

University of Wollongong Thesis Collections

University of Wollongong Thesis Collection

University of Wollongong

Year 2003

Exploration without boundaries: virtual
voyages into virtual landscapes

Hilary Frances Rhodes
University of Wollongong

Rhodes, Hilary Frances, Exploration without boundaries: virtual voyages into virtual landscapes, D.C.A. thesis, Faculty of Creative Arts, University of Wollongong, 2003.
<http://ro.uow.edu.au/theses/350>

This paper is posted at Research Online.
<http://ro.uow.edu.au/theses/350>

NOTE

This online version of the thesis may have different page formatting and pagination from the paper copy held in the University of Wollongong Library.

UNIVERSITY OF WOLLONGONG

COPYRIGHT WARNING

You may print or download ONE copy of this document for the purpose of your own research or study. The University does not authorise you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site. You are reminded of the following:

Copyright owners are entitled to take legal action against persons who infringe their copyright. A reproduction of material that is protected by copyright may be a copyright infringement. A court may impose penalties and award damages in relation to offences and infringements relating to copyright material. Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.

Chapter 2

Virtual Space: *Exploration Without Boundaries* in Context

Exploration Without Boundaries is a virtual environment, and as discussed in the previous chapter was constructed entirely on the computer in virtual space, yet reflects real space.

This chapter provides a brief explanation of the concept of virtual reality, and to contextualise *Exploration Without Boundaries*, I provide an overview of the origins of the technology as well as the literature concerning virtual worlds and in particular, dystopian/utopian scenarios.

The virtual worlds in the literature are mainly concerned with dystopic scenarios, stemming from the military origins of both hardware and software: the environments in *Exploration Without Boundaries* however, do not necessarily evoke dystopic scenarios, though these are occasionally implied by the juxtaposition of objects and the atmospheric effects in the scenes.

Finally I provide an overview of the process of creating virtual worlds using the technology and discuss the implication of the grid as a basis for all computer aided imaging.

2.1. Definitions

For the purposes of this dissertation, the following definitions of the terms ‘virtual’, ‘real’ and ‘virtual reality’ will be accepted as they appear in the online Concise Macquarie Dictionary¹ as particularly applicable to computer technology:

2.1.1. Virtual: Adjective

Computers of or relating to an environment, object, etc., which exists only as a computer representation, as opposed to physically: a virtual bookshop.

2.1.2. Real: Adjective

existing or occurring as fact; actual (rather than imaginary, ideal, or fictitious):
a story taken from real life.

being an actual thing, with objective existence (rather than merely imaginary).

2.1.3. Virtual Reality

an artificial environment represented by a computer and intended to appear and feel real to the user, who, with the use of electronically monitored gloves, earphones and goggles, is able to interact with this environment as if it were physically real.

any artificial environment represented by a computer.

2.2. Aspects of Virtual Reality in Literature and Film

The following literary references present particular views and opinions which contextualise *Exploration Without Boundaries* within the framework of virtual reality and new media.

The visual culture theorist Nicholas Mirzoeff maintains that there are two opposite poles in the critical view of innovation in virtual reality: one suggesting that it is a complete transformation in technology thus breaking with the past, and the other considering that virtual reality has long been in existence, in the form of the stereoscope and other devices.

Also Mirzoeff suggests that virtuality became a 'buzzword' during the 1990s, that it is a "*seemingly new way of experiencing the outside on the inside*" and that it has "*become epitomised by the virtual reality helmet*" (Figure 42) (181). One reason for its popularity is that there was a raising of awareness of what appears to comprise virtual reality by the popular novels of Stephen King, William Gibson and Neil Stephenson² whose novels are even cited as necessary readings for those who would see themselves as 'digerati', or the avant-garde of the digital world (Nagel, Jude and R.U.Sirius 77).

Figure 42. The virtual reality headmount.

Source: Pearce 502

2.3. Technological Utopia and Dystopia

The aforementioned science fictions of King, Gibson and Stephenson have been analysed at length in the critical literature concerning digital environments. Robert Markley states that many of the developers and popularisers of virtual reality technology share a neo-liberal humanist perspective and employ arguments displaying romantic attitudes and elements of Platonic idealism concerning the creative potential of this technology. Markley also derides the popular conception of Cyberspace, suggesting that it is a "consensual cliché" and that it is misguided to trust virtual technologies, imputing that the bug and problem-ridden products do not promise a trouble-free utopia. He suggests that there is a

Western tendency to “privilege mind over materiality” and castigates the proponents of VR culture as “rapturous rhetoricians” (56).

Markely’s critique of the techno-libertarian attitude is reinforced by the views of Paulina Borsook in her book *Cyberselfish* in which she makes highly critical observations concerning the working conditions and attitudes of information technology workers.³ The life lived in the dark underworlds brought about by technological complexity and ‘big science’ is portrayed in the films *The Matrix*, (Figure 43) *Dark City* and *Bladerunner* (Figure 44) as amoral and unethical. Paula E. Geyh takes these observations further, describing at length the present post-modern tendency to dystopia in *The fortress and the polis* in relation to the mapping of cyberspace and the conflation of the virtual and the real in architecture (Munt 99-112).

In contrast to these pessimistic outlooks, Donna Haraway and the performance artist Stelarc anticipate future utopian worlds where humans might eventually take on characteristics of the machine. The popular cyber culture author Howard Rheingold considers that VR (virtual reality) systems are the thinking tools of the future (386-91) and promotes a cautionary and rather utopian vision of virtual reality as a “magical window into other worlds” (19). Jaron Larnier, developer of VR systems envisages travellers freely roaming in landscapes of their own desire (Hillis 196), while even more fearful and concerned views are propounded by the cyber ethicist Mark Slouka (7, 77) as well as by Gregory Rawlins who describes a Gibsonian scenario in which a designer creates virtual interiors (29). Rawlins goes on to predict how real world based reality will soon become confused with computer mediated reality; that we are now ‘*moths attracted to the Promethean flame of technology*’ and that we are creating an ‘*empire of the mind filled with danger and exciting possibility*’ (176).⁴

Figure 43. Inside *The Matrix*.

Source: Warner Brothers site — <http://whatisthematrix.warnerbros.com>

Figure 44. The Tyrell Corporation in *Bladerunner*.

Source: The *Bladerunner* official magazine site <http://www.devo.com/bladerunner/>

Figure 45. Part of opening sequence of *Metropolis*
Erich Kettelhut (1893-1979), oil and gouache on cardboard,
39cm x 54.5cm. Filmmuseum Berlin.
Source: Michael Organ's *Metropolis* archives (no longer available online).
Organ's URL is
<http://www.netpac.com/provenance/vol1/no2/features/archinet.htm>

Since new technology always requires considerable capital investment and labour, one of the arguments that predict a dystopian future is based on the fact that power, hence control, resides in the hands of the military-industrial complex and its technocrats. These visions of technological dystopias are well known and early on had entered the public psyche through the works of H. G. Wells, Mary Shelley, George Orwell, Aldous Huxley and Ray Bradbury among others (Schaer 253). These utopian/dystopian visions also made their way into popular culture through early film e.g. Fritz Lang's *Metropolis*, and comic strips exemplified by *Batman* with its dark, neo-gothic atmosphere pervading the modernist art deco world of *Gotham City*.

Cinema could be said to be the first medium capable of realising complete, realistic virtual worlds, utilising a combination of stagecraft and mechanics in tandem with the manipulability of the motion camera and editing suite. Perhaps the best and earliest example of this is *Metropolis* (Fritz Lang 1927), one of the most remarkable films (Figure 45) particularly for its time, and Michael Organ's online *Metropolis* archive features scenes from the film set including a wide-ranging selection of dystopian futuristic promotional posters, advertising material and programmes. *Metropolis*, which Organ describes as technological gothic, became the inspiration for *War of the Worlds* (Byron Haskin 1953), *2001 A Space Odyssey* (Stanley Kubrick 1968), *Blade Runner* (Ridley Scott 1982), *Dark City* (Alex Proyas 1998) and *The Matrix* (Andy and

Larry Wachowski 1999). *Metropolis*, *Blade Runner* and *Dark City* are dystopias of dark industrial urban worlds and it is the profusion of these dark visions that lead me to invoke a different aesthetic and project a viewpoint that is more open to other possibilities, and that at the same time raises awareness of issues concerning colonisation, ecology and energy usage.

2.4. The Military Origins of Computer Technology and Virtual Reality

On examining the historical background of virtual worlds as depicted in games, film and literature, some mentioned in the previous section, it becomes clear why the tendency to depict technological dystopias is so prevalent, as this technology had been originally developed for exclusively military purposes. Early 3-D games were designed by animators from a technological background of industrial design and engineering who were involved with the computer mediated emulation of possible war scenarios.

CAD/CAM (Computer Aided Drafting and Computer Aided Manufacture) were developed much earlier than the software applications now used by multimedia developers, graphic designers and filmmakers, therefore a disproportionate number of games and 3-D scenes rendered by animators depict war machinery and military technology. So both military as well as market forces provided the push for computer scientists and mathematicians to develop improved methods of depicting realistic virtual worlds, but not until the advent of fractal based software did it become possible to emulate natural textures and atmosphere as in *Exploration Without Boundaries*.

The military origin of digital technology is evident by the fact that the first computers were used to decipher code, and later to produce complex calculations for nuclear fission. With later developments, the quality of visual feedback improved, but only became adequate with the advent of the ENIAC (1946). This computer, initially developed for predicting ballistic missile trajectories, had the power to process the amount of data needed to display visual information.

The development of computer mediated virtual reality is described in detail by Ken Hillis in *Digital Sensations* (2). In brief, designs for flight simulators had already been patented as early as 1910 and in 1930, Edwin Link (Figure 46) patented a model cockpit equipped with flight controls and pneumatic devices which could reproduce a plane's yaw, pitch and roll; the movements of a plane in flight. The military origins of

Figure 46. Link and the model cockpit.

Source: Binghamton Library
<http://library.lib.binghamton.edu/special/link.html>

flight simulation (Figure 47) is evident in the camera controls in most 3-D software applications including that employed in the making of *Exploration Without Boundaries*.

2.5. Types of Virtual Reality and their Relation to *Exploration Without Boundaries*

Various types of virtual reality (Figure 48) have been developed throughout history to enhance drama and spectacle. The technology is not particularly new either – the first multi sensory engine having been invented by Heilig and patented in 1962 (Rheingold 49). Heilig constructed a booth in which one could view film loops and listen to sound, along with other effects in order to create the ‘illusion’ of motor biking. A SonyStyle⁵ ‘virtual ride’ employs the same concept, except that the viewer wears a head mount to see the stereoscopic film – this experience is not interactive, and the viewer has no control over the environment in any sense whatsoever but rather experiences it passively.

Michael Heim states that there is a hierarchy in computer mediated virtual reality with regards to technological sophistication: weak virtual reality (a category into which *Exploration Without Voyages* would fall) is that which appears as a 3-D environment on a 2-D screen, true or strong virtual reality involves ‘total sensory immersion’ which comprises wearing a helmet and data glove, or other physical device to create a feeling of control in actual space (29).

In another form of virtual reality, 3-D polarising lenses are worn: this can be emulated on certain computer monitors with the appropriate software, or with the provision of special stereoscopic glasses (Engdahl). One form of this stereoscopy is the effective virtual reality installation at the Powerhouse Museum in Sydney known as *The Wedge*, which develops the

Figure 47.
Flight simulator.

Source:
Powerhouse Museum
<http://www.phm.gov.au/universal/simulation.htm>

Figure 48. Simulated 3-D view of molecules.

Source: Hofstetter and Fox 87

Figure 49. *The Wedge*.

Source:
Powerhouse Museum
<http://www.phm.gov.au/universal/simulation.htm>

illusion of depth by stereo projection on two walls forming a corner, with the viewer situated between them (Figure 49). The viewer wears polarising stereoscopic glasses that differentiate between the rapidly alternating polarised projected images which are manipulated with a joystick in emulated 3-D space.

To achieve strong virtual reality requires powerful computers, expensive resources and plenty of room, and the hardware and software requirements are not universally accessible. However, there is a negative side effect that is not generally acknowledged in that strong virtual reality can cause serious physical and psychological damage to the participant. Heim describes this affliction as *'Alternate World Syndrome'*, which takes the form of flashbacks and severe disorientation, notably experienced by pilots training in flight simulators.

2.6. The Artist and the Process of Making a Virtual 3-D Digital Landscape

The digital landscape is that of the virtual and the simulated as seen on the small flat area of a computer monitor, yet it is here that the artist builds 3-D architectural edifices, landscapes, and space scenes in an infinite universe. Paradoxically also, it is a closed and personal world for the artist, yet both restricted and open at the same time. Once a landscape imaging application has been launched, an image appears on the screen and in some cases, even a default rendered landscape. This makes the initial prospect of commencing work very unlike that encountered by the traditional painter, who sees the landscape in the real world, but is confronted with a blank canvas. In other words, the virtual landscape artist may be altering a pre-formed landscape by changing and modelling it, as well as choosing the atmosphere, materials and the field of view.

An essay by Mike King describes the processes involved in creating 3-D worlds in detail, suggesting that the 3-D computer application frees artists from the rigidity of linear perspective (215). Agreeing with King, I go further in finding the process of creating a computer generated 3-D environment as in *Exploration Without Boundaries*, is more akin to building, sculpting and model making than painting or even photography, yet the final render is the equivalent of a camera taking a picture of that virtual world from a chosen projection or view point, whether orthographic or in perspective. However, in realistic landscape painting, the viewpoint is always that of the painter and is relatively static for the duration. A painter, like a photographer, is usually not able to quickly obtain a number of significantly different viewpoints, say, from above, below or from another side without considerable difficulty. On the other hand, the virtual landscape artist is able to easily choose any view of any virtual landscape, from any vantage point. As well as producing static images involving three

dimensions, the virtual artist can animate progress through the scene as in the linear movies in *Exploration Without Boundaries*, thus enhancing even further the illusion of a real world.

2.7. The Process of Creating Virtual Worlds

The process of creative development of real or virtual worlds is similar in both disciplines.

The production of *Exploration Without Boundaries* involved modifying, i.e. sculpting virtual landforms and placing them in 3-D virtual space. All 3-D modelling applications reproduce the real with a simulated 3-D environment in which is constructed complex objects, animations in (x,y,z) Cartesian space, all manipulated via a GUI (Graphical User Interface) (Figure 50).

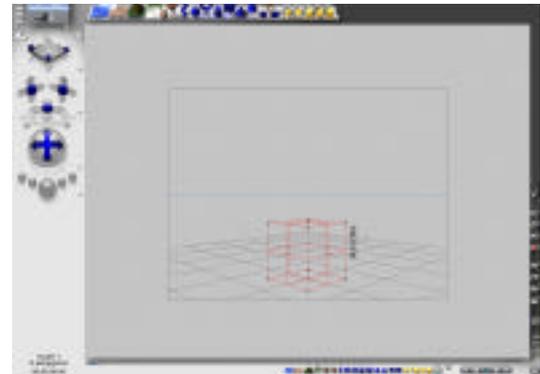


Figure 50. The Cartesian grid in the *Bryce 5* environment.

Source: Rhodes, H. 2002

With the development of 3-D imaging, artists may create for themselves other spaces, neither of, nor in this world. They are spaces that only exist electronically, are seen on screen and the whole experience can be enhanced with added sensory inputs, sometimes tactile, kinetic or even olfactory depending on the VR system. Some VR systems are so immersive, they create the impression of moving through real space, even allowing the participant to pick up and manipulate simple objects and sometimes enter extraordinarily sublime and evocative worlds. Yet 'strong' virtual reality with interactive rendering still does not possess the power to create images that even approach the realism of the natural world – the computing power is not yet available for this. This is another reason why I choose to produce pre-rendered movies and environments for *Exploration Without Boundaries*, as only by this method can the necessary standard of definition to create realistic looking environments be achieved.

2.8. Modernism, the Grid and Virtual Reality

In virtual reality, the grid provides the co-ordinates in 'x,y,z' space, the Cartesian framework for all 3-D vector modelling, and also gives the co-ordinates of any pixel on the monitor, each pixel's colour being defined numerically by a hexadecimal triplet. Some Bauhaus works foreshadow the pixel grid; one particular example was produced on a typewriter by Hajo Rose (Figure 51) for a fabric print (Droste 225). Ironically, this print was produced on a machine with its own matrix of numbers and letters, a device that would later evolve into the electronic keyboard. This print also presaged raster graphics and ASCII art (pictures made from type in text messages, usually email).

Paradoxically, it was the grid that lead ultimately to the development of computer systems with graphical interfaces and it was the sophisticated digital technology with its inbuilt grid and strict hierarchical systems that would be instrumental in breaking the 'form follows function' ethic that had ruled industrial and graphic design since the Bauhaus period. The

dematerialisation ensuing from the progressive miniaturisation of components enabled industrial designers to become more playful with the outward appearance of products once they could enlist the full power of CAD (Computer Aided Design) systems (Figure 52). Likewise it was the unprecedented computing ability of this rigid technology, governed by binary numbers and electronic circuit grids, which enabled designers to produce adventurous curvilinear and organic forms. At the same time, CAM (Computer Aided Manufacturing) production techniques simplified the tooling up process, reducing costs, likewise, the development of graphic applications for desktop publishing and imaging, permitted graphic designers to take full charge of their own typography, streamlined the process of publication design, and gave more creative freedom.

Lunenfeld has considered the grid important enough to write an anthology and critique on new media installations and architecture entitled *Snap to grid*, and believes this particular common computer graphics function to be a metaphor for thought in

Figure 51. Hajo Rose, detail of Bauhaus print. This typed pattern foreshadows the ASCII text grid.

Source: Droste 224

Figure 52. *Column museum* Possible column forms.

Source: Burry 38

electronic culture (xvii). Without the all-pervasive grid, it would not have been possible to produce any part of *Exploration Without Boundaries*, the grid underlies the mazes, the fractal frieze in the installation, the cubes, and the book, but never intrudes.

According to Rosalind Krauss, the clinical Cartesian grid that had dominated modernism (Figure 53) from the mid years of the Bauhaus, with its utopian visions of sanitised cities, clean lines and ascetic aesthetics, also pervaded modern art from the 1920s until the early 1970s. Krauss considers that this grid is responsible for

depersonalising and regimenting art, and almost imbues it with an antithetical personality when she describes it as being “*hostile to literature, narrative and discourse*” causing the (visual) arts to have walled itself in as if contained in a ghetto (9).

Krauss, like Mandelbrot saw the grid as an unfortunate and negative development in the realm of the visual arts. The omnipresent grid reflected the increasingly urbanised, manufactured and industrial culture of which modernism was an integral part, and was fundamental to the mass-produced, socially idealised architecture for the population. This grid was at the core of the Bauhaus ideology and formed the basis for plans, designs and construction.

Like Krause in her critique of the grid in modernism, I postulate that the detritus of modernism and fear of technological domination and control which pervade the grid-ridden dystopias in digital media, literature and film, have much to do with the software and hardware. These same grids reside within the machine itself in the form of the integrated circuit’s maze-like configuration as well as in the Cartesian (x,y,z) environment.

To contrast this, I largely employ fractal synthesis in my work, a technique that emulates the organic and chaotic rather than Euclidian geometric forms.

Exploration Without Boundaries is an emulation of the inner and outer workings of nature through the machine, something that is not often discussed in journals and texts that critique computer mediated productions. Only the maze graphically embodies the symbolic grid and printed circuit yet it reflects the intrinsic system and workings of the machine (Figure 54).

Figure 53. The modernist grid. Sol le Wit, *Floor Piece #4*, 1976. Painted wood, 1m x 1m x 1m. Source: Krauss 244

Figure 54. The maze or grid-like configuration of the integrated circuit – a networking data-link chip from IMP. Source: Bylinsky

2.9. In Conclusion

The theorists who write about computer-aided technology have provided some interesting insights into the societal concerns with the digital, however I cannot but agree with Markely, who suggests that much of what is written about virtual reality is hyperbole. On the other hand, like Mirzoeff, I take the balanced view that the technology provides useful tools for different applications and at the same time argue for a middle ground between the extreme views of the discontents and utopian optimists.

Although technology associated with virtual reality originates with the military, *Exploration Without Boundaries* includes hardly any futuristic simulation of science fiction environments, but rather reflects on previous technologies of navigation and transport (Figure 55). Therefore *Exploration Without Boundaries* is a world that reflects the real rather than concepts of virtual reality, and presents a world retrospectively cognisant and familiar to most, even including those who do not necessarily relate well to digital technology.

The future of the dark places in *Exploration Without Boundaries*, for instance the sombre industrial landscape with its discarded tools and damaged environment, and also the space scene, may be imagined in many different ways. The industrial has now become sanitised, the workers having departed for 'better' (white collar) jobs if any, and the site either converted to an industrial theme park or an industry museum (Figure 56). For example, *Australia's Industry World* in Port Kembla, Sydney Park Brickworks Museum with its disused kilns, chimneys and pug mills, also the

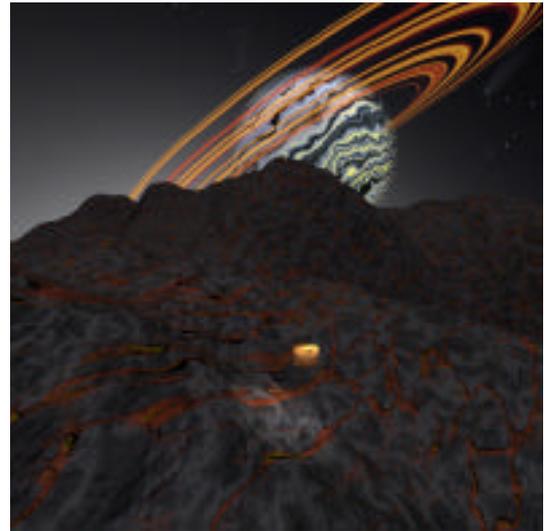


Figure 55. H. Rhodes, space scene of the south-south-west region in the *Era of Power, Exploration Without Boundaries*, 2002.

Source: Rhodes, H. 2002



Figure 56. The industrial scene from the *Era of Power* in *Exploration Without Boundaries* with pithead, gasometer and railway tunnel, 2002.

Source: Rhodes, H. 2002

Figure 57. Duisburg-North Park project in Germany.

Source: Cerver 464

Duisburg-North Park project in Germany (Cerver and Asensio 462-65) (Figure 57). The *Era of Power* space scene in *Exploration Without Boundaries* shows the generation of power, but speaks nothing of the inhabitants: the desolation and harshness of this apparently lifeless site express the struggle to maintain existence.

The underlying Cartesian grid does not intrude in *Exploration Without Boundaries* because I have deliberately avoided using gridded textures, and instead have employed almost exclusively organic fractal textures to make the scenes appear more natural.

Creating virtual worlds is a rewarding process and gives the artist wide choices of expression, much greater than are available in traditional media because the artist becomes the film maker, set builder, architect and model maker, and dare it be said, becomes almost god-like in the process. Finally, to sum up I provide this end quote from Demaria's anthology and history of electronic games "...the common factor is the imagination of the person behind the controls" (320) (Figure 58).

This chapter has outlined the background and development of virtual reality in relation to my own concerns. In the next chapter I discuss the more practical processes involved in the creation of 3-D virtual worlds in contrast to the construction of sculptural landscape forms in the real world, as exemplified by the Land Art movement in the USA and the UK during the 1970s.

Endnotes

1. Macquarie, The *Concise Macquarie Dictionary*, 2000-2002, 09/02 2002, Website, Macquarie University and Macquarie Library P/L, Available: <http://www.macquariedictionary.com.au/>, 08/09/02 2002.
2. All of these authors provide a singularly dark and dystopian outlook on the future
3. Paulina Borsook, *Cyberselfish: A Critical Romp through the Terribly Libertarian World of High-Tech* (London: Little, Brown and Company, 2000).
4. Referring most probably to the scenarios painted by Gibson in *Neuromancer*: William Gibson, *Neuromancer* (London: Harper Collins, 1993).
5. SonyStyle at Fox Studios in Sydney has a number of 'virtual reality' theme rides in which one sits on a vibrating chair with a headmount and view a 3-D movie of a ride e.g. hang gliding, while listening to wind sounds and being blown with cool air. I found this experience more annoying than immersive.

Figure 58. Scene from *Riven*—
"The common factor is the
imagination of the person behind
the controls."

Source: Miller and Miller,
Ages of Myst, 1997