenly, from the microscopic to the cosmic.

Aemulatio is also intrinsic to these spectra of circlons and events in Carter and Latham's systems: fundamental to both is the belief that there is some manifest correspondence between every scale of the universe's operations[70].

The centrality of the human (as we have seen in the previous chapter) is also key. Event Structure takes this centrality a stage further; in Latham's system the very workings of the universe are ordered by our perception of them. As explored in chapter one this is a system built of moments of perception, *human* perception: our 'state' profoundly affects the universe we experience.

Analogy we have already seen is a key constituent of both men's systems, *just as/ just so* rationales are essential in building the links between smoke rings and circlons, sprayed paint and least events, etc. *Analogy* helps them make their first leaps in constructing their cosmologies, extrapolating from those moments of material insight (chapter two) to whole functioning universes. These resemblances don't just instigate Carter and Latham's projects; they also help to rationalise phenomena within them.

In an example of this, Carter is trying to explain his theory that rather than Gravity being an attractive force, it is the by-product of everything in the universe expanding (his system does not allow for any forces that do not operate mechanically, so objects not in direct contact cannot exert any kind of force on each other). Carter sees this fact as self-evident: 'A child taught this principle could easily attain a far better understanding of the working of gravity than even Einstein himself had with his mathematics of an imaginary

[70] within modern physics the opposite is true. With the discovery of quantum mechanics, the worlds of the very small and the everyday were pulled apart, appearing to obey very different rules. Now further thought is being given to the extent that many of the physical 'laws' might be the emergent properties of complex systems at different scales, rather than fundamental 'laws' in the sense Newton, or even Kelvin would have understood them. An excellent discussion of this is: Laughlin, R. B. (2006). A different universe : reinventing physics from the bottom down. It may even be the case that at very large scales, constants within the standard model in fact become variables, with some supporting experimental evidence being collected through infrared interferometry from astronomical data. In this paper [which I don't fully understand], the data points to a *variation* in the fine structure *constant* over the span of visible space: Murphy, M. T., J. K. Webb and V. V. Flambaum (2003). "Further evidence for a variable fine- structure constant from Keck/ HIRES QSO absorption spectra." Monthly Notices of the Royal Astronomical Society **345**(2): 609-638.

multi-dimensional and curved entity in space.'(Carter 2010, p.114-115) To further evidence this notion, he cites the example of a balloon covered in paint and allowed to dry; if it is further inflated the paint fragments in a characteristic fashion. He notes that there is a similar pattern to clouds on certain days and shows photos of both for comparison [see fig 3.4]. 'These stretch marks in the sky offer dramatic proof that the surface of the earth is continually expanding in all directions beneath the cloud layer' (Carter 2011-2012, p.105). As he has no other explanation for the clouds' pattern, it is self-evident to him that *just as* the balloon, *just so* the earth must be expanding.

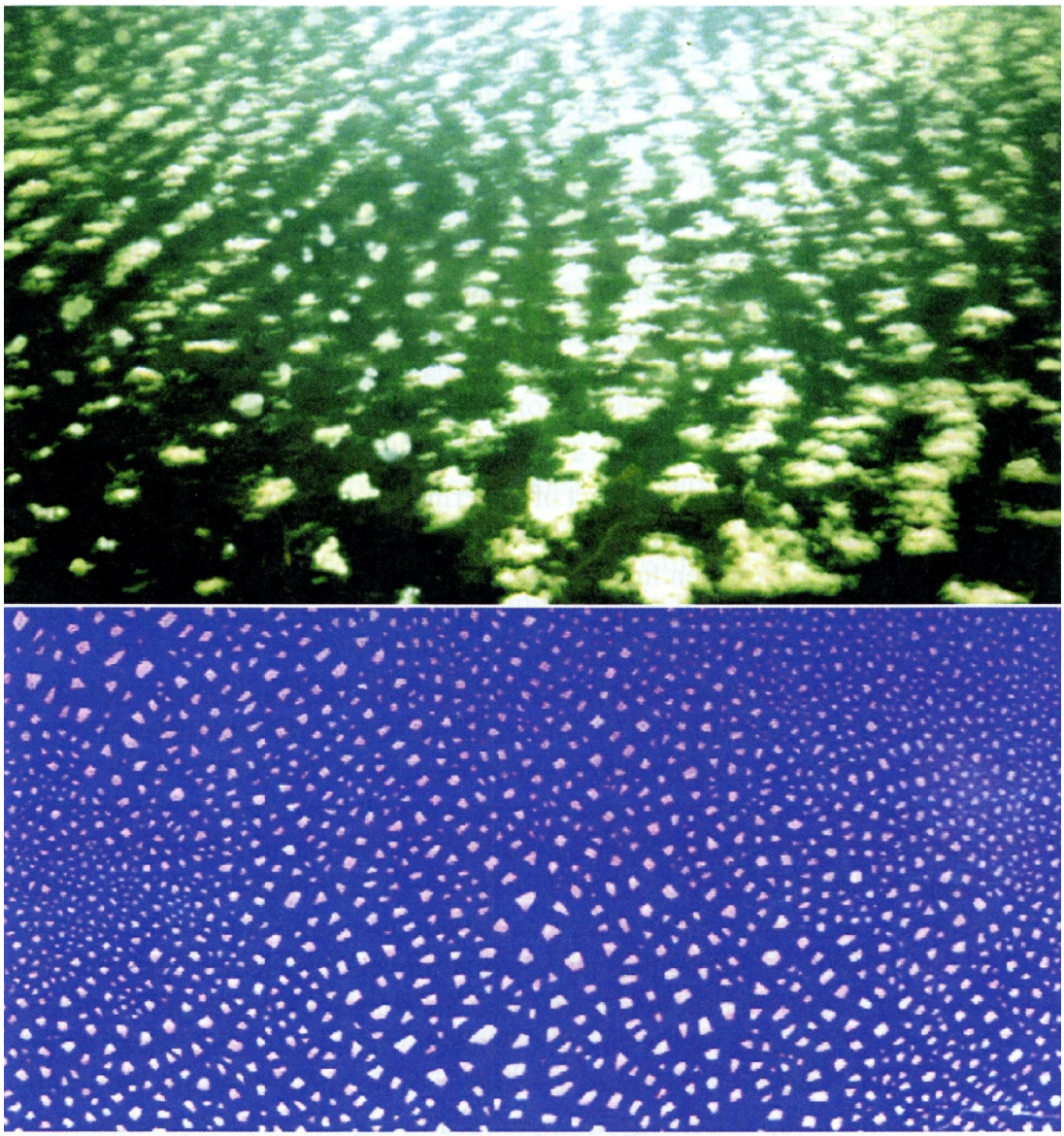


Fig 3.4, Texas clouds above a painted balloon, Carter, 2010

He also illustrates this effect in a trio of diagrams illustrating the paths of cannonballs through Newtonian mechanics, his theory and General relativity (although the latter is hardly illustrative[71]). Rather than the cannonball falling to earth, the earth expands up to meet the cannonball, and it is only the simultaneous expansion of the ball that stops this being immediately apparent.(Carter 2010, p.123).

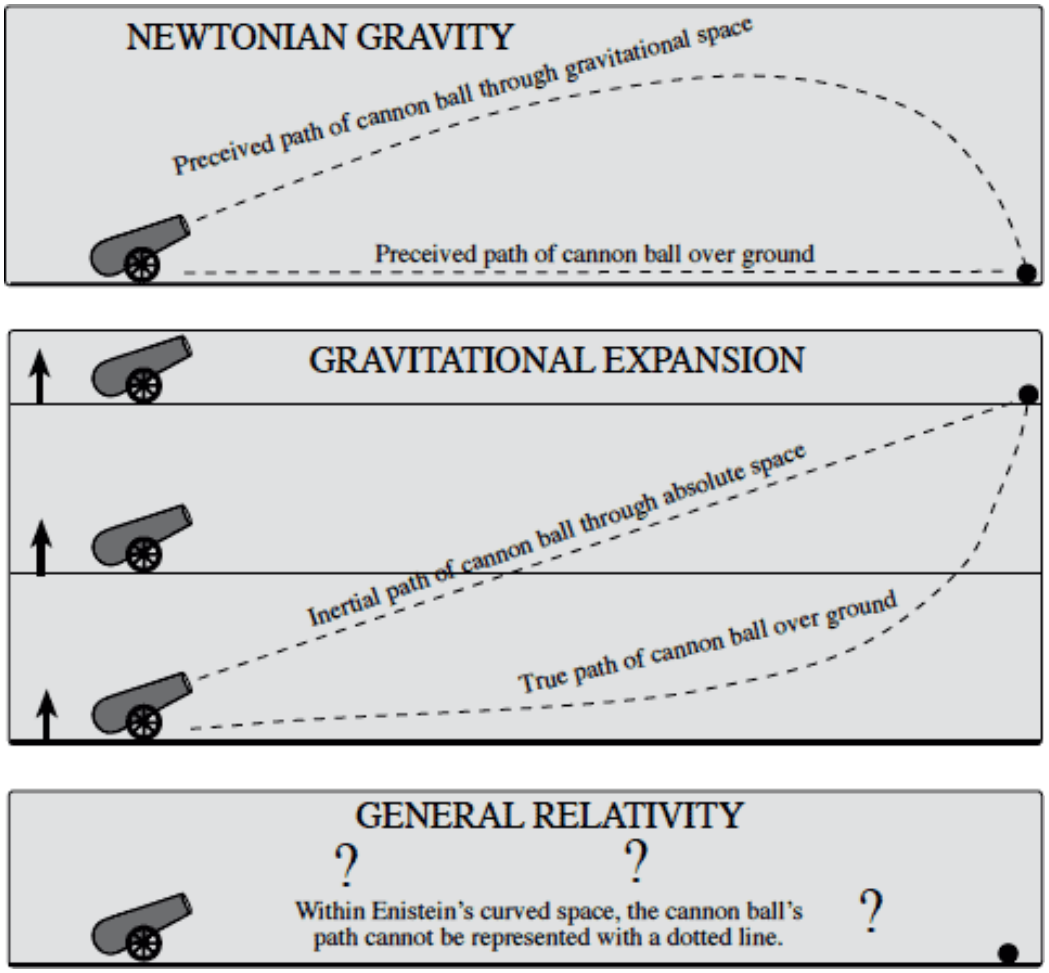


Fig: 3.5 Diagrams showing different gravitational models from The Other Theory of Physics, Carter, 2010

Carter side-steps a few paradoxes of his own within this theory: why doesn't the earth's crust crack in a similar way as the clouds- and if it too is expanding at a rate to match the

[71] Despite what Carter claims, it would be possible to illustrate the path of a cannonball within Einstein's model, in fact it was accounting for just such variations that preoccupied the early education of the British physicist Paul Dirac (1902 – 1984) who spent his high school physics lessons adjusting all the Newtonian problems he was given to solve to account for relativistic effects. See opening chapters of Farmelo, G. (2010). The Strangest man: the hidden life of Paul Dirac, quantum genius.

rest of the earth then surely the tops of mountains would change shape as this expansion would have to occur faster the further from the centre of the planet. The reader is left with the sense that Carter has satisfactorily proved to himself the principle based entirely on the *just as* analogy of the paint covered balloon and the clouds.

Finally, *sympathy* and the ordering by resemblance based on shared properties. As we have explored in the cosmology of Carter, gender plays one such ordering role across unrelated phenomena in a similar way that gender maps across the elaborated Aristotelian cosmology of the Renaissance; linking through shared characteristics otherwise unrelated species and materials. In Event Structure, the three 'types' we have explored, defined by similar bandwidths of reception to events across the Flat Time Spectrum exemplify a similar sympathetic resemblance. The intrinsic property of the kind of frequencies they can 'receive' links them to actions, objects and emotions that share these 'frequencies' on the spectrum, as well as other individuals of their 'type'.

So it seems that there is a good read across from key traits of our outsider cosmologists to the creation of knowledge within Foucault's Renaissance episteme. Neither Carter nor Latham are self-aware in this regard, indeed both prefer to relate their work to contemporary science where possible, or in the case of Carter, the works of other scientific outsiders as well.

A Discourse Analysis

Discourse analysis is a technique for analysing texts that helps to reveal their epistemological basis as well as to uncover their relations to institutional and social structures. It is part of Foucault's approach to understanding the history of ideas within a given place, time, or field. In The Order of Things, Foucault explains the development of his discourse analysis using examples from linguistics. Within the Classical episteme, which follows the Renaissance, the historic categorisation of the relationships between different languages (e.g. Sanskrit and Mandarin) had been determined by an analysis of

constituents such as grammar, root sounds and words, and patterns of variations, creating an absolute taxonomy of ancient and modern languages and dialects. Foucault notes how this matches in epistemological approach the building of taxonomies of species of flora and fauna within the natural sciences (Foucault 2002, p305-306). Indeed, the building of taxonomies is a key epistemological process within Foucault's conception of the classical episteme; perhaps best illustrated architecturally in the Natural History Museum in Oxford [see fig 3.6][72].

Fig 3.6 Column bosses at the Museum of Natural history in Oxford, showing different branches of plant kingdom with columns of different British rocks.

[72] There are thirty columns in the Museum's covered 'courtyard', each with a different British rock column and with carved capitals and corbels representing all the botanical orders. That the natural world could be catalogued and ordered through the ingenuity of man was a central tenet of the scientific culture of the time, perhaps in that through the ordering or creation Man could better understand the mind of god and reaffirm his place as the keeper of the garden of Eden. For more information, see: http://www.oum.ox.ac.uk/learning/pdfs/columns.pdf

However, Foucault argues the nominal literality of language related profoundly to knowledge (as sign and signified), which characterised the Classical episteme is now past. In the contemporary era, although decoupled from a direct equivalence to the operation of nature and reduced to an object, language can still offer: ‘a dense and consistent historical reality’ from which the scholar can reveal the ‘locus of tradition, of unspoken habits of thought‘, can in effect extrapolate the epistemological architecture of its age (Foucault 2002, pp.322-324). This analysis of the workings of texts within the context of a wider epistemological enquiry he calls discourse analysis.

The Archaeology of Knowledge (Foucault 1969) which followed The Order of Things elaborates this process, and explains and justifies Foucault’s approach. To further understand the development of our outsider cosmologists, I will now attempt a rather paraphrased version of Foucault’s discourse analysis focused on the writings of Carter and Latham. The Archaeology of Knowledge (particularly section II) provides a useful overview of this toolkit and we will follow its suggested protocol in the analysis which follows.

Foucault gives some recommendations as to the sorts of texts suited to this approach. Firstly, he notes it is important to include the full extent of available texts in this kind of analysis. In fact Foucault is wary of approaching a discourse analysis of a single oeuvre at all, given the substantial epistemological shifts that might have occurred within the timescales of the production of various texts by the same author: ‘The oeuvre can be regarded neither as an immediate unity, nor as a certain unity, nor as a homogeneous unity’ (Foucault 2002, p.27). However, as he is also happy to admit, defining the appropriate boundaries of an archaeology (and by extension a discourse analysis) is inherently problematic. However, this is not an exercise in defining an episteme, just the use of his discourse analysis to shed further light on our cosmologists. For our purposes, the prodigious volume of text produced by these two men between them ought to be

sufficient, given some of the limited case studies Foucault uses within his own analysis to define entire epistemes.

Foucault also suggests that a lack of self-reflection is important in texts to be considered within the discourse analysis (Foucault 2002, p.70). Fortunately, the writing of both Carter and Latham, whether it occurs in their published output, online or in personal correspondence, is striking for its lack of self-reflection, or perhaps more accurately self-reflection as to the ultimate epistemological nature of their respective projects. Such is the self-assurance of these two authors in their cosmology-building endeavours that little time was wasted by them speculating on their role within a wider intellectual space.

As we touched on in chapter one, Event Structure is rooted in a certain kind of phenomenological logic which might have been well presented and discussed within this field. Certainly, Latham's construction of the RIO: the artist as revealer of truth, and his preoccupation with the experience of time, might have been directly theorised by the artist in terms of well-established discourses. For example, the French phenomenologist and contemporary of Latham, Maurice Merlau-Ponty (1908 – 1961)'s essay 'Eye and Mind', published in Art de France journal in 1961 (Merlau-Ponty 1961, quoted in Moran 2000) opens with the lines 'science manipulates things and gives up living in them' and proceeds to try and address the challenges of perception, where it relates to scientific observations. Latham might have found this an intellectual hook to catalyse further exploration of the philosopher's work, potentially finding an ally in addressing some of the concerns that Flat Time tries to resolve; but to my knowledge no such theorisation or reflection takes place. As we will see, where Latham does reflect on other systems, it is only really with contemporary science that any detailed engagement takes place[73].

In most of his publications, such as The Other Theory of Physics, Carter rarely steps outside a specific critique of the standard model of physics, other than occasionally to

[73] Bar a particular preoccupation with the author James Joyce (1882 – 1941), which we will return to.

relate his project to other scientific outsiders' work[74]. Carter's publications are an evolution, rather than a series, with substantial sections from one copied into and revised in subsequent publications[75]. Intriguingly, it is only in his most recent pamphlet My Discoveries & Inventions in the Physics of Mass, Space, Time and Gravity (Carter 2013) that Carter considers the nature of his project in more philosophical terms. It is perhaps not unsurprising that after more than two decades of contact with Wertheim, a theoriser of outsider science, not to mention the wider conversation that comes from exhibiting in the art world, Carter might have started to more carefully contexualise his theories, underlining Foucault's concerns with the evolving oeuvre as a subject for discourse analysis,

Wertheim has been corresponding with Carter since 1993 when his first complete published theory was offered to a select group of scientists by way of a mail shot from Enumclaw. It is likely that Carter has examined and adjusted the epistemological roots of his theories since then. For example, over time his 'theory', has become 'a philosophy'; in this case 'for the Discoveries and Inventions in Nature'[76]. For the first time at the start of his 2012 book The Living Universe and as parentheses to his 2013 pamphlet's introduction, he quotes both John Archibald Wheeler (1911 – 2008), the discoverer of the Black Hole and the philosopher René Descartes (1596 – 1650). It might be unfair to suggest that Carter's introspection had been catalysed *entirely* by his relationship with Wertheim, as both Wheeler and Descartes are widely known and ought to be of interest to the philosophising cosmologist, but it is worth noting that both Wheeler and Descartes do feature in Physics on the Fringe. Despite this passing mention appearing in Carter's

[74] Notably in his foreword 'To The Aether People' in the most recent The Other Theory of Physics.
[75] For example, the balloon/ clouds example from earlier in the chapter is included in several of his texts (but is only given full colour reproduction in some).
[76] In a similar fashion, Event Structure as we have seen, has migrated from a 'psychophysical cosmology' to Flat Time - ostensibly a challenge to modern physics.

books, it remains the exception and the rest of the texts, whilst slightly expanded, are free from any new philosophising.

First Acknowledge the Source

Foucault first suggests we explore the source of our dialogue: who is speaking and with what authority? (Foucault 2002, p.55) This is rather intractable in terms of our overall enquiry, as in the case of Carter and Latham, these men are afforded few of the readily discernible rights, competences or consensus-based relations to society that, for example a doctor might have within a discourse analysis on madness. Indeed, having spent much of the first chapter exploring the validity of the proposed label 'outsider cosmologist', it is clear there is no simple authority for these men that give their ideas an intrinsic wider epistemological legitimacy. However, to follow the discourse analysis I will aim to explore what claims they have made themselves for the authority of their cosmological perspectives and evaluate them by these criteria.

In their relation to wider society these are not 'experts' in any conventional sense: they are not institutionally ordained interlocutors of larger systems of knowledge (although both, through the Society for Mental Images and the Absolute Motion Institute, set themselves up within a pseudo-institutional structure[77]). Latham maintained the ill-defined role as artist, with his legitimacy as such underlined through his collection by the Tate Gallery, his representation by the Lisson Gallery and the other facts of his making and disseminating images and objects within the sphere of art. But does this role give him an authority to create knowledge as a cosmologist when engaging with scientists[78]?

In 1989, Anna Baker, who describes herself as Latham's assistant and who had been employed by the Lisson Gallery to research Latham's early work, wrote to the physicist

[77] Following the publication of The O- Structure, and the death of Gregory, there is no evidence the Institute for the Study of Mental Images continued to exist. The Absolute Motion Institute consists solely of Carter, and as such can be discounted from analysis separate to that of the cosmologist himself.
[78] Whilst he sets up Event Structure as a post science, post language theory, it is notable that for most of his career he largely focuses his ire at scientists, rather than literature, poetry or other 'users' of language.

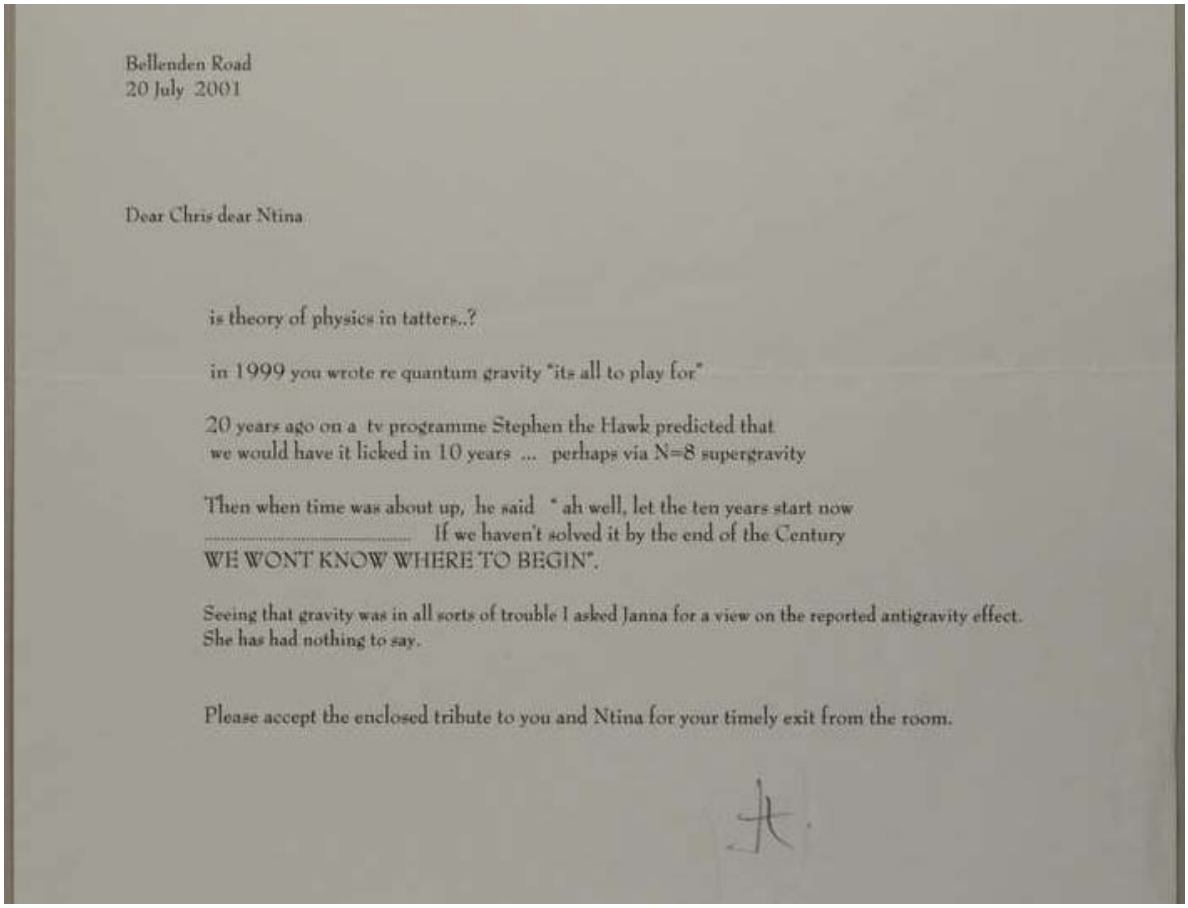
Stephen Hawking (1942 –) ahead of the opening of the show *John Latham: works 1983-1988*:

> John Latham has asked me to send you his good wishes. We appreciate that it may be difficult for you to travel to London but would like to tell you that his forthcoming show has a central piece which uses your book, "A Brief History of Time", as part of a sculpture that demonstrates a dimensionality[79] and refers to the interface of two professions (of which the two of you are forerunners) which both have dimension as their proper concern. (Baker)

Another letter was sent by the Lisson to Hawking at the same time proposing that the art historian (and former director of the Tate) Dr. Michael Compton make contact with Hawking on Latham's behalf to arrange a conversation about Flat Time. There is no evidence Hawking replied to either. It is clear from this letter that Latham is content to use his position as an artist if it will help him engage with Hawking.

In another letter, on this occasion to 'Chris and Ntina', the physicists Christopher Isham and Konstantina Saviddou (whose inclusion of Latham in their Time essay opened this thesis), are hectored by a gleeful Latham. It opens: 'Is theory of Physics in tatters..?' [see fig 3.7]. It concludes 'Please accept the enclosed tribute for you and Ntina for your timely exit from the room' reflecting Latham's profound belief that physics has failed to account for the universe, and implicitly, that he had the authority to make this claim (Latham 2001).

[79] We can only presume that the 'dimensionality' Baker refers to in the excerpt above is an attempt to suggest to Hawking that there is a read across from Latham's work to the proposed extra dimensions in mathematics Hawkins describes in his book as an approach to unifying the conflicting models within Physics. This is an important point: in bringing together the various fundamental forces in physics, theoretical physicists have borrowed mathematical techniques to describe multiple dimensions beyond the four we experience, to allow for these forces to interrelate neatly in one model. In the Latham work featuring Hawking's book, the book is sliced in two by a sheet of glass and each half slightly displaced suggesting a schism in Hawking's reasoning and the necessary inclusion of the 'dimension' of culture/art/human perception within our overall cosmology.



Bellenden Road
20 July 2001

Dear Chris dear Ntina

is theory of physics in tatters..?

in 1999 you wrote re quantum gravity "its all to play for"

20 years ago on a tv programme Stephen the Hawk predicted that
we would have it licked in 10 years ... perhaps via N=8 supergravity

Then when time was about up, he said " ah well, let the ten years start now
..... If we haven't solved it by the end of the Century
WE WONT KNOW WHERE TO BEGIN".

Seeing that gravity was in all sorts of trouble I asked Janna for a view on the reported antigravity effect.
She has had nothing to say.

Please accept the enclosed tribute to you and Ntina for your timely exit from the room.

Fig 3.7 Letter to Isham and Savvidou, 2001

However, whatever was enclosed (I suspect a copy of one of his Flat Time Theory publications) it is clear that Latham is not acting in relation to the institutional and personal conventions of physics entirely as simply an *artist.* Even if we consider the Romantic or Renaissance (and art school) notion of the artist as 'revealer of truth', his familiar and expert tone in his critiquing Isham and Savvidou's physics does not suggest he is assuming such a visionary role. He also clearly positions himself outside of the conventions of physics itself, where he would be expected to make this kind of judgment through papers and reasoned critiques in the language of physics itself, mathematics. Latham tacitly acknowledges his lack of institutional authority at moments like this, but is not content to engage merely as a successful artist with an amateur interest in physics. For Latham, whose cosmology is rooted in the limitations of physics, art, and language, his implicit role as the Reflective Intuitive Organism (RIO), that we met in the previous chapter, gives him all the authority he needs. The RIO has a wide spectrum of

receptiveness to events on the Time Base Spectrum which gives him/her valuable insight across many fields. It is this insight which also underpins the utility of the artist placement in industry, as pioneered by the Artists Placement Group. In this case the artist (as RIO) was called the 'Incidental Person' a term frequently used by Latham about himself (Latham 1976)[80]. The notion of the RIO might be seen as a development of earlier ideas about artistic revelation, but in explicitly discounting the prior history of art through its limitations in dealing with scientific questions, Latham never explicitly draws on this idea in his claim to cosmological authority as the RIO.

Also of note in this letter is his curious preoccupation with Stephen Hawking that emerges throughout the second half of his life. The sarcastic 'Stephen the Hawk' (who Latham believes has failed to 'see'), sets up an informal, and therefore un-deferential relationship with the physicist that suggests an intimacy that as far as we know has no basis in reality.

Even had Hawking engaged with Latham's professed interest in his work he might have been surprised to find the artist demonstrating little real engagement with the details of A Brief History of Time. Latham was principally interested in the moments in the book when Hawking discusses the limitations of the theoretical models he proposes. It was these moments, when science's lack of certainty was laid bare, that would join the collection of articles and notes Latham collected for over three decades documenting the failures of current cosmological models, penned by physicists, philosophers and the commentariat (New Scientist and The Guardian being his stalwart sources in most cases)[81].

Subsequently to Marxism Today reviewing A Brief History of Time, Latham writes to them

[80] The *Artist as RIO as Incidental Person as Latham* is implicit and explicit to various degrees in many documents within the Flat Time House archive. The RIO is an ideal, who within Event Structure theory exemplifies the archetype of Alyosha. The Incidental Person (often just 'IP') on the other hand is the proposed role the artist should take in industry because he/she *ought* to have the qualities of the RIO and therefore be helpful. Latham fulfils the role of the IP in practice (as well as refers to himself in these terms elsewhere) and through his self-documented successes therefore cements his implicit claim to be a RIO.

[81] Including: Brooks, M. and S. Battersby (2000-2009). "Dark energy" and "The Impossible Puzzle" in New Scientist. **box 5**. And Gribbin, J. (1990-1999). "Energy of 'Nothing' Upsets Cosmology" Article in New Scientist. **box 5**. And Gribbin, J. (1980-1989). "Precise Measurements of Nothing Pin Down the Universe" Article in New Scientist. **Box 5**. with tens of other examples from New Scientist alone.

with an essay about his theories, noting at the end the error in their review. Specifically, that Hawking offered a *complete* model to explain the workings of the universe (Latham and Steveinsoon)[82].

Latham's frustrations with the limits of his perceived authority are clear in a correspondence with the deputy editor of The Guardian. Latham had written to the newspaper about a dispute between the Artists Placement Group and the Art's Council. As part of this correspondence he had tried to induce The Guardian to consider reporting on his theoretical ideas. Thanking him for his input on the APG dispute, the editor continues:

> 'My delay in responding to you about your theory is that I am totally ill-equipped to understand it. These are advanced and complicated areas, much more appropriate at this state of their development to examination in specialist publications' (McKie 1954)

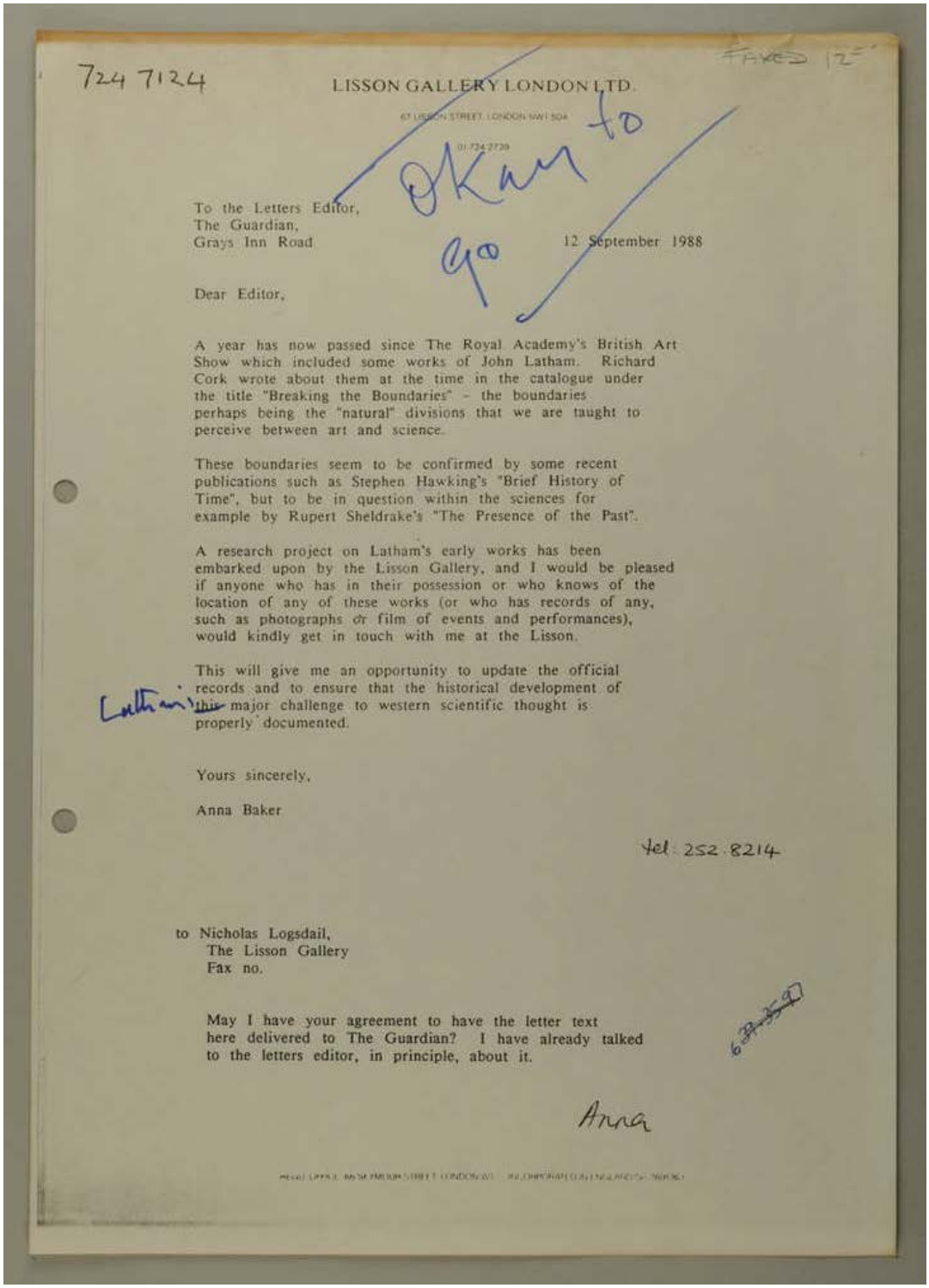
The Guardian is prepared to report on Latham as an artist within the terms of the APG, but not as a cosmologist. Latham uses a number of strategies to attempt the transition from a position as artist to that of expert cosmologist. He repeatedly uses this trick, as his Flat Time Theory builds from the 'end' of both art AND science to slip his grander claims into more art-specific correspondence. This is demonstrated in another letter, again from Latham's assistant Anna Baker, to the Letters Editor of The Guardian. Requesting any archival material they might have on Latham's performances or shows, it concludes:

> 'This will give me an opportunity to update the official records, and to ensure that the historical development of this major challenge to Western scientific thought is properly documented' (Baker 1988)

It might be suggested that Baker is overstating Latham's claims for rhetorical purposes, were it not for this draft being marked up by Latham himself, his characteristic scrawl

[82] In the thirty or forty documents in Latham's archive that reference the physicist, you sense Latham's growing frustration with Hawking's public persona as the unifier of physics. It seems Hawking becomes symbolic to Latham of the failure of modern science, the artist perhaps particularly resenting the public profile enjoyed by the scientist.

correcting ‘this’ in the above quote to ‘Latham’s’ [see fig 3.8][83]. A corrected copy of the sent letter is also in the archive.



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Okay to go

To the Letters Editor,
The Guardian,
Grays Inn Road

12 September 1988

Dear Editor,

A year has now passed since The Royal Academy's British Art Show which included some works of John Latham. Richard Cork wrote about them at the time in the catalogue under the title "Breaking the Boundaries" - the boundaries perhaps being the "natural" divisions that we are taught to perceive between art and science.

These boundaries seem to be confirmed by some recent publications such as Stephen Hawking's "Brief History of Time", but to be in question within the sciences for example by Rupert Sheldrake's "The Presence of the Past".

A research project on Latham's early works has been embarked upon by the Lisson Gallery, and I would be pleased if anyone who has in their possession or who knows of the location of any of these works (or who has records of any, such as photographs or film of events and performances), would kindly get in touch with me at the Lisson.

This will give me an opportunity to update the official records and to ensure that the historical development of ~~this~~ Latham's major challenge to western scientific thought is properly documented.

Yours sincerely,

Anna Baker

tel: 252 8214

to Nicholas Logsdail,
The Lisson Gallery
Fax no.

May I have your agreement to have the letter text here delivered to The Guardian? I have already talked to the letters editor, in principle, about it.

Anna

Fig 3.8 Draft Letter to the Letters Editor at The Guardian, Baker, 1988

[83] You will also note yet another reference to Stephen Hawking.

Back to Foucault's question: who is speaking and with what authority? Well, Latham the artist was speaking, with an authority which outside his role as artist is only provided by his implicit claim to be a RIO. As far as the discourse analysis is concerned, this is a role with little wider authority.

Can the same be said for Carter? Other than the mail shot that Wertheim received, mentioned earlier in this chapter, James Carter claims never to have sought engagement or dialogue with the press or mainstream science community in a direct fashion. In the foreword to the most recent edition of The Other Theory of Physics he says simply that '(T)he development of this work has been a completely solitary effort during the past thirty years. I have never studied at a university and although I have examined the ideas in a lot of physics books, I have never really had an in-depth conversation about physics with anyone' (Carter 2010, p.5)[84]. It seems Carter acknowledges his lack of a wider authority.

In fact, Carter has a better claim than Latham to some kind of institutional platform and the pre preface 'A NOTE TO THE AETHER PEOPLE' we have already examined gives us a clue as to this audience.

Since its inception Carter has been a central organising figure in the Natural Philosophy Alliance, a global network of scientific outsiders, or as their website would have it 'dissident physicists', an expression whose political resonance is perhaps not as unwitting as it may seem. These individuals from across the globe share ideas and discuss their alternative theories of science and cosmology through articles and publications, web seminars and an annual conference. Such is this group's conviction that the mainstream models of physics are inadequate that any critique of it barely registers on their extensive

[84] He goes on to perhaps explain why:

> 'Because this book is not yet finished to my satisfaction, I have never really represented it to any "reputable" physicists for their evaluation. Each of the many editions of this book was only printed in a few copies, mostly for my own reference and a few perplexed friends.'

website and conference programme[85]. They are far more concerned with the goal of establishing a correct alternative. It is clear that much of Carter's efforts to engage an audience for his work are focussed on this group, and through them he has a certain prestige. Carter was involved at the inception of the Natural Philosophy Alliance and was been partially responsible for its name, recalling the days of a unified pursuit of knowledge by non-professional thinkers. Carter has presented papers and attended every one of the Natural Philosophy Alliance annual conferences since the first in 1994[86] (Wertheim 2011, p.240).

Within this organisation, Carter clearly occupies a position of some authority, and as he explicitly rejects any other claim to expertise or institutional affiliation, it's worth us exploring the Natural Philosophy Alliance a little further.

At first glance The Natural Philosophy Alliance (NPA) (or John Chappell Natural Philosophy Society[87]) is a collective of scientific outsiders in the Carter mould. They run an online database of members and their research, the World Science Database, so it is easy to flick through their research outputs and profiles, and search terms like 'aether' produce a few pages of results[88]. Whilst there are even results for search terms like 'UFO', the majority of papers are earnest, specific, and easily mistakable at first glance for real, 'mainstream' science papers. A quick reading of the membership biography pages on their website reveals something quite striking: the vast majority, unlike Carter, are scientists by training, indeed many have PhDs in physics or maths and hold positions in science or science-related fields (like engineering) at universities. Moreover, as discussed in chapter one, many are addressing specific problems in mainstream science with

[85] http://www.naturalphilosophy.org/site/ - note owing to a recent governance dispute, the NPA has split with the major splinter group branded as the 'John Chappell Natural Philosophy Society' (after the original founder of the NPA).
[86] Until their recent schism.
[87] The group was split during the period of my research owing to allegations of mismanagement. The largest portion of members, including Carter himself, have continued under the 'John Chappell Natural Philosophy Society' name. The back story of this schism would take a whole chapter to unpick!
[88] http://db.naturalphilosophy.org/

theories that might even have test-able conclusions. Suddenly, the term 'dissident physicist' seems closer to the mark than 'outsider cosmologist' or even 'outsider scientist'. Whilst this is undoubtedly a home for those railing against the mainstream paradigms of modern physics, these are by and large not 'outsiders' at all, at least not in the sense the art world would use this term, or in the sense we established in chapter one for dealing with Carter himself.

So does Carter's administrative role in this organisation give him a legitimacy, or wider cultural relation? Can we see his output in relation to a tacit authority awarded him by this cohort of dissidents? Wertheim answers this for us anecdotally: at the Natural Philosophy Alliance's conference in 1998, the founder John Chappell (????-2002) urged members to present papers that are 'open-ended' and 'leave room for discussion'. She goes on:

> Given Chappell's directives, most speakers were trying hard to leave room for doubt, but you could tell nobody had his or her heart in that.... Everyone was itching for his or her turn at the podium... How exactly is a person supposed to respond to someone *else's* hair-brained theory when each person has their own Solution?'(Wertheim 2011, p.243)

Carter's role does give him a platform, one which does allow for dissemination of his ideas and the opportunity for discussion amongst, if not experts then at least interested parties. If Carter's role in this organisation gives him legitimacy, it is not one closely associated with the content of his theory however. The more you read about the John Chappell Natural Philosophy Society[89], you realise the shared strand that runs through the collective is less about science, outsider or otherwise, and more about dissidence[90]. The realities of the NPA and Carter's modest approach to proselytising his ideas mean

[89] And having now experienced it first-hand..

[90] There is an irony that the chief accomplishment of the John Chappell Natural Philosophy Society and, in Wertheim's words, the legacy of what John Chappell began, is the World Science Database: a project to create a database, a taxonomy: a key exhibit of the Classical episteme. From the measurements of *mathesis* (essentially mathematics as it relates to knowledge creation), to the analysis of the constituents of ordered series, *genesis*, the Classical age is the 'fundamental era of the ordered table' Foucault, M. (1966). The Order of Things : an archaeology of the human sciences. That collectively these dissidents have created little coherent conclusions over twenty years other than this classical ordering of their own breeds of dissidence, is as telling about their intellectual instincts as any exploration of their individual projects.

than this cannot be considered to be a role with substantial authority in a wider epistemological sense.

So who is speaking and with what authority? Neither Carter nor Latham have occupied the kind of role granted epistemological authority to construct cosmologies, however both have found ways of constructing within their own terms legitimacy for pursuing their projects.

Isolate Preconceptual – Theorectical Schemata

Next in our discourse analysis we are urged by Foucault to isolate preconceptual or theoretical schemata; these schemata are the characteristics of the systems of knowledge that I charted in chapter two and reprised in the light of The Order of Things at the start of this chapter. It seems extremely likely that these cosmologies and the system building strategies and instincts of the men who created them exhibit schemata including: *convenientia, aemulatio, analogy and sympathy.* Finally, as noted earlier in the chapter, Foucault asserts that the Renaissance episteme is rooted in a belief in the ultimate decipherability of nature by man, and it is to this that we will turn in the next section, as it very much overlaps with the instinctive sense of their criteria for truth or falsehood.

Criteria for Truth or Falsehood

Foucault suggests we should look at the concept of *validity* during our discourse analysis; this domain addresses with what criteria we might discuss the truth or falsehood of a statement or idea (Foucault 2002, p.68).

In the introduction to The Other Theory of Physics the closing section is entitled simply ‘Common Sense’. In it, Carter asserts the primacy of the five senses. 'Our total perception of the outside world is the synthesis of the continuous stream of information from our senses.... our five senses have been extended to allow us see everything from the

smallest atom and to the most distant galaxies[sic].'[91] From this phenomenologically circular observation he leaps to a more aesthetic assertion:

> With common sense, a phenomenon must be explained in terms of all the different ways that it can be physically sensed and measured. As with Occam's Razor, common sense is evaluated in terms of its simplicity and beauty.

I.e. if a theory is right it should be readily observable to be right and moreover, should 'feel' right in its simplicity and be free of 'the paradoxes, dualities and metaphysical principles' that he believes 'lie at the foundation of relativity and quantum mechanics' (Carter 2010, p.13). Working through the complexities of his 200-page textbook one might readily query whether he has succeeded under his own terms, but it is certainly the case that whilst frequently low on detail, his model is superficially without the *mea culpa* of un-resolved conflicts and dualities that exist within the standard model of physics.

Latham is also fond of highlighting the self-acknowledged 'failures' in the standard model. It seems that scientists' openness about the struggle in physics to unify gravity with other fields into one model[92]; a comfortableness with dealing in congruent but intuitively opposing models such as the wave/particle duality of light; and the use of words like 'indeterminacy' or 'uncertainty' within actually very certain principles (such as Heisenberg's), have created not only an intuitive minefield for the non-expert and expert alike but invite the bold outsider cosmologist to dismiss mainstream science per se as fundamentally false.

Both Carter and Latham have independently highlighted all of the above 'failures', often lumping them together, when in fact they represent very different kinds of problems. These failures are also consistent with Kuhn's description of the development of science, which both men are happy to subscribe to (if tacitly taking the role of the new paradigm). Latham calls the point where science realises its own failure as *a* 'zero state conclusion - which amounts to an apparently impossible conclusion in all ways' (Latham 1986). He

[91] A bracketing recalling the dimensions of the *Time Base spectrum*.
[92] As well as other 'conundrums'

claims this occurs simultaneously to the failure of art as a mode of cultural enquiry, exemplified for Latham by Rauschenberg's ‘blank canvass’ (his 1951 series of white canvasses) [see fig 3.9]; an end point that coincides with Heisenberg's uncertainty principle in the genealogy of his cosmology[93]. Both Carter and Latham are clearly resistant to the complexities and discontinuities of modern science and encouraged by its apparently self-professed failings. So through what criteria do they claim their systems are true?

Fig 3.9 *White Painting* [three panel], Rauschenberg, 1951

Related to ‘simplicity and beauty’ is legibility, which unsurprisingly sits at the heart of both men’s conditions for truth. Remembering that the Renaissance episteme assumes that the book of nature is ultimately intelligible, is it easy to sympathise with Carter’s and Latham’s frustrations that nature would write such a complex book as modern science seems to suggest.

[93] In fact, the uncertainty principle and Rauschenberg’s *Blank Canvass* occurred some decades apart.

This attachment to intuition is fundamental in validating both their approaches and goes back to the origins of their projects. Wertheim describes Carter's frequent arguments with his apparently somewhat lacklustre high school science teacher:

> Often, Jim acknowledges, he was wrong, but occasionally he would "catch the tiger by the tail," and gradually he started to believe that "an authoritative opinion might not be as good as an ignorant but intuitive opinion."

Carter would go on to build his whole system on intuitive premises. Coincidently, it was with this same high school teacher that Carter has his first run-in with the concept of aether that he was to wrestle with in disseminating his later work. Later on in the study of Newtonian mechanics the teacher asserted that for any object to move it must push against another object. Carter, a child of the space age immediately asks: how then do spacecraft manoeuvre?

> He said that in outer space the rocket engines push on the aether. This was the first time I had ever heard of such a thing as aether and I didn't much like the whole idea. (Carter 2015, p.15)

This fundamental error on the part of his physics teacher further reinforces Carter's faith in his own intuitive wisdom, and scepticism of authority.

For Latham's as well, intuition is key. The *Observer* series we discussed in chapter two is the earliest point where Latham's approach to intuition is explicated through his studio work and the ideographic motif established developed steadily, as we have seen, for the rest of his life.

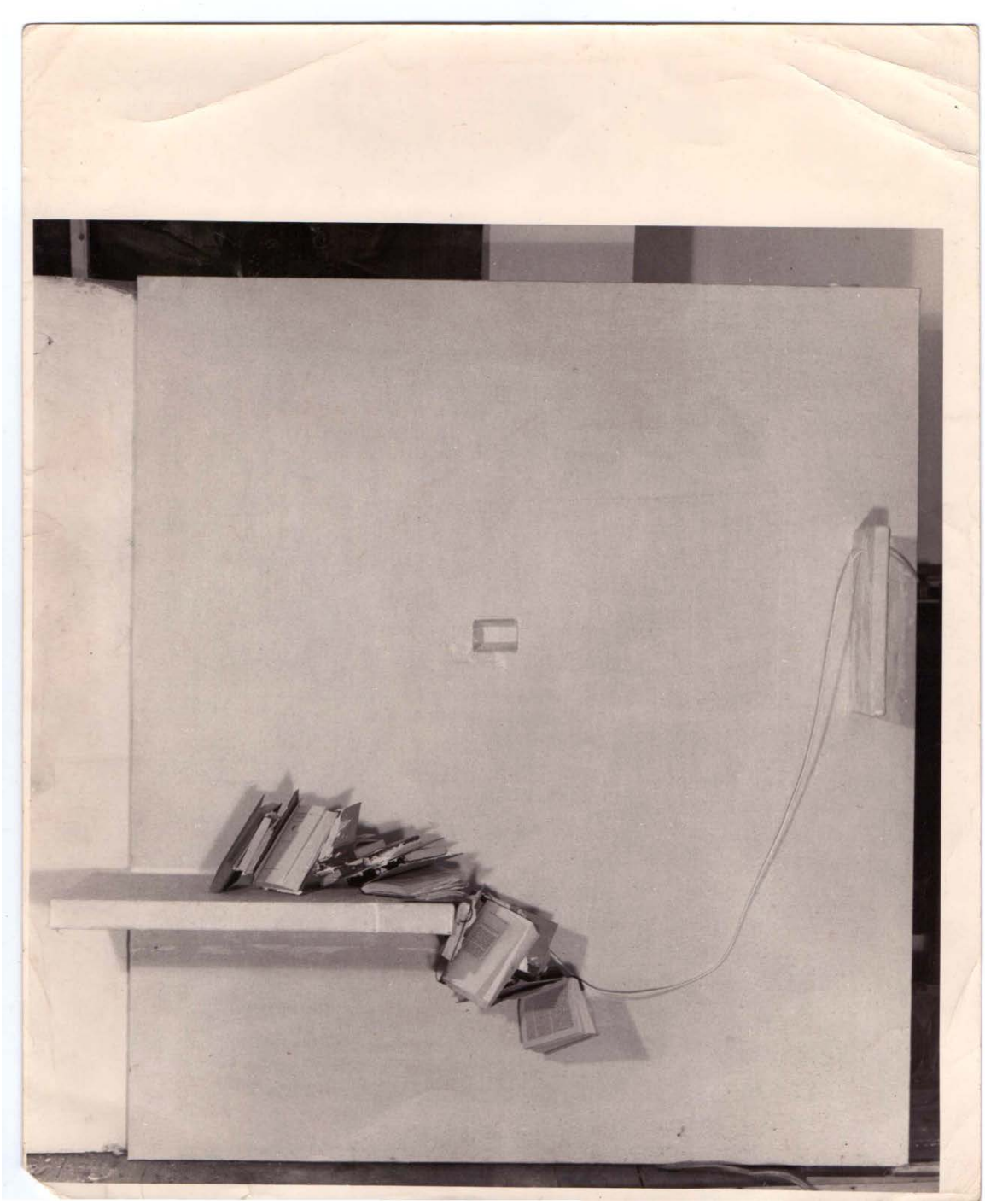


Fig 3.10: archive photo of *Observer V*, Latham, 1960

The central role of intuition in Latham's Event Structure can also be further understood through the Observer series. In Chapter two we learned that the three elements of the compositions correspond to the three Brothers Karamazov. Mitya, the eldest brother, Latham describes as 'non reflective'. Mitya is spontaneous, driven by his genetic inheritance, and experiences only the immediate: 'events' no greater in 'frequency' than

those of the everyday occurrence. Ivan, the observer (or as Latham denotes: *Observer 1* or O_1), is a state of intellectual engagement lacking any intuitive conception: experiencing the greater 'events' but none of the smaller ones. Alyosha, the youngest brother (O_2), represents the 'Reflective Intuitive state' and is the RIO: 'The Reflective Intuitive Organism ..... characterised by the fact his sensibility and flexibility allows him to receive information from all time bases...'. (Harrison 1968, pp.258-261, Keiner 1992)

As discussed earlier in the chapter, the RIO for Latham is the ideal state, functioning both intellectually, physically and intuitively and able to experience all possible frequencies of the Time Base spectrum. The RIO can therefore engage critically with the world both through language and rational processes but also directly through sense and impulse. As noted, Latham identifies the artist as RIO (and specifically himself). Not only does this give him authority as if only the RIO can observe the full spectrum, then only the RIO can elaborate a new comprehensive cosmology to replace art and science, but the RIO's intuition becomes a qualifying characteristic of the truth of the system: Event Structure is true because the RIO has intuitively deduced this is the case.

Carter expresses this primacy of intuition as 'common sense' as we have seen; it is central to him justifying his motivation in seeking a new cosmology, and implicitly throughout, a key test of the veracity of his proposition[94]. In summary then, Carter and Latham reject mainstream science because of its frustrating complexities and self-confessed failings. Their criteria for truth, and the truth of their own systems, is that they are readily intuitive and built through intuition. Given how impenetrable a lot of their writing is, this is a surprising revelation. Moreover, unlike the resemblances we have noted, this

[94] There seems to be certain irony then that he feels he specifically needs to explain the *counter*-intuitive challenge of his expanding matter gravity theory. In a section entitled 'Gravity's mental block' he says: 'At first thought, the concept of the gravitational expansion of matter seems to be impossible'. It soon becomes clear however, that he extends this critique to Einstein's theory too: 'To say, as Einstein did, that space and time possess a 'non-intuitive curvature' is just ambiguous enough to prevent the emotional regions of consciousness from rebelling...'. Essentially he is arguing that if you think his theory is hard to swallow, you'd be even more intuitively perplexed if you really understood what Einstein proposed. Carter, J. (2011-2012). "The Living Universe, A New Theory for the Creation of Matter in the Universe." Retrieved 11th April, 2013, from http://www.circlon.com/home/11-All-Elements.html.

attachment to intuition is not consistent with the Renaissance episteme. Foucault makes no mention of this kind of general intuitive criterion, and whilst the Renaissance resemblances might seem to be a process of codifying the intuitive, in doing so they explicitly remove the need for such subjective validation.

Mathesis

Next, in the discourse analysis, Foucault would seek an understanding of the material's relation to *mathesis* (both Cartesian and post Cartesian algebra). *Mathesis* becomes an axis in the space within which he goes on to define knowledge creation within the Analysis of Finitude, what he labels his contemporary era. What he means by Mathesis is essentially the extent to which the material is mathematically describable, and the primacy of mathematics within the concept.

Carter and Latham both share a frustration with complex Mathematics. For different reasons both men highlight the dominance of elaborate and highly specialised mathematical techniques within the mainstream science as evidence of its failure.

In a hand-typed letter to the Tate in 1994, in this case to Simon Wilson, the education curator at the time, Latham begins, ever hopeful:

> I have heard it said that the Tate is thinking of making a JL show coinciding with the publishing of John A. W.'s book.

He urges Wilson to host an event at the Tate entitled *THE THEORY OF EVERYONE* to coincide with the potential 'JL' show (John Latham, abbreviating in initials and referring to himself in the third person, John A. W. Is his biographer John Walker).

Sadly, details of this proposed event have not survived as they were attached separately to the letter, along with a number of Latham's theoretical papers for Wilson's attention. His intention was to convince Wilson that yet more evidence had come to light supporting his theory and moreover to provide an explanation of the failure of the mainstream science establishment to pay his theories their due attention (he writes at other times to scientists offering to explain why mainstream cultural institutions have conspired to hide his work).

His conclusion is his proposal that the Tate should host a multi-disciplinary seminar including scientists and artists to discuss his theories.

His letter to Wilson continues, reiterating one of his key themes:

> Such a confluence of disciplines hasn't, and couldn't occur in any other form [to Event Structure]; and that objections from other closed disciplines [any discipline that doesn't purport to apply to everything, ie all disciplines] are most likely to be invalid on that account. Language [he includes mathematics in this definition], which they all adopt as the arbitrating medium short of test, is... unfit to describe the 'one' that I refer to and describe in the form of art. (Latham 1994)

Latham describes his unifying theory through his art as other languages are inadequate tools for the task, mathematics in this case being the failed language of mainstream science.

In an earlier letter to Wilson, Latham invokes the great mathematician and theoretical physicist Werner Heisenberg to back up this point, (mis)quoting Heisenberg writing in the fifties, an old man close to his death[95]:

> Language of mathematics is fully adequate for physicists, but in order to understand the 'one', one will have to go on to the language of the poets. (Quoted in: Latham 1985)

Mathematics as an inappropriate tool would ring true with Carter too, who states: 'the modern theorists use the art of mathematics to create elaborate nonsensical theories that are just beyond the range of experimental falsification.'(Carter 2010, p.13) This is subtly different from Latham's critique that mathematics is inadequate to describe the cosmos; for Carter, the problem is that it is not mathematics' elaborate nonsense, it is physics' elaborate nonsense which has been driven by their desire to account for everything using ever more complex mathematics.

Carter addresses mathematics head on in the section 'Mathematical Considerations' in The Other Theory of Physics. He states: 'One of the fallacious assumptions of classical

[95] This illustrates how Latham selects quotes that are often taken out of context and misrepresentative of the scientists' work, in order to suit his theory. In reality, Heisenberg would have seen all of cosmology within his use of the word physics and the 'one' a likely reference to implicitly unanswerable metaphysical questions.

physics is the belief that physical events and phenomena occur within a simple and precise mathematical framework'. He goes on to explain that it was only owing to the mathematical elegance of Maxwell's equations (describing electric and magnetic fields) that they became mainstream. The non-field explanations for these phenomena, as proposed in his theories 'are denied serious consideration because they cannot be given a precise mathematical description. Even if someone was able to develop a precise set of non-field equations, they would likely be so complex and mystifying that only the most gifted mathematicians would be able to understand them.'(Carter 2010, p.161,162.) So Carter seeks to detach his model from a reliance on mathematics, which may or may not be able to actually describe what he is proposing.

Notwithstanding their differing conclusions, it is almost certainly both Carter's and Latham's lack of fluency with sophisticated mathematics acts as a driver to construct an alternative, intuitive model. Wertheim picks up on this challenge, reflecting on just how small the community is who are conversant with the mathematics required to engage in cutting edge theoretical physics (Wertheim 2011, p.268).

So how do Carter and Latham relate to Mathesis? Both are comfortable expressing themselves using simple algebra- indeed it is immediately striking when reading either of their texts how frequently they fall into algebraic, or at least pseudo-algebraic forms of expression. However, as soon as they lose the ability to decipher the maths, they lose the ability to comprehend the actual workings of the physical systems it describes. This unsettling sense of grasping, but not *really* intuitively understanding mainstream science is a common contemporary phenomenon. Carter and Latham when facing this barrier have fallen back on the primacy of their intuition and imagination to develop an alternative approach to understanding the universe in a way that they at least can comprehend to their satisfaction.

Original and Derived Language and the Creation of New Objects

Within the final stage of discourse analysis, Foucault explores the explicit structure and use of language - grammar, use of vocabulary, roots of words, phonetic elements, etc. Part of this, and the part we shall explore here where it relates to our protagonists, is the use of original and derived language (Foucault 1969, p.68). Superficially at least, in this regard, Latham and Carter could not be less alike.

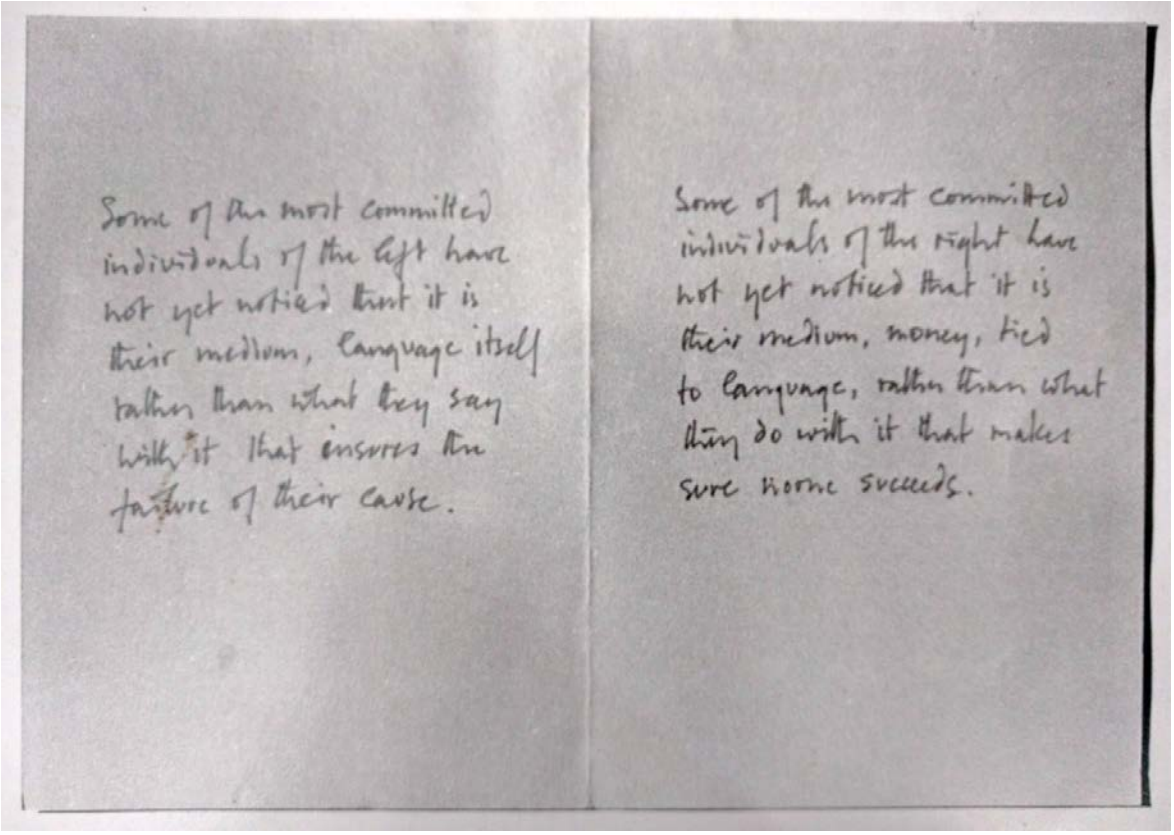


Fig 3.10 *Left and Right*, Latham, 1983[96]

As we have explained, Event Structure comes about at the point of failure of science and art. Implicit in this is the failure of all extant languages to explain the operation of the universe. Visual art, through evenometry, provides this language. In his work *Left and*

[96] Text: 'Some of the most committed individuals on the left have not yet noticed that it is the medium, language itself rather than what they say with it that insures (sic) the failure of their case/ Some of the most committed individuals on the right have not yet noticed that it is their medium, money, tied to language, rather than what they do with it that makes sure no one succeeds.

Right (1983) for example, [see fig 3.10] he explains in each case why the failure of language underpins the ultimate failure of both the political left and right[97].

Rather than abandon language altogether though, throughout his oeuvre Latham plays with words and meaning. His is a cosmology where language is defunct and words can be invented, become symbols, and be reworked with new meanings. Barbara Steveni, explains:

> John was always playing with words, and putting the language round the other way, so that Nodnol would be London backwards, and his burning of his Skoob towers would be 'books' backward, and so, Noit would be the end of 'attention', and it was also 'no it'; it was to go from nothing to one, or from nothing to finding out, which is the way that one might be working as an artist, but that's the explanation. (Steveni 1998, p.77)

His coining of terms like 'noit' and casual use of them in correspondence and conversation become typical of his style. In a letter to the critic Lucy Lippard (1937 -) he explains the superiority of the visual over the linguistic:

> Looking at the dimensionality of a 'picture plane', you are picking off data instantaneously, from an omnipresent state. Listening to or using words, we have no equivalent for an omnipresent state.

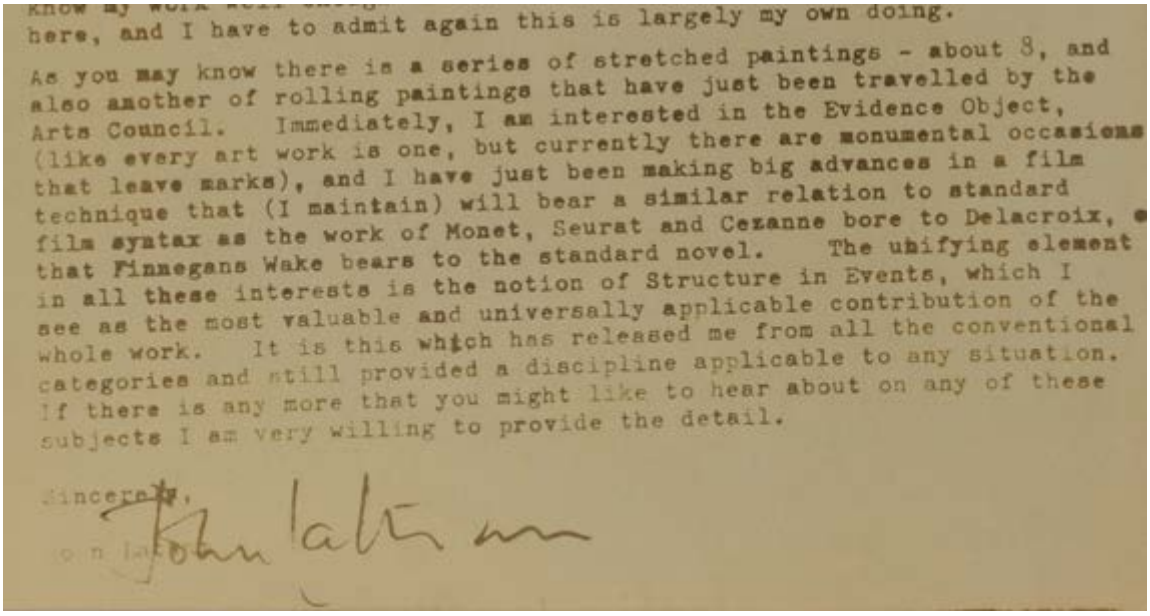
He goes on later in the letter to describe this crisis point in language and science:

> The verbal medium reached, in the account given, the ultimate demonstration of its function, in the examples of Joyce (time-based event-structuring) and Wittgenstein (failing to prove a correct intuition by space based ordinary logic).(Latham 1980)

Latham claims Joyce has anticipated Event Structure, particularly in Finnegan's Wake, a point he makes in a letter to the curator Norman Reid (1915 – 2007) [see fig 3.11](Latham 1967). Likewise, the philosopher Ludwig Wittgenstein (1889 – 1951)

[97] This also conveniently illustrates his personal political ideology, which whilst utopian is explicitly not aligned with the mainstream polarities of political struggle. This fact creates tensions with more political engaged artists within the APG and causes problems for contemporary academics trying to write Latham into the history of British social activist art.

also anticipated Event Structure through his failure to account logically for the structures of language[9899].


here, and I have to admit again this is largely my own doing.

As you may know there is a series of stretched paintings - about 8, and also another of rolling paintings that have just been travelled by the Arts Council. Immediately, I am interested in the Evidence Object, (like every art work is one, but currently there are monumental occasions that leave marks), and I have just been making big advances in a film technique that (I maintain) will bear a similar relation to standard film syntax as the work of Monet, Seurat and Cezanne bore to Delacroix, e that Finnegans Wake bears to the standard novel. The unifying element in all these interests is the notion of Structure in Events, which I see as the most valuable and universally applicable contribution of the whole work. It is this which has released me from all the conventional categories and still provided a discipline applicable to any situation. If there is any more that you might like to hear about on any of these subjects I am very willing to provide the detail.

Fig 3.11 Excerpt from letter to Norman Reid, Latham, 1980

Having placed the failure of language at the heart of his cosmology, it is not surprising perhaps that Latham's writing is peppered with neologism and acronym, puns and word games. Language is negotiable, and his expansive grammatical constructions and shifts to diagrammatic or quasi algebraic shorthand underline this belief.

In these examples we see him coin 'the omnipresent state' - this term is derived conceptually from Event Structure but it is presented to Lippard as an idea/word that is a fait accompli. This strategy of straight-facedly using his specific but idiosyncratic linguistic formations to bombard the uninitiated is seen throughout his correspondence, with journalists and curators to physicists and family members alike. Many of his concepts

[98] presumably as evinced by the change in his approach between the Tractatus Logico-Philosophicus (1922), and the Philosophical Investigations(1951)

[99] So convinced was Latham of Event Structure's hegemony over any other theories or ideas of substance he encountered, that they were simply lifted into the varied genealogy of thought that all led inexorably, in his view, to Flat Time Theory. This trend included much of Hawking's work as we have seen but applied as broadly to art and culture where variously Delacroix, Malevich, Joyce , Wittgenstein and Russell all build up to and anticipate the breakthrough of his unifying model. Latham, J. (1995). "History - look at the C20 tracks" draft for the Guardian, Flat Time House, archive of John Latham. **Box 5**.

become tangible through their naming but in many cases their meaning remains deliberately ambiguous (as in the case of Noit, no-it, 0-1)[100].

For Carter the opposite seems true. As explained, he characterises his approach through common sense and most of his writing is superficially matter of fact and concise. Indeed, his whole cosmology covering topics including the big bang, relativity, quantum mechanics and the whole of the foundations of chemistry totals no more than 200 pages[101]. Where language furnishes Carter with latitude is in his ability to coin terminologies that sound like conventional science to obscure the peculiarities of his theories. The 'circlon' is a good example of this and his texts are peppered with very specific but entirely invented words or titles of new concepts built from existing words like 'Temporal velocity and the Nonlinear Passage of Time' a key idea in his gravitational theory (Carter 2010, p.113). In fact 'Time' is a good example of the extent to which both men will use an existing word to their own end, to create a new concept or object within their epistemological approach.

For the purposes of their projects both men seek to radically redefine time. As we alluded to in the introduction, these projects do not simply accept the 'background, absolute time

[100] Indeed, this injection of Event Structure into otherwise more practical correspondence becomes a frustration to his peers at times, even his wife Barbara Steveni acknowledges this fact, speaking about the A.P.G.:

> A lot of these influences of John's refusal to use language with the baggage that it comes with, but reinventing the language, has sort of gone right through a lot of the A.P.G. and what is now the O. & I., and has caused a lot of difficulties for people, because it always meant that it was a very exclusive language, if too much of it came in, and that was very noticeable with, when we started to talk to industries and everything. I mean I do the explanation and what it was that we were doing, but if too many of these words were used, or John would talk in his, getting across, as he would call it, non-received language, you know, if he was getting that across, that would become very difficult if it was too much woven in to the output of material that we were approaching people with, and that, you know, has always been a problem. Steveni, B. (1998). Artists' Lives. NATIONAL LIFE STORIES. M. Roberts. The British Library, The British Library Board. P.77

[101] And this includes digressions including the psychology of gravitational theories and the practical options for space travel.

of Newtonian Physics' as Isham and Savvidou describe it (Isham and Savvidou in Ridderbos 2002, p.9). For Latham, as we have seen, Time is composed of moments of perception: events. This idea flows from his belief that any theory that doesn't account for the varied human experience of time is flawed:

> What comes out is, firstly an inherent flaw in common language that reduces the potential for precise statements to nil, without the visual plus of a recasting of 'time'. (Latham 1995)

This has several consequences. Latham accepts the observations of quantum mechanics and maps this quantised physical model onto a temporal one: 'It is self-evident from quantum mechanics that everything that happens does so in discrete bits. Everything is therefore 'event' structured..'. As explained, time is fractured, literally to be understood as one of his roller paintings, marks of varying sizes representing experiences at given moments (occurring across the time base spectrum), but adding up to the continuity of human experience:

> By rolling the painting over a barrel one finds the painting revealed in the way we experience a 'now'. The 'then' and the 'to come' are not manifest [because we see only one 'strip' of the canvas]. But with this way of presenting a work the 'always there' is actually there, physically. (Latham quoted in Harten, Brooks et al. 1975, p.49)

In many ways Carter engages with Newtonian time through a similar strategy. He is typically matter of fact about thus titling a section of his text: 'There is no Universal substance called "time"' (Carter 2010, p.96)[102].

For Carter there are two accounts of time. One is simply a by-product of matter and space and either measured mechanically, i.e. through a pendulum clock, or rotationally, like the turning of the earth (he also sticks atomic clocks into this latter category)[103]. The second he calls metaphysical time: 'Metaphysical time is the perception of time as a continuous flow that is without interval and is thus immeasurable.' This is the turning of Latham's

[102] Note how both men have placed time in inverted commas or speech marks, reflecting on their lack of faith in this concept as it stands.

[103] We should not expect these two types of time to be consistent as they are the emergent properties of two different kinds of mechanism, thus neatly sidestepping any relativistic complications (Carter 2010).

roller, the individual's perception of 'time' as a continuity, but categorically not a physical fundamental: 'Time does not move the world, but the motions of the world can be beautifully generalized into the metaphysical idea of time'(Carter 2011-2012, p.121)'.[104]

In their use of language neither Latham nor Carter completely disengage the sign with the signified. The neologisms in Latham's writing are actually quite specific: intending a fixed number of possible readings in each ambiguity[105].

Carter on the other hand invents new words in an altogether more straightforward way, building quasi scientific words and terminologies that to the non-expert might be from a real physics text book.

It is in the redefinition of 'Time' that we see the extent of their subversion of language to the demands of the conceptual project at hand. Both men, whose theories of time are central to their systems, place a question mark over the conventional meaning of the word and redefine the term to their own ends. It is as if the millennia of discussion on the nature of Time had simply not occurred. This is particularly surprising in the case of Latham as the Isham and Savvidou article which he was so fond of referring to is part of an excellent primer on the subject.

This use of language to define concepts, which once named can then be dealt with as *a priori* artefacts with which to build further on their theories, illustrates what Foucault would describe as the use of language to create 'objects'. Like the Noit -> no-it->0-1 example Steveni explains, these words can then be exploited to demonstrate ideas through their own inherent properties, and associations. The second part of this epistemological strategy is consistent with the Renaissance alchemists of chapter two, for whom the words and symbols 'discovered' for the purpose of describing their unfolding cosmology

[104] In fact, Carter's theory of time develops in more recent texts and is even more complicated than this. He explores an idea called '3 Dimensional Time' measurement adding categories of 'Photon Time', 'Gravitational Time' and 'Rotational Inertial Time' to his roster (Carter 2012, P.42)

[105] That these terms are often rooted in puns and word plays is perhaps in a testament to a rather Edwardian sense of humour.

had a reflexive relation to the concepts they described and could themselves be interrogated for hidden knowledge. However, in the Renaissance episteme, words were part of creation and might be ‘discovered’, but not openly invented. Likewise, in the Classical episteme, language had a fixed binary relation to knowledge, so the shifting of meaning displayed by Carter and Latham would also be inconsistent with this epistemological approach. Their self-conscious use of neologism and redefinition of terms like ‘time’ however are much more consistent with Foucault’s description of the use of language within the contemporary episteme. In the contemporary episteme, you will recall that language itself has been reduced to an object, decoupled from meaning and, like everything in the paradox of subjectivity that characterises Foucault’s contemporary epistemology, open to precisely the kinds of intervention that Carter and Latham both exploit.

In this chapter we have established that much of the underlying approach to knowledge within the cosmologies of Carter and Latham is consistent with the Renaissance episteme. Using some of the discourse analysis technique described by Foucault we have explored the writing of our outsider cosmologists, specifically their relations to authority, veracity, and mathematics and through an analysis of some of the ways they use and create language.

We have found that both men do not genuinely seek to engage with mainstream science on its own terms, unsurprising given our conclusions in chapter one about the un-scientific nature of their theories. Instead they have created on their own terms positions of authority from which to engage with a wider conversation in the case of Carter, or to claim authority, in the case of Latham’s upgrading of the artist to RIO.

In both cases their criterion for truth seems to rely on a circular dependence on intuition that allows them to intuitively validate their own theories.

They both struggle with complex mathematics which has in part driven their search for an alternative, and they both use language in ways which is not quite consistent with the Renaissance episteme, particularly in the case of Latham.

Even within the poorly defined timelines of Foucault's theory, both men produced their systems against the backdrop of the contemporary episteme. In light of what we have learned, how could this have shaped their approach?

At the crux of Foucault's description of this era is the problem of creating knowledge when both the object of this knowledge and its means of creation are one and the same thing: humanity. Thus the analytic of finitude, what he calls the contemporary episteme, is typified by the exploration of the limits of our ability to know.

According to Foucault, in the contemporary episteme science and mathematics have become contained within an overall structuring of knowledge, as 'merely' tools and techniques for creating certain specific, qualified truths. Mathesis is an 'axis' against which the degree of mathematisation of the sciences from the physical to the social can be plotted; it is orthogonal to the final dimension of this knowledge space: that of philosophical reflection (Foucault 1970, p.378). Science and mathematics have been explicitly detached from directly addressing any metaphysical or philosophical questions relating to the human experience. This has been compounded by their achieving a complexity and sophistication of concept and language (in the form of complex mathematics, specialist vocabularies and other systems of conventional notation such as Feynman diagrams or IUPAC nomenclatures for example) that renders much of their enquiry inaccessible to non-specialists.

When put in these terms it is clear quite how directly Carter and Latham are acting in opposition to the problems of contemporary knowledge production as described by Foucault. Both their systems try to reunite the philosophical and the metaphysical with the

scientific, something Foucault's analytic of finitude theory specifically prohibits. Latham's utopian objectives in creating a single system for describing the world (and thus allowing for universal mutual understanding), seems to seek to address both the social and cultural insecurities created through this loss of certainty and the apparent uselessness of a science which cannot in fact explain everything.

As a result of the analytic of finitude's problems of subjectivity, science, despite its limitations, nevertheless represents the most substantial knowledge-creating social and institutional apparatus. As a result, the positions of privilege in knowledge creation with which scientists are held makes them a target for Carter and Latham, the former through his society of dissidents and the latter through his personal challenges, not just to public figures like Hawking, but to supportive friends like Isham.

Finally, in a manner that further illustrates that these cosmologies are not simply harkening back to the Renaissance episteme, both men have shaped their cosmologies in response to the sophistication of mathematics that hides the nuances of contemporary science from the uninitiated. Having rejected mathematics as inadequate, in the case of Latham, or unable to offer any possible practical experimental basis for his theories in the case of Carter (as we saw in chapter one), both men verify their theories through a *subjective* criterion of intuition, a claim to veracity explicitly at odds with Foucault's observations of the challenges of the analytic of finitude.

We can conclude that Carter and Latham's projects have been catalysed and developed in part as a result of a dissonance with the contemporary episteme and a struggle to create knowledge to satisfy their need to understand the world and to solve its problems. In the conclusion we will expand upon this theme, returning to the question of how these cosmologies work in the gallery and whether the epistemological insights we have gained in this chapter help us to better understand the operation of their work as art.

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Conclusion

> ‘Neither the Universe of Einstein, however, nor the extended universe of Eddington’s fundamental theory provides the sort of events with which man is most concerned. No existing model of the world represents life and human purpose, let alone the purpose of the universe, if there be one!’ (Gregory and Kohsen 1959, p.54)

Fig 4.1 Archive photo of *Big Breather*, Latham, 1972-73

Over the last three chapters we have explored the cosmologies of James Carter and John Latham through a number of distinct critical strategies.

In **Chapter One**, we noted a convergence of the projects of the 'outsider scientist' Carter and the 'artist cosmologist' Latham. Latham, a fixture of the London avant-garde seemed to have finally got some exposure within mainstream science in the Isham and Savvidou essay, and Carter, after several decades of developing his alternative model of science, seemed to have transitioned to a new role as a kind of outsider artist.

We explored these trajectories in more detail, specifically the claim that either Carter or Latham was an outsider artist or was really involved in science at all, and found that there was little evidence that these definitions offered a satisfactory account of either. We explored Margaret Wertheim's claim that Carter was an 'outsider scientist', but through her narrow justification of this category as a field of critical reflection on mainstream science, as well as a more detailed critique of both men's systems in the light of the theories of Thomas Kuhn and Karl Popper, we concluded that instead a better label might be 'outsider cosmologist'.

In **Chapter Two** we offered a comparative critique of these two outsider cosmologies with the extensive pre-scientific intellectual construction of alchemy and discovered some interesting similarities.

The insights of both Carter and Latham were rooted, like a number of alchemical ideas, in the direct experience and handling of materials. These experiences were then extrapolated across disparate elements of their cosmologies. Both men also used diagrammatic logic or the iterative development of ideograms to both elaborate on and validate their ideas, and we traced a corresponding development in alchemy, from Aristotle through to mediaeval alchemical cosmologies. Crucially, just as within alchemy, both men created a specific role in their systems for the human; Latham through the human experience as the central phenomenological account of the 'events' that build up

Event Structure, and Carter through the pervading theories of consciousness and gender that privilege the human within The Living Universe.

These parallels with alchemy suggested a reading of Carter and Latham in light of Michel Foucault's epistemological theories. In **Chapter Three** we pursued this strategy and used a paraphrased version of Foucault's discourse analysis to interrogate the writing of our outsider cosmologists to better understand and contextualise their epistemological strategies.

Through a step by step comparison with the four resemblances with which Foucault characterises the Renaissance episteme, we find that Carter and Latham are both employing approaches to creating knowledge consistent with Foucault's description of this episteme. The alchemical parallels we discovered in Chapter Two map onto Foucault's description of the resemblances that typify the Renaissance episteme. The large volume of written material available justified an exploration of Carter's and Latham's writings through a discourse analysis, drawing on the techniques laid out by Foucault in his description of this tool. As perhaps we might have suspected, given the lack of Kuhnian or Popperian qualities identified in Chapter One, the positions of authority occupied by both men do not suggest a serious attempt to engage in a conversation with science, but rather both men create platforms or identities from which to engage in dissent to orthodoxy: as the RIO in Latham's case, or convener of an outsider science organisation in Carter's. We identified the primacy of intuition to testing validity within both men's systems and explored some other interesting characteristics of their writing, including the use of neologism and analogy. We also find both men struggling with the complexity of contemporary mathematics, and observe that the difficulties this causes both men in understanding and engaging with complex physics further exacerbates their central criterion of intuitive sense when considering the validity of a theory.

Whilst much of the discourse analysis points to a Renaissance epistemological approach underpinning both Carter's and Latham's systems, we ended Chapter Three considering Carter and Latham in light of the contemporary episteme. We concluded that Carter's and Latham's use of language, reliance on intuition, and particular antipathy to complex mathematics suggest rather that these projects are a response to the challenges of knowledge production in the analytic of finitude, as Foucault describes it.

Carter and Latham have co-opted the Renaissance resemblances identified in chapter two to help build systems in response to the problems of accounting for the subjectivity of the human in knowledge production and the complexities of mathematics in contemporary science.

Blurring the Boundaries

As we have noted, one of the challenges to Foucault's epistemology is its lack of clearly defined boundaries. 'Knowledge creation' seems to be a privileged activity within each episteme and variously defined to suit his genealogy. Surely in the classical episteme, as within the contemporary, there is constantly 'knowledge creation' happening within a wider culture that does not conform to his theory. An ongoing evolution of the occult for example, or indeed any mainstream theology would seem to buck this trend, operating epistemologically outside his template, where the exploration of fixed externalities like a god, allow for the production of new knowledge. This does not even need to be restricted to marginal exploits. In the Classical episteme, the process of science is to map intrinsic truths about the natural world, reinforced by language through binary sign/signified resemblances between words and meanings. His critique in the analytic of finitude vastly reduces science's status as a means of knowledge production to merely two dimensions of the knowledge production space within the contemporary episteme. Despite the shift he claims, many scientists and individuals throughout wider society maintain a very classical view of the primacy of scientific thinking, and given the difficulties Foucault describes in the analytic of finitude, who can blame them? Likewise, across wider society people still

read horoscopes, attend séances, collect butterflies, and take homeopathic remedies (whose particular rationales can perhaps best be comprehended through alchemical resemblances).

It is probably not an accident that Foucault omits to give his epistemes dates; he understands this blurring of boundaries and is offering a meta-narrative of the development of typical intellectual strategies across different facets of society, not a rigid genealogy.

Carter and Latham are not direct continuations of earlier traditions or systems but they are in their operation apparently continuations of elements of the Renaissance episteme. What makes them interesting in this regard is that unlike horoscopes or the occult, their projects appear to be completely novel, and the images and objects they create are stimulating and intriguing to a wide audience, offering glimpses of an old and familiar way of understanding the world within the linguistic and aesthetic trappings of the contemporary era. The final part of this conclusion will discuss these facts in the light of the conclusions from the preceding chapters and with reference to two pieces of their work.

Two works

Carter has been producing CGI models of his circlon systems for several decades. They have appeared both in his Santa Monica Show and the more recent *The Alternate Guide to the Universe* at the Hayward. More recent examples show rendered 3d structures of interlinked toroids, illustrating various attributes of his cirlon based elements and their interactions. The CGI is coloured in a retro palette of bright primaries, recalling a popular science broadcast from the 1980s or a high school science project [see fig 4.2].

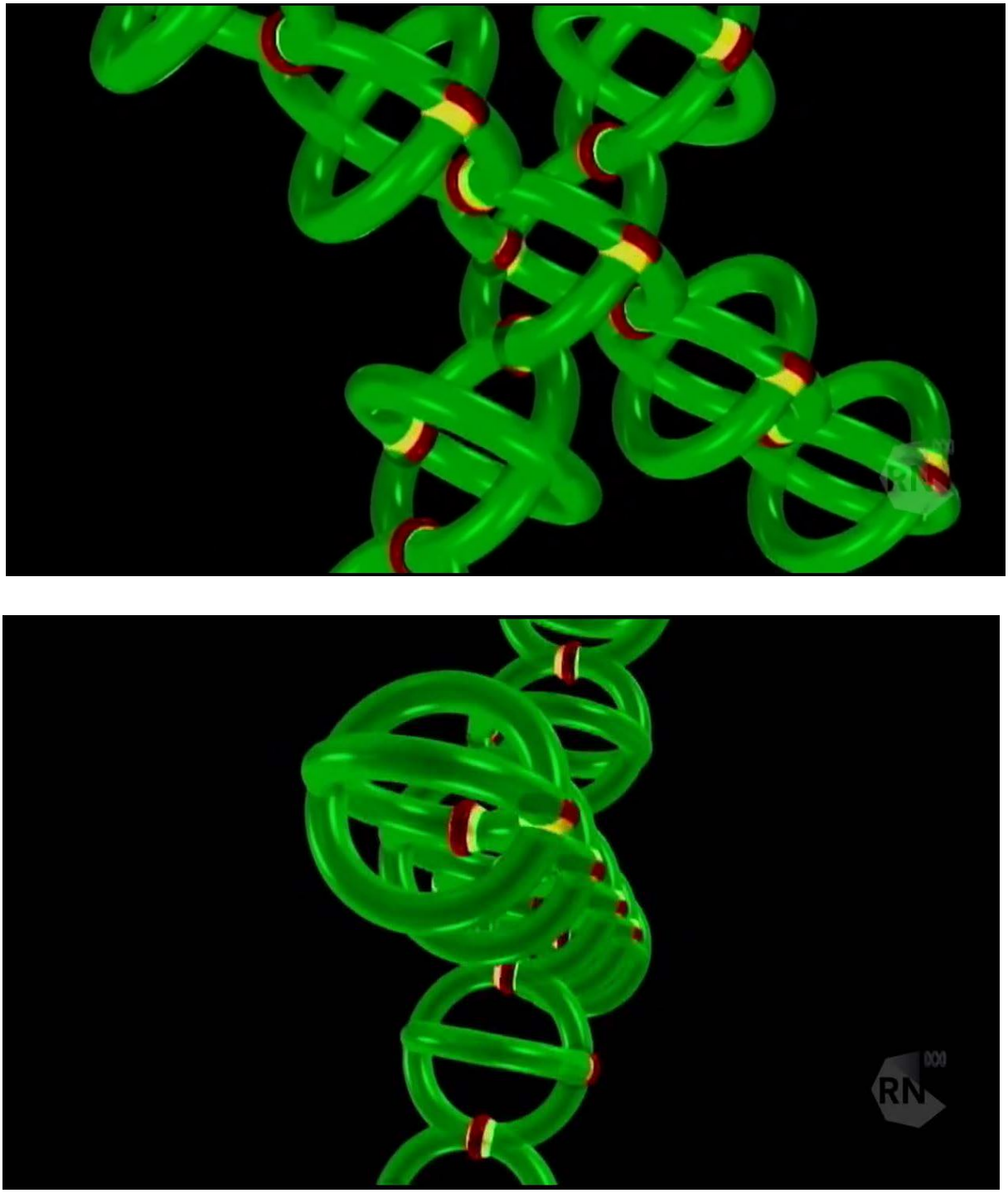

Fig 4.2 Stills from CGI circlon animations, Carter.

Big Breather was a two storey high contraption developed by Latham in the early 1970s and built with the help of a designer, Angus Wallace and latterly the Chester firm Proteus Bygging & Co. Initially installed at Gallery House, Kensington, it was later moved across the road to Imperial College after a malfunction flooded the basement [see fig 4.1 & 4.3] (Walker 1995, p.126).

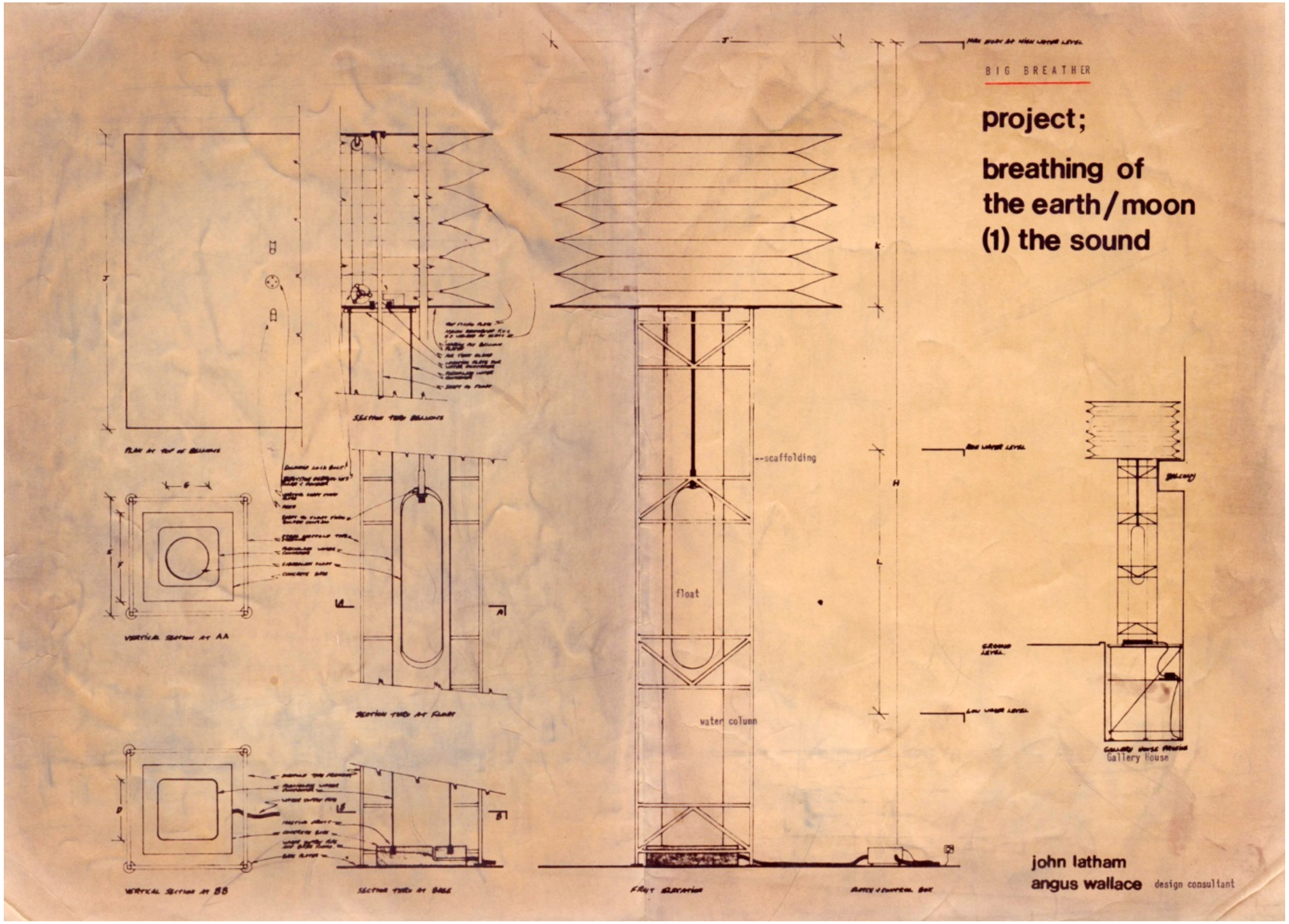

Fig 4.3 Blueprint for *Big Breather*, Latham & Wallace, 1972

Big Breather is a column of water in a Perspex column representing a square foot of ocean, which rises and falls over a 24-hour period. This movement of water, echoing the tides, moved the air in the column above it into the bellows at its top which gradually inflate and deflate, producing a drone-like sound. Within Event Structure the work links the rhythms (frequencies) of the celestial bodies to actual frequencies of sound. Latham also proposed the Big Breather as a marine energy device, reflecting his growing ecological concerns, extracting energy from the tides. *Big Breather* was a key work within Latham's oeuvre as John Walker explains:

> Big Breather exemplified Latham's interdisciplinary ideals: it cut across the divisions between artwork, scientific model, energy source, marine tool and musical instrument. And while its appearance flouted the normal aesthetic criteria for visual art, its sound was sonorous and its conception poetic.(Walker 1995 , p.127)

Both of these works make perfect sense with reference to Carter's and Latham's cosmologies. They are intriguing and imaginative illustrations of some of the key concepts of their cosmologies. But to the visitor to the Hayward or to Imperial College when these works were installed, what impression did they make and how did they function as artworks?

Coming to these works 'blind' we are instantly drawn in by their aesthetic and formal appeal. Despite the amateurish production values in both cases, both works are visually striking: through the bright use of colour and simple geometric forms in the CGI circlons, and the scale and unusual materials and composition of the *Big Breather*. Both works operate over time, and are rhythmically beguiling: in Carter's case the swooping CGI camera draws us deeper and deeper into the web of pulsing circlons, and in Latham's case the wheezing exhalations of the bellows would have drawn the passer-by to examine the object in more detail.

Both works also imply the complexities they partially illustrate. It is not possible to see the interlinked circlons of Carter's animation or the slowly inflating and deflating bellows of the *Breather* without inferring that they represent explicitly or through some kind of

metaphor, a larger, exterior system of ideas. *Big Breather*'s proximity to Imperial College is an explicit challenge to be taken seriously as a utilitarian, as well as an aesthetic construction, and the CGI circlons shown side by side with other images from the Living Universe offer the potential of a revelatory illustration.

So in both cases the viewer can reasonably anticipate that they might decode the work they have encountered; both works implicitly claim a purpose, which supersedes any other aesthetic function. Indeed, this is the case, as for both men these works have such a purpose: to illustrate principles within their respective cosmologies.

However, they ultimately fail to deliver: what are these linked rings? They have all the familiarity of a documentary animation designed to explicate, but the camera never 'zooms out' literally or metaphorically to fully account for the system being explored, creating the moment of seeing and comprehending.

What is this strange piece of engineering? Our eyes trace its workings, seeing the bellows and the column of water rising and falling (pump hidden out of sight), we understand it's purpositivity but are robbed at the moment of potential revelation of a rationally determined purpose. Even if Carter's and Latham's systems are more fully accounted for in the gallery, they don't seem to lead to neat resolutions, only more questions.

In these pieces, as in the majority of works comprising their oeuvres, at the moment where we would *understand, and create knowledge*, the experience falls apart and we are left bemused by our own inability to comprehend. Why does this column of water rise and fall? It is not driven by the bellows, but surely drives the bellows? If the column can be driven- why not just drive the bellows? Why is it so tall? Why does it make a noise? Similarly, can the earth really be expanding? Are artists really more 'receptive' to every 'event' that might be experienced?

Moreover, the Renaissance resemblances these cosmologies employ, when encountered without the cultural baggage of their alchemical heritage, seem plausible and powerful, as might be expected given their origins within a compelling system that developed within multiple cultures over thousands of years and echoing a more primitive, personal approach to decoding the world. That these ways of thinking seem to be discovered afresh in the singular creations of Carter and Latham makes them all the more seductive. They echo in their operation many earlier systems of thought that persist within contemporary society through knowledge structures like religion, superstition, and pseudo-sciences such as homeopathy or biodynamic agriculture.

A key part of what Carter's and Latham's works and cosmologies achieve as artworks is to pose us the challenge of decipherability, though their deliberate formal language and their aesthetics of rationality and explanation. If we recall Carter's periodic table, full of explanatory notes and helpfully coded in bright colours, or Latham's *Time Base Roller* and accompanying *basic* (*T) diagram* (what other visual art work comes with its own explanatory poster?), both promise to tell you something certain about the universe, confounding perhaps the subjective angst of the analytic of finitude; but neither ultimately delivers this certainty.

Carter and Latham's systems are reactions against the uncertainties of the contemporary episteme. They are attempts to create *de novo* operational systems of knowledge production that re-unite the human experience and the metaphysical with the operations of the natural world, through a hybrid of Renaissance resemblances and contemporary linguistic games, glued together with the intuition of their creators.

As art though, their oeuvres function best through their failure to deliver on this attempt. In exploring their systems, rather than ultimately being offered the plausible solution they promise, we really just experience a record of the cosmologists own struggle with epistemological uncertainty. Their systems consist of a collection of unsolvable

riddles[106] which, in pausing to try and solve, allow the viewer to reflect on their own anxieties about the hegemony of complex science and the irreconcilable subjectivity of other forms of knowledge creation.

There is undoubtedly also something tragic in their struggle, where so much effort and detail has been provided. This only adds to the interest in these works as art. Moreover, despite this failure, their rootedness in the material, use of visual logic, and their re-use of Renaissance resemblances, which are still found scattered throughout culture today, make them fascinating reflections on the way humanity builds systems, as a question in and of itself.

To the question of the gallery and the validity of Carter's and Latham's cosmological outputs[107] as art exhibits, we find that the gallery is a fitting home for these systems regardless of the 'art' status of their creator. This is not because they might be seen as 'outsider art' by contemporary definition, or because they provide a critical challenge to complex science per se, although I don't deny that they can function this way. It is because the operation of non-contemporary epistemological models is part of our wider

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[106] There are broadly two types of riddle, those that are supposed to be solved to a unique solution (or set of solutions), and those that aren't. The former are exemplified in the Anglo-Saxon tradition of riddle making, full of word plays and bad rhymes but ultimately an invitation to be solved. From The Exeter Book of Riddles (various c.600-700AD):

> A strange thing hangs by a man's thigh,
> Hidden by a garment. It has a hole
> In its head. It is stiff and strong
> And it's firm bearing reaps a reward.
> When the man hitches his clothing high
> Above his knee, he wants the head
> Of that hanging thing to poke the old hole
> (of fitting length) it has often filled before.
> Quoted in Crossley-Holland, K. (1979). The Exeter Book of Riddles, P.47

The latter are like the Taoist tradition of the 'koan' which is to be contemplated, without having a single correct solution, to help the 'solver' reflect on the functioning of external systems in the world:

> "A monk asked Master Tozan in all earnestness, "what is Buddha?"
> Tozan said, *Masagin*! (three pounds of flax!)" (Yamada 1990, p.89)

In the case of Carter and Latham's work, by 'riddle' we mean the latter.

[107] It is important to note that in the case of Latham, some of his work also functions in other ways, which might relate to political, aesthetic or humorous strands within his oeuvre, so this conclusion should be seen in relation to how his cosmology relates to art.

cultural fabric, evidenced by the ongoing presence of a multitude of Renaissance and Classical resemblances. Particularly given this fluidity of forms of knowledge creation throughout culture, and the challenges of contemporary epistemology, these questions are very suitable for interrogation through art practice. As singular system builders with developed cosmologies rooted in the material and the visual, they are excellent candidates for such exploration and as such the gallery is a fitting home for their outputs.

For the gallery audience, Carter's and Latham's work evokes a deep rooted familiarity and fascination with older epistemological forms. Then, in their failure to cohere as compelling accounts of the cosmos, these visually and materially sophisticated systems confront us with the challenges of knowledge production within our own episteme.

Crossley-Holland, K. (1979). The Exeter Book of Riddles. Harmondsworth ; New York, Harmondsworth, Penguin Books.

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Walker, J. (1995). John Latham - The Incidental Person - His art and ideas. London, Middlesex University Press.

Yamada, K. (1990). Gateless Gate. Tucson, University of Arizona Press.