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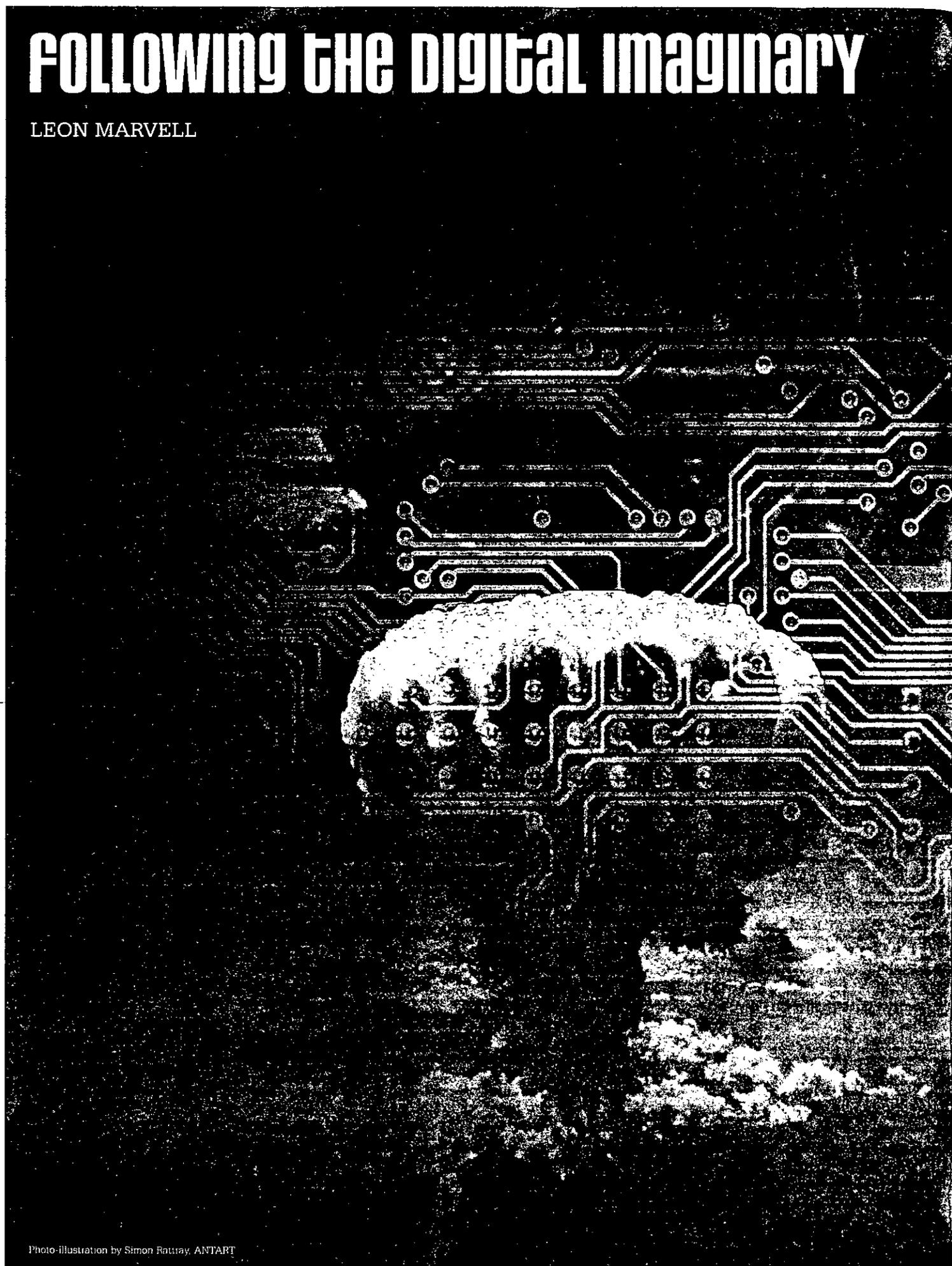
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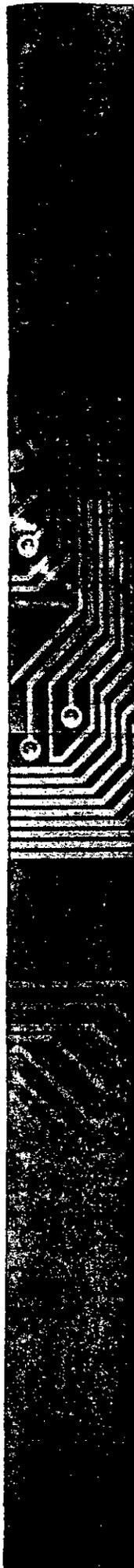


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FOLLOWING THE DIGITAL IMAGINARY

LEON MARVELL





In her voluminous published diaries Anaïs Nin somewhere relates how her psychoanalyst Otto Rank once stated "All morality is but aesthetics". Although such a contention would be enough to make most theologians and philosophers fall off their chairs, the idea that the aesthetic sense may in fact constitute a fundamental category of human experience rather than merely be attendant upon 'higher' faculties, is a notion worthy of some consideration. Ernst Mach, one of the early 20th century founders of quantum mechanics, went as far as to suggest that scientific theories are not so much increasingly close approximations to reality, as they are insights into the psychology of the scientists who produced them. Together these two contentions suggest that the aesthetic sense plays a greater role in the cultural and scientific descriptions of our world than is usually acknowledged.

Such a proposition may seem counterintuitive, given that since the beginning of the Modern era one of the most staunchly defended divides has been that which is said to separate the aesthetic and the scientific fields of endeavour. Indeed, upon the creation of the Royal Society in the late 17th century, certain categories of expression were explicitly excised from the society's language: any writings that smacked of the poetic or that relied on overly metaphorical formulations were rejected as being illegitimate modes of scientific discourse. An attentive study of the history of the subsequent scientific project reveals however that this prohibition is almost constantly forgotten, and that many of the most important scientific concepts are underpinned by unquestionably aesthetic considerations.

Most historians consider that the 19th century Industrial Revolution evolved in two stages: the first phase was associated with the industrial application of the steam engine and heavy machinery, and the subsequent phase was associated with electrification. (It transformed Paris, for instance, into the *Ville Lumiere* or 'City of Light' in the 1880s.) In broader and more inclusive terms however, one may characterise this period as the Thermodynamic Age. It was an age dominated by the emerging discourse about 'energy' that was given birth by Sadi Carnot's explanation of the theoretical implications of the steam engine and culminated in the three laws of thermodynamics. In the middle of the 20th century this age would subsequently yield to its natural heir, the Atomic Age, itself beholden to Albert Einstein's brilliant reconceptualisation of the idea of energy. Just as surely, this latter age transformed into that which we are now experiencing: the Digital Age. While these eras are of course simply heuristic devices, I would suggest that they are nonetheless useful, and every bit as meaningful (and similarly fraught with difficulties) as the terms Middle Ages or Renaissance.

One of the characteristics of these eras and the aesthetic transformations they encapsulate is the emergence of key *imaginaries* that define the dominant metaphors and cultural forms of a given period. The thing that distinguishes a *particular* imaginary from the imagination in general is that it is constituted by a limited set of specific objects that are associated with an abstract idea. For example, the imaginary that has grown around the idea of 'god' has a particular set of figurations that differs significantly from those that have grown around the idea of 'the machine'. And, of course, the imaginaries of both god and the machine differ greatly depending on whether one is examining them in a Western European, South East Asian or Pacific context.

When I speak of an imaginary I not only intend the set of attendant images but also the cognitive practices that are generated by and support those images. For example, the cultural and scientific discourse about thermodynamic 'energy' that was first generated by the industrial applications of Watt's steam engine represents the complex imaginative extension of the simple idea of 'heat transfer'.

The key to understanding these transformations in imaginaries is in each case a machine. In the Thermodynamic Age it is the steam engine, in the Atomic Age it is the fission

bomb, and in the Digital Age it is the computer. Each of these machines was the occasion for the generation of a complex of images, ideas and metaphors that contribute to the imaginary of each age. In the Thermodynamic Age the paintings of Seurat and the pointillists echoed the worldview of the thermodynamic atomists, and Seurat himself was strongly influenced by the theories of perception put forward by one of the key figures in the discourse surrounding thermodynamics, Hermann von Helmholtz. In the early 20th century Bertrand Russell propounded his philosophy of logical atomism at the same time as the industrial machine was becoming a metaphor for all things human. In Eugene O'Neill's expressionistic play *Dynamo*, in the photographs of industrial machines in situ by Charles Sheeler and in the paintings of strange devices by Duchamp and Léger the machine became other than itself. For Sigmund Freud the thermodynamic concept of energy was transformed into the mysterious libido, a concept ultimately reliant upon metaphors drawn from the ideas of a series of 19th-century thinkers who successively elaborated the concept of the transfer of heat from one body to another.

The steam engine with its pumps and pistons, levers and gears was the mechanical equivalent of muscle and bone, of the palpable application of energy and labour. Industrial machines were the epitome of materialism in both its scientific and social aspects. This was to change irrevocably when, in 1945, John Von Neumann set his ENIAC computer to the task of working on physics equations in relationship to the development of the first atomic bomb. Not long after the world learnt of the bombing of Hiroshima and Nagasaki and people were inevitably confronted with the mysterious, evanescent nature of things. Einstein's vision of reality as the product of the curvature of space-time, of the sub-atomic constituents of matter as being an infinite but closed field of post-Newtonian forces, had suddenly and horrifyingly become concrete. In the Atomic Age the concept of matter as the stuff that one could see and touch, that was palpable and 'massy', had all but disappeared as a result of the fact of atomic fission – or at any rate had become so rarefied that the words used in physical descriptions acquired a considerable ambiguity. This fracturing of matter and the recognition of the mysterious nature of the matter-energy exchange can be found reflected in many of Pollock's paintings, which seemingly echo the chaotic traceries and quantum jumps of sub-atomic particles in a particle accelerator. Mark Rothko began painting his folding, shifting fields of colour soon after the first atomic test, capturing perhaps the coruscating and fleeting nature of reality in the face of the fission bomb. Sartre and Camus grappled with the absurdity of existence when confronted with reality as the mechanical interaction of random particles and the immanent threat of nuclear atomisation. Geneticist Jacques Monod applied the absurdism of random interactions to the chromosome string, and threw up his hands in despair with the title of his book, *Chance and Necessity*.

With the creation of Von Neumann's ENIAC computer, the concept of a machine powered by the transformation of mechanical energy – thermodynamic, hydraulic, piston power – was superseded by the mysterious, immaterial nature of the *transformation of information*. It is the computer that is central to the shift from the aesthetic of the Atomic Age to that of the Digital Age.

Even though a computer is undoubtedly a material object, its function, its *meaning* as an object, lies within the realm of ideas. Paralleling the ghostly *cogito* of Descartes, it is this invisibility of its functioning – the transformation of information that defines it – that distinguishes the essence of the computer from any one of its particular physical manifestations. From its earliest beginnings as a clunky analogue calculating device, the modern computer is now envisioned as a virtual *simulacrum*, an object the functions of which seem to occupy the liminal region between the physical and the intellectual. Contemporary mathematical physicist Frank Tipler describes the computer as an exact emulation of an ideal universal computer:

An emulation is an exact simulation, an absolutely perfect

copy. Everybody's computer emulates other computers, although the average person is not aware of that. In any running computer there are several computers there. All but one of them are virtual computers, perfect imitations of other computers. Writing commands into your machine, you see the physical machine, but in reality an emulation of another computer exists inside this machine. But it only exists as bits of information.¹

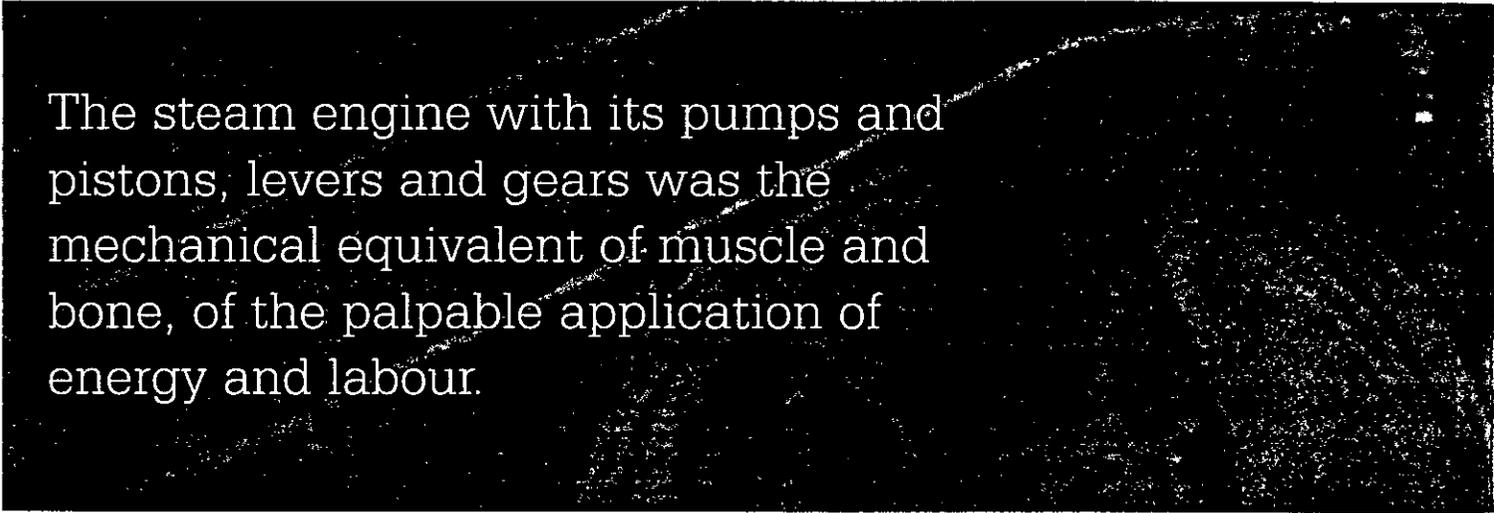
This constellation of ideas contributes to the latest modifications to the imaginary of the machine and consolidates the shift from the aesthetic of the Atomic Age to that of the Digital Age. At the core of the digital aesthetic is the notion that everything is reducible to a calculation utilising binary integers and, more importantly, that there is a formal beauty to this calculating that transcends the object of the calculation.

After emerging from a virtual reality environment, Michael Heim, self-described proponent of 'Heidegger Lite' philosophy, noted:

Reality afterwards seems hidden underneath a thin film of appearance. Your perceptions seem to float over a darker, unknowable truth. The world vibrates with the finest of tensions, as if something big were imminent, as if you were about to break through the film of illusion.²

used for much academic computing, self-published a 1,280-page tome entitled *A New Kind of Science*. For over ten years Wolfram has been studying cellular automata – simple computer programs that generate self-replicating, and therefore lifelike, 'digital organisms' – and he is convinced that these computer-generated graphics essentially model the workings of the environment. Even the simplest algorithms can reproduce structures commonly observed in the 'real' world – the branching structure of the lungs, the forking branches of a tree, cloud patterns or the spots on a leopard, for example. Wolfram suggests that just as with his cellular automata, the complexity observed in the natural world is the result of the iterations of simple algorithms.

The digital aesthetic displays an overriding obsession with the replication of natural form, and in this it paradoxically demonstrates a return to a key concern of artists during the Renaissance: verisimilitude. Contemporary computers can simulate practically anything, to such an extent that it is becoming increasingly difficult to immediately distinguish between that which is 'real' and its simulation. Verisimilitude has become the holy grail of the Digital Age. Observing many contemporary computer games, the exactitude of their visual and audio elements makes identification of an actual car race broadcast on television as distinct from its Playstation or Xbox equivalent a difficult proposition to the casual observer. The



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The crepuscular truth is the 'digital reality' that undergirds the world of appearances: like the Buddhist notion of the experiential world as the play of illusion, *samsara*, for Heim and like-minded thinkers our everyday world hides something greater and more essential beneath it. As much of his inspiration derives from the 1960s, it is not surprising that he often likes to quote Jim Morrison of The Doors:

We have been metamorphosed from a mad body dancing on hillsides to a pair of eyes staring in the dark.³

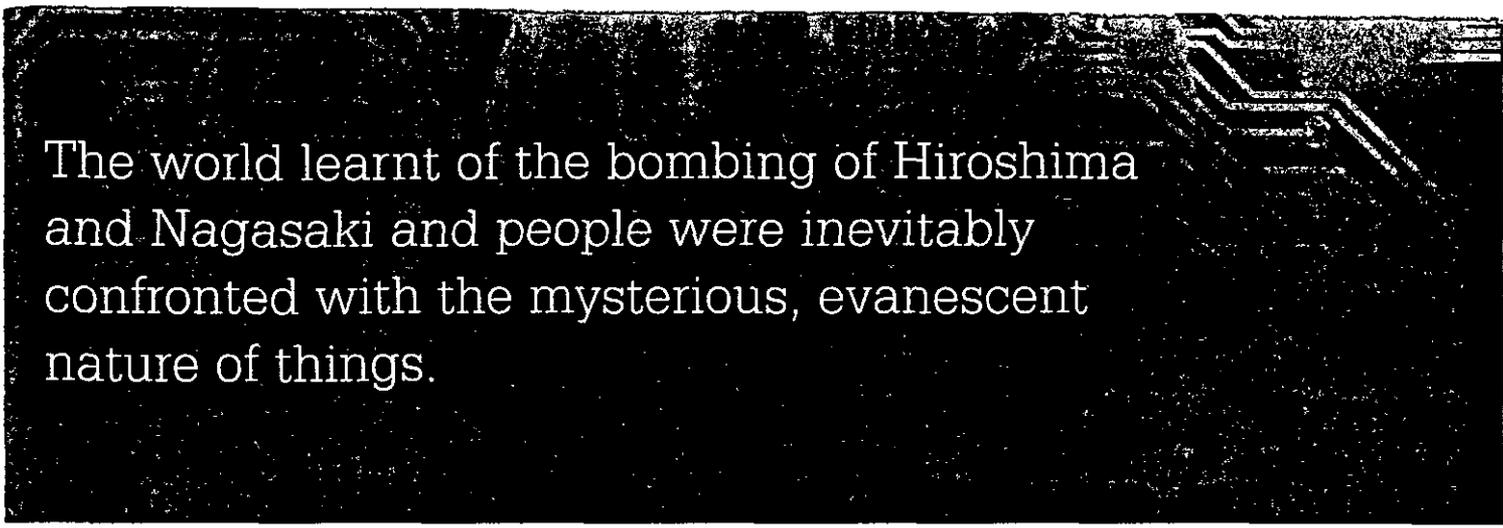
The human predilection for the visual so bemoaned by a series of thinkers in the 1970s and after – Foucault, Baudrillard and the contributors to *Screen* magazine come immediately to mind – here becomes a metaphysical principle: reality construed as the dance of phosphor dots playing on our retina, the theatre of the world becoming a program generated by a universal computer

This notion that reality is the product of digital calculation is taken very seriously by several contemporary thinkers working within the digital aesthetic. In his book *Three Scientists and Their Gods*, Robert Wright describes the vision of contemporary computer engineer Ed Fredkin who believes that reality itself is digital: the universe is an infinite computer calculating eternity and all that it contains. Recently Stephen Wolfram, a mathematician and the designer of *Mathematica*, the software

ubiquity of CGI (computer graphics interface) visual effects in contemporary cinema makes identification of 'real' locations and events as opposed to their computer-generated cousins an increasingly pointless task.

The idea of a machine that could simulate any other machine was a central concern of one of the key figures in the development of the modern computer, Alan Turing. Turing's ideal machine was a 'universal computer', universal because it could in principle replicate the functioning of any other machine. The dream of the Turing machine was that of the ultimate machine. As the Digital Age develops, the computer has indeed come to be seen as this final machine: not only can any machine be simulated, but also anything at all can be replicated. If virtual reality environments develop beyond the present clunky, head-mounted displays, perhaps even the experiential world itself may be effectively simulated.

This digital imaginary – the imaginary that encompasses a world constructed of binary digits and the final machine – is presently so powerful that it is difficult to imagine how it might be superseded. Yet the fact that science uses mathematics as its system of representation, and therefore necessarily proceeds by an analysis of quantities rather than qualities, is entirely contingent upon historical factors. Science, and therefore the wider culture within which scientists work, does not have to proceed in this manner. But mathematics is such an important



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symbol of our transition to modernity that a time when Western culture might adopt a new manner of scientific representation may have passed forever.

There are perhaps two challenges to the digital aesthetic and its attendant imaginary. Both of these challenges, if effected, would produce radical imaginaries of their own. The first challenge is the natural heir to the Digital Age, and again is centred on a new kind of machine: the development of an AI or Artificial Intelligence that passes the Turing test. Simply put, this test would validate the fact that an artificially created intelligence was capable of fooling a human being that it was another human being rather than a machine. The intellectual level of the AI is not the point – it could have the mind of a three-year-old or the intellectual capacity of Derrida – it simply has to fool most people that it is a human being.

If this was to come about, the ramifications of the era in which AIs are a permanent part of our cultural life would be profound. We would be confronted with a number of fascinating scenarios: what would happen to art photography or installation art or art practice itself when an AI begins to enter the gallery scene? How would the MTV awards and cinema be transformed when an AI creates its own music/music video/feature film? How would the world be represented by an AI? The implications of a non-human imaginary could be thrilling, if somewhat frightening.

If an AI never eventuates, then perhaps it will be because of the second possible challenge to the digital aesthetic. This challenge is what the surrealist theoreticians called 'objective chance'. There is no true randomness in any algorithmically generated event. Even though computers often rely on a random number generator to accomplish a task, this sub-routine can only produce a pseudo-random number because, ultimately, the

outcome is always determined by an algorithm, and all algorithms must have a strictly determinable outcome. For people like Fredkin and Wolfram this forces on them the belief that there is no true randomness in the universe either: chance is just an illusion thrown up by the universal computer, and with access to the code, road deaths, earthquakes and the whorls on your fingertips would all be seen as the result of a strict order of calculation. Yet if they are wrong, if objective chance is a fundamental aspect of the way things are, then the idea of the world as calculation can only go so far and the analogy of universe as computer breaks down at a fundamental level.

At the moment the search for ever-increasing accuracy in simulation across the scientific and cultural fields will lead the digital aesthetic towards an inevitable period when real events and digital events become impossible to distinguish. The idea of cyber doubles, *Star Trek's* 'holodeck' and virtual worlds have already expanded and deepened the digital imaginary. What lies beyond the Digital Age will, perhaps, be determined by minds that see things in a completely different way – or the universe itself may be revealed as much greater than the grandest of calculations, and a new imaginary will respond to this as yet unimaginable world view.

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< Notes >

- 1 Frank Tipler quoted in an interview with Anthony Liversidge *Omnis Magazine* 17:1, October 1994 p96
- 2 Michael Heim *Virtual Realism* Oxford University Press, New York 1998 p52
- 3 *ibid* p85



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