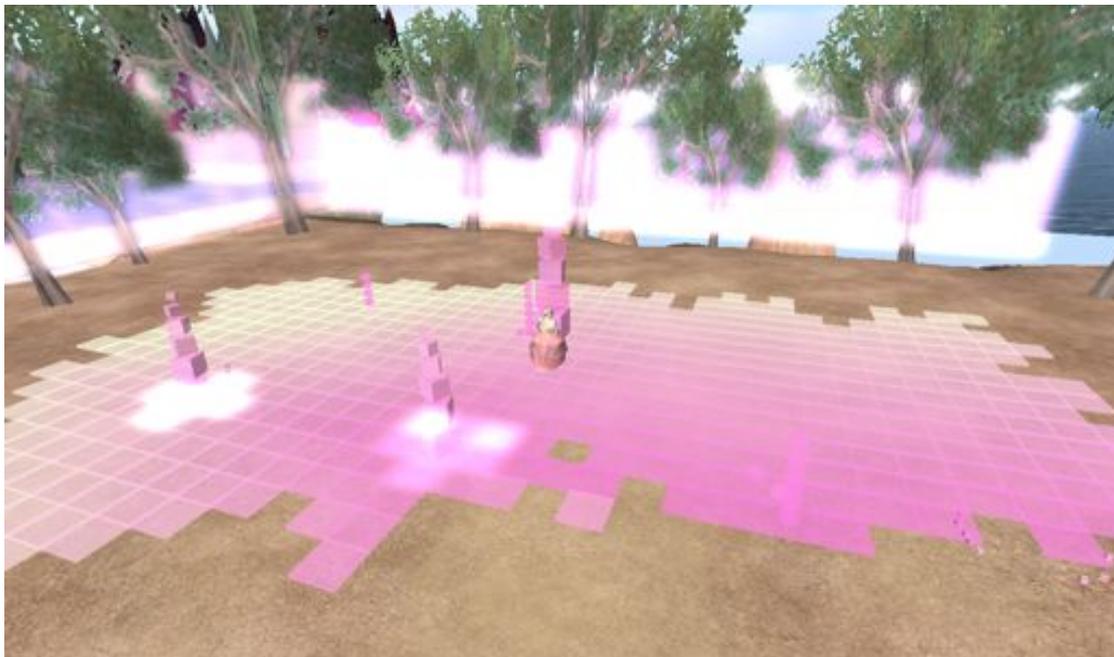


# The Multi-User Virtual Environment as a *Post-Convergent* Medium

An exegesis submitted in fulfillment of the  
requirements for the degree of **Doctor of Philosophy**

**Adam Nash**

School of Media & Communication  
College of Design & Social Context  
RMIT University  
July 2010



# The Multi-User Virtual Environment as a *Post-Convergent* Medium

By Adam Nash

## TABLE OF CONTENTS

<b>The Multi-User Virtual Environment as a <i>Post-Convergent</i> Medium</b>	<b>2</b>
By Adam Nash	2
<b>Abstract</b>	<b>5</b>
<b>Keywords:</b>	<b>6</b>
<b>Introduction</b>	<b>7</b>
What are the intrinsic qualities of realtime 3D Multi-User Virtual Environments (RT3D MUVES)?	7
Existing knowledge	8
Aim: Use a formal experimental method of creativity to produce interactive artworks that may indicate or exploit the intrinsic qualities of the RT3D MUVE medium.	9
Methodology: action research	9
Relevance of research	10
Significance of research	11
Evaluation tools	11
Scope of research project	13
Results	14
Conclusion	16
<b>Chapter 01: Background</b>	<b>17</b>
Millennial concepts of virtual space and performance art	17
Formalist frameworks	19
Twentieth century formalist frameworks	19
Hypothesis: RT3D MUVES as formalist frameworks	20
Selection of action research method	21
Method: iterative design	22
Evaluation of experiments	22
Context: Early theories of virtuality	23
De/Re-territorialisation of the user with the avatar as a result of the multi-sited relationship between materiality and virtuality	24
Dematerialised representation, digital embodiment, connection and differentiation, prior space, Badiou's 'third subject'	25
Floridi's formal model of telepresence	27
Deleuze's heterogeneous assemblages and Floridi's model	27
McLuhan and convergence	28
Remediation and the new	28
Sydney Eve Matrix' <i>cyberpoetics</i> as a <i>post-convergent</i> analytical tool	29
Technical manifestation of post-convergence	29
Conceptual manifestation of post-convergence	30
Post-convergent approach to art: what can be done in this medium that cannot be done in any other?	31
<b>Chapter 02: Design of Work</b>	<b>32</b>
Pre-convergent practice in RT3D MUVES	32
New forms of pre-convergence within a post-convergent medium	33
Hypermediacy, immediacy and post-convergence	33

Char Davies	34
Tamiko Thiel	35
Melinda Rackham	35
Steve Guynup	36
Digital embodiment updated to RT3D	36
Comparing RT3D MUVes with music and sound practice, in terms of abstract, formal composition systems	36
Rickert and Salvo's <i>distributed Gesamtkunstwerk</i> as alternative model of convergence in music	37
Technologically determined formalism	38
Deleuze and Guattari's <i>Body Without Organs</i> in relation to RT3D MUVes and music	38
Grosz' music as <i>excess over survival</i> , affect and the erotic	39
Memory Plains Returning	40
Stress Test	47
Chromacy	49
Scorched Happiness	50
Pale Shining Winter	54
Blue Line	54
Second Life	55
Ramonia on Marni	56
A Rose Heard At Dusk	58
Seventeen Unsung Songs	59
Trace Aureity	65
One, Another	67
<b>Chapter 03: Results: Realtime 3D Multi-User Environments as a <i>post-convergent</i> medium, and as a site for art</b>	<b>70</b>
What are the intrinsic qualities of RT3D MUVes?	70
Convergence leads to post-convergence	70
Pre-convergent art practice is possible in a post-convergent medium	72
A temporally non-linear collaboration between the virtuosic user and artist redefines the concepts of <i>live performance</i> and the agency of the artist	72
Digital colour, opacity and time as intrinsic qualities	74
Virtual environments are entirely composed of data	75
RT3D MUVes as a site for art	75
Alain Badiou's 15 Theses on Contemporary Art	76
Theses 1 to 3	77
Thesis 4	81
Theses 5 to 8	83
Theses 9 to 11	85
Theses 12 to 15	89
<b>Chapter 04: The Ontology of Data and The Status of Artworks in Virtual Environments</b>	<b>92</b>
Modulation	92
Modulation example	93
Data is the medium, modulation is the action	94
Data-as-data and data-as-display	95
Parameters for modulation	96
Data in relation to the <i>hyperreal</i> and Benjamin	97
Retrieval as opposed to access	98
Sites of de- and re-modulation, MP3 example	99
Paul D. Miller's <i>multiplex consciousness</i> , sampling and mashups	101
Modulation and dialectics	104
Parameter manipulation	105
Examples of parameter manipulation from this project	105
RT3D MUVes in relation to other digital media	107
<b>Chapter 05: Conclusion</b>	<b>110</b>
Iterative design experiments	110
Identification of post-convergence	111

Data and modulation	113
Current contemporary practice	113
Future avenues of pursuit	114
BabelSwarm	114
Autoscopia	115
SquareTangle	115
Conclusion	115
<b>List of Works Cited</b>	<b>117</b>
<b>Bibliography</b>	<b>126</b>

# Abstract

This thesis argues that realtime 3D Multi-User Virtual Environments (RT3D MUVES) can be thought of as *post-convergent* in both technical and conceptual terms. As a product of its fundamental technical make-up, the MUVE as a medium is capable of containing, displaying, reconstituting and mixing all prior electronic media (e.g., realtime 3D, audio, video, networking, animation, etc.) as content; this process has been ably demonstrated by McLuhan (2001 8), among others. Conceptually, MUVES are *post-convergent* because they exist after the convergence of media, sometimes identified in the rubric “multimedia”, that occurred from the late twentieth, and early into the twenty-first, century. For example, the integration in mobile phones of web-based social networking tools is typical of multimedia convergence; a robust electronic device is presciently combined with a networking application, which consequently expands the possibilities and conceptual understanding of both. This multimedia convergence has led to a kind of creative practice within MUVES marked by a conceptual approach to recombining media into a product that acknowledges these media sources, while forming a kind of meta-experience, or excess, of media only achievable within MUVES. This goes beyond simple concepts of *convergence* to explore the intrinsic qualities of this new medium within which no single media-element has precedence over another, in principle.

In this vein, I present a series of art-works that demonstrate an attempt to identify the intrinsic qualities of such a *post-convergent* medium by proposing solutions that are not beholden to any of the individual recombined media. An iterative approach, in line with the tenets of *action research*, has been taken to ensure a systematic and documentable experimental process. Each work was constructed to examine, represent and/or exploit a quality intrinsic to realtime 3D MUVES. In each case, the work was then evaluated and the results used to form the basis for the next work. Most of the works explicitly experiment with the interaction of sound, vision and user-led interactivity, exploring the notion of live performance and what that means in a digital, networked, archived environment that spans international time zones.

In conclusion, I suggest that recognising and working with the intrinsic qualities of realtime 3D MUVES necessitates dealing with their post-convergent nature. Chiefly, this means understanding a realtime 3D MUVE as a data-driven network of media-elements in an interdependent relationship with each other, where each element is necessarily modulated between data and display. These media-elements include, but are not limited to, sound, image, video, text, grammars of time-based media, the network, user interface and other *human computer interface* (HCI) considerations; social networking, databases, software-based algorithms, scripts, protocols and dedicated computing hardware etc. No single media-element necessarily takes precedence over any other; rather they combine and recombine in a dynamic manner to create a state of the art that can potentially lead to a user experience greater than the sum of all the media elements. The research is focused specifically on the area of art and performance.

## **Keywords:**

realtime 3D Multi-User Virtual Environments (RT3D MUVES), avatar, post-convergence, composition, non-linear, Second Life, VRML/X3D, data, modulation, virtual art

# Introduction

## What are the intrinsic qualities of realtime 3D Multi-User Virtual Environments (RT3D MUVES)?

What constitute the *intrinsic qualities* of realtime 3D Multi-User Virtual Environments (RT3D MUVES)<sup>1</sup> as they relate to the performance of art? By *intrinsic*, I mean in the sense of what can be *done* in this medium that cannot be *done* in others (Matrix 22)? By *done*, I mean: what can an *artist* produce within this medium that can or cannot be produced in any other medium, or by any other means? By *qualities*, I mean the interface or technological or conceptual means by which a virtual environment may exist as an observable space to a person accessing the MUVE by exploiting these qualities. This starts with the technical act of logging in to the far richer interactions and affects of, for example, collaborating on the construction or performance of a virtual audiovisual *sculpture* from different physical locations, or the flow of data between the MUVE and the real world and/or other virtual environments. By *artist*, I mean any person who conceptualises and/or constructs *interactive* audiovisual works that exploit, situate or maintain any or all of such intrinsic qualities. By *interactive*, I mean a significant aspect of the experience of the work is not available until someone other than the original artist, is *using* the work. Once this agent begins interacting with the work, the work expresses some aspect unique to that particular interaction. I will usually refer to this agent as *the user*, even though sometimes there will be shades of prior vocabularisations such as *audience*, *viewer* or *listener* and so on, occurring. This is caused by the necessary complexity of the enormous matrix of technosocial interdependencies required to bring RT3D MUVE into existence, and reflects the still emerging state of these environments and the work being created in them. As a result, a standardised and unique vocabulary specific to this medium is yet to be established and therefore necessarily relies on prior vocabularies being used with varying degrees of

---

<sup>1</sup> Realtime 3D Multi-User Virtual Environments (RT3D MUVES) refers to any digital networked multi-user environment that has a visual component displayed using realtime 3D; that is 3-dimensional computer graphics that are not pre-rendered, as in 3D special effects for films, rather they are generated in realtime response to the user's interaction. The user is specifically any person who accesses such an environment. The term 'user' is borrowed from the field of user interface design and game design and is usually the preferred term of those who access these environments.

nuanced differences in meaning.

### **Existing knowledge**

Marshall McLuhan's famous concepts that describe new media as characteristically being those that incorporate all previous media within themselves as content are usefully durable when applied (both literally and metaphorically, which is apt with McLuhan) to RT3D MUVES (McLuhan 8). Donna Haraway, Katherine Hayles, Anna Munster and Sidney Eve Matrix all propose various interesting versions of not only *digital embodiment* and *dematerialised representation*, but also wider notions of virtual consciousness and environments that are able to dynamically accommodate changing vectors of potential multi-sited relationships, rather than simple dichotomies such as material/virtual, true/false, digital/analog (McLuhan 8; Haraway 2; Hayles: Immersed 4-5; Munster 19). Meanwhile, Floridi's *successful observability*, and *backwards and forwards presence*, provide a strong formal model to help explain or at least contextualise the user experience and the apparent dichotomies that do present upon initial encounter with notions of presence, agency, performance and affect within a RT3D MUVES context (Floridi 656-667). While all of this excellent work provides intellectual foundations to enable critical investigation of (artists and users encountering art within) a RT3D MUVES, very little work has been aimed specifically at the creation or experience of interactive RT3D audiovisual artwork, especially at what emerges from the artistic creative process when the process aims to exploit or at least identify the intrinsic qualities that constitute its own formal framework — as is the intention with this research project. Other, less specifically technically-oriented philosophical tools are provided by Gilles Deleuze (Spinoza 123) and Manuel DeLanda (5, 202) in order to approach an understanding of the ontological status of all participants in the process and performance of interactive art within RT3D MUVES, in particular the artist and the user, as defined above. Key to this is an investigation into the viability of RT3D MUVES as a legitimate site for art, and to this end, useful reflective tools are also provided by Alain Badiou's On the Subject of Art and 15 Theses on Contemporary Art.

**Aim: Use a formal experimental method of creativity to produce interactive artworks that may indicate or exploit the intrinsic qualities of the RT3D MUVE medium.**

My aim throughout the research project, and this critical exegesis of it, is to identify any potential or actual intrinsic qualities in RT3D MUVEs as a medium or site for the performance of interactive audiovisual art. This is enabled through a formal experimental process of iterative design of live performances (as well as review of the live performances themselves), virtual art objects and interactive prototypes, devised for the purposes of examining these relationships within RT3D MUVEs. These practices, and the resultant art and artifacts should aid an attempt to more precisely define and enact potential or actual intrinsic qualities of virtual environments.

**Methodology: action research**

The action research methodology was adopted in order to understand the creative process within the medium of RT3D MUVEs. This means adopting an iterative process of conceptualising, designing and creating various works and then evaluating them for their ability to exemplify the intrinsic qualities of virtual environments. First promulgated by Kurt Lewin in 1946, Rory O'Brien (2001) outlines a five-step process for implementing action research. First, a problem is identified and diagnosed. Then, possible solutions or approaches are proposed. From these a plan of action is developed and implemented. The consequences of this action are evaluated. Finally, these findings are interpreted in the context of the success of the action. From this the problem is redefined, beginning another iteration of the cycle, which continues until the problem is resolved.

An action research method was suited to this project because the research problem was to identify intrinsic qualities of RT3D MUVEs as a medium for audiovisual art and performance, so this meant proposing and enacting an iterative cycle of:

- 1) identifying possible solutions to mounting live interactive audiovisual art and performance in MUVEs;

- 2) executing works of art within MUVES that might address these challenges;
- 3) evaluating and interpreting the results to redefine the problem;
- 4) proposing and creating another work of audiovisual art based on these results.

## Relevance of research

In the mid- to late-2000s, RT3D MUVES have entered mainstream cultural consciousness, largely thanks to the widespread uptake of Second Life and similar RT3D MUVES<sup>2</sup>. Contemporary media arts, music composition or sound organisation, and digital interface design are all fields of practice beginning to emerge as sites for examining the context, preconditions and consequences of this uptake. Much of this work focuses on the relationship between RT3D MUVES and material space and culture, particularly within the curated notion of *mixed reality* artwork funded and/or mounted by many institutions, including the Australia Council for the Arts with their ongoing annual funding of *mixed reality* art projects using RT3D MUVES<sup>3</sup>. As with the early days of the desktop computer revolution, for example, where real-world metaphors proliferated throughout interface design in a way that sometimes obfuscated the intrinsic nature of digital text and image, so too do we find this in RT3D MUVES, where real-world metaphors are often laboriously constructed for the purposes of bridging user expectations and thereby promoting this new medium. In these early days of uptake of RT3D MUVES, little examination has so far been carried out into the intrinsic qualities of RT3D MUVES as a medium or site for the performance of interactive audiovisual art. Over the duration of this research project, practical investigation by artists in MUVES has increased dramatically, but little formal investigation appears to have been carried out so far. Mainstream and specialist press have given considerable online and offline

---

<sup>2</sup> In July 2008, *Second Life* claimed over 15 million unique avatars, with over 1 million logins in the previous 60 days and between 50 - 60 thousand people logged in at any given time, supporting millions of US dollars in monthly transactions. Source: [http://secondlife.com/whatis/economy\\_stats.php](http://secondlife.com/whatis/economy_stats.php)

<sup>3</sup> See Australia Council's *Inaugural Second Life Artist In Residence Award*, of which I was a co-recipient with Christopher Dodds and Justin Clemens in 2007, and subsequent 2008 round, expanded to include all MUVES, not just *Second Life*.

Significant work is being or has been created in this emerging field by Melinda Rackham, Char Davies, Gazira Babelli, Andrew Burrell, DC Spensley.

coverage to MUVES since Second Life hit the headlines in 2007<sup>4</sup>. This research attempts to contextualise MUVES within contemporary thought and art practice, and to identify distinguishing or useful qualities that allow the creation or execution of art that could not be achieved in any other medium.

### **Significance of research**

This research work is important because it explores the intrinsic qualities of RT3D MUVES and these qualities govern how RT3D MUVES might function as an emerging performance medium or platform. The outcomes of this exploration will help in providing a performance vocabulary and set of potential or actual best practices in virtual environments. In particular, this research seeks to bring together notions from various artistic disciplines to help create practices to explore the medium intrinsically, whilst contributing to an understanding of prior practices. Additionally, some of the outputs of these experiments (documented below) have been recognised by peers as significant examples of contemporary practice, having been short listed for, and exhibited by, the Premier of Queensland's National Art Award in New Media at the Queensland Gallery of Modern Art in 2008.

### **Evaluation tools**

Since the output of the experiments are digital interactive artworks, two modes of evaluation are required: 1) a design-oriented or technically systemic evaluation; 2) an evaluation of the affect cycle achieved between artist, user and environment. For the technical evaluation, standard empirical technical processes of iterative design will be employed, while for affect, the project is guided by Deleuze and Badiou. In Spinoza: Practical Philosophy, Deleuze deals nimbly and, for our needs, usefully, with the initial problem of the ontological status of the virtual environment itself, that is, whether it is even possible to attempt to create affect with art within such an environment:

It should be clear that the plane of immanence, the plane of Nature that

---

<sup>4</sup> See for example Time Magazine, 9<sup>th</sup> August 2007, "Second Life's Real World Problems" by Kristina Dell, <http://www.time.com/time/magazine/article/0,9171,1651500,00.html> Retrieved Dec 18<sup>th</sup> 2008; Forbes magazine, 26<sup>th</sup> July 2007, "Second Life Goes Legit" by Andy Greenberg, [http://www.forbes.com/2007/07/26/second-life-gambling-tech-security-cx\\_ag\\_0726secondlife.html](http://www.forbes.com/2007/07/26/second-life-gambling-tech-security-cx_ag_0726secondlife.html) Retrieved Dec 18<sup>th</sup> 2008; Sydney Morning Herald, May 13<sup>th</sup> 2007, "Virtual Trip: Travel in 'Second Life'", <http://www.smh.com.au/news/Technology/Virtual-Trip-Travel-in-Second-Life/2007/05/12/1178899118087.html> Retrieved Dec 18<sup>th</sup> 2008.

distributes affects, does not make any distinction at all between things that might be called natural and things that might be called artificial. Artifice is fully a part of Nature, since each thing, on the immanent plane of Nature, is defined by the arrangements of motions and affects into which it enters, whether these arrangements are artificial or natural. (Deleuze, Spinoza 124)

In the same chapter, he talks of a “kinetic proposition” where a body is not defined by form or function, rather as a “complex relation between differential velocities” or a “composition of speeds and slownesses on a plane of immanence” (Deleuze, Spinoza 123). This definition or corollary of a body provides an evaluation tool for the affect cycle, and the tool can integrate into Floridi’s model of presence (investigated below).

For the broader question of the evaluation of whether virtual environments can be legitimately thought of as potential sites of art, and their contextual place in the history of art, Deleuze’s Bacon: The Logic of Sensation provides some guidance. Similarly, Alain Badiou’s On the Subject of Art provides a useful model for thinking about the nature of artworks in RT3D MUVES, when read in conjunction with the ideas of subjectivity within virtual environments as explored by Donna Haraway, Katherine Hayles, Anna Munster and Sidney Eve Matrix. In order to attempt a contextualisation of RT3D MUVE-based art within the broader history of art and philosophy, it is also useful to refer to Alain Badiou’s 15 Theses on Contemporary Art, along with a reading of Heidegger’s The Origin of the Work of Art and Benjamin’s The Work of Art in the Age of Mechanical Reproduction in the context of the digital age.

Since we are also dealing with formalism, it is also useful to apply Badiou’s 15 Theses on Contemporary Art, in order to ask Badiou’s incisive question “how can contemporary art avoid being formalist romantic?” (Polemics 134-139). This is especially pressing because computer programming code, where formal logic becomes a binding element, is used extensively in the digital craft of the experiments. Using Haraway’s method for analysing what she calls *technofigurations* (or, as Matrix defines this, order of affect; “material and semiotic objects consisting of complex relations of power and knowledge”

(Matrix 11)), by critically reading the intertextuality of these experiments, I aim to ensure that the evaluation method is fully capable of accommodating the complex network of technical, economic, political and social relationships that comprise these *technofigurations*. In this case, I mean RT3D MUVes and the audiovisual interactive artwork produced specifically for them. It is significant that this phase of Haraway's work was challenging the very kind of sci-fi vision that many enabling technologies of RT3D MUVes are explicitly culturally based upon (Ondrejka 2). As Haraway says, "Irony is about contradictions that do not resolve into larger wholes, even dialectically, about the tension of holding incompatible things together because both or all are necessary and true" (Haraway 82). Finally, in order to attempt an evaluation of conclusions reached, specifically regarding the nature of data as the medium of creation, transmission, display and reception of these artworks, it is useful again to refer, in various degrees of depth, to the writings of Donna Haraway, Katherine Hayles, Anna Munster, Sidney Eve Matrix, Alain Badiou, Martin Heidegger, Gilles Deleuze and Elizabeth Grosz.

### **Scope of research project**

The research project was centred around the practical creation of a series of realtime 3D virtual environments, especially, but not necessarily, multi-user ones. Because, throughout the period of the research, this has been (and still is) an emerging medium, the research utilised two technology platforms as they became available. These are: Virtual Reality Markup Language (VRML) with multi-user capability enabled via a Java-based Client Server Architecture (VNet); and Second Life (SL).

The scope of the project did not include computer games as such, but because of the close relationship between the games industry and the significant development of hardware capabilities in RT3D, especially vision/graphics but also sound/audio, across the life of this research project, it was sometimes necessary to look at certain aspects of particular computer games for the insights they provide into virtual environments: many of the technical capabilities of realtime 3D games reveal the technical limits of

## RT3D MUVEs.

Through this project work, I have specifically attended to the interaction of sound, vision and digital data within the medium, as elements within the overall matrix of relationships and potential vectors that technically and conceptually constitute a RT3D MUVE. I have concentrated on the elements sound and vision, not out of a privileging of these two elements over other phenomena, but for their utility within the acculturation process to the experience of art in RT3D MUVEs. In other words, prior practices of sound and vision are converged within the RT3D MUVE, and therefore offer formal parameters within which the artist or composer can begin to approach the virtual environment. For similar reasons, the project also explores changing notions of liveness and performance that have emerged particular to a digital networked archived environment that spans international time zones.

## Results

The results of these experiments show that, from the point of view of the artist or creative practitioner, RT3D MUVEs are a *post-convergent* medium. This is based on the premise that they exist after the (McLuhanistic) convergence of existing media into a new media (McLuhan 8; Jenkins 17), and therefore are a complex matrix of interdependent relationships between the range of media elements. This matrix of elements (for example, sound, vision, network, time, interactivity, social interaction, but this list can include all prior technologies) where no individual media-element, or user experience, or artist's determination, exists without the other, and all affect each other but not necessarily equally, rather in a dynamically changing ebb and flow based on interaction between the artist, the user and other contingencies that characterise the medium (for example, lag, non-linear time relationships, but again the list can contain all prior technologies). If we accept that this complex system contains all other media as content, it is nonetheless consistent for the practitioner to sometimes focus on one aspect if desired (for example, streaming an audio file, like a song in a juke box, inside a RT3D MUVE), however doing so often serves chiefly as a technical

acculturation device. To work with the intrinsic qualities of the medium, an artist should approach RT3D MUVES as a matrix of multi-sited relationships in order to facilitate the establishment of an interactive affect cycle, and at the very least acknowledge Alain Badiou's criteria for art as expounded in 15 Theses on Contemporary Art<sup>5</sup>. There is therefore the potential for a rich engagement within and between agents in a medium that is best characterised by Deleuze's network of relations between differential velocities that are not distinguished by form or functionality, and also by Munster's differential relations between embodiment and technics in which both artist/composer and user become nodes in this interdependent network. This also works to satisfy Floridi's test of successful observability and backward and forward presence at different Levels of Abstraction (Deleuze, Spinoza, 123; Munster 5; Floridi 656-667).

In the technical sense, RT3D MUVES are post-convergent because they are capable of containing, displaying and reconstituting all forms of prior media, in other words they converge prior media as content (McLuhan 8). In the conceptual sense, these environments are post-convergent because they exist subsequent to the convergence of media that occurred from the late twentieth and early into the twenty-first century, such as Web 2.0 and mobile culture, and are characterised by Jenkins, and others, as convergence (Jenkins 17). This is not to say that this phase of pre- and post-convergence is unique to RT3D MUVES, or even to digital or networked media specifically, rather it is an ongoing cycle throughout the history and development of media (McLuhan 8). In this sense, the notion of post-convergence is simply a reference to artwork that occurs after such convergences and specifically seeks a virtuosic engagement with the new medium itself. McLuhan calls these "accelerations", which calls to mind Deleuze's Spinozan kinetic relationships of differentials, as well as Munster's dematerialised representation and digital embodiment, Hayles' self-reinforcing cultural patterns, Haraway's messy engagement, Matrix' cyberpoetics, and Bolter and Grusin's remediation, all of which can (but are not required to) be usefully applied within Floridi's formal telepresence model of successful observability

---

<sup>5</sup> See also Deleuze, 1988 123; Haraway 82; Hayles 4-5; Munster 19.

and backward and forward presence (McLuhan 8; Deleuze, Spinoza, 123; Munster 19-20; Matrix 11; Haraway 82; Bolter and Grusin 3-15).

## **Conclusion**

I have identified realtime 3D Multi-User Virtual Environments (RT3D MUVES) as a *post-convergent* medium, within the ongoing cycle of convergence and remediation that characterises media history. In other words, having technically and conceptually converged all prior media as content, RT3D MUVES exist technically and culturally subsequent to this convergence and therefore offer to the artist a medium within which to create art that cannot be created in any other prior medium. I have identified a set of potential or actual intrinsic qualities of RT3D MUVES as related to the creation of interactive audiovisual artworks and consequently some potential or actual technical and creative practices to be used in virtual environments as a means for artists to deal directly with the post-convergent potential intrinsic to RT3D MUVES. Chief among these intrinsic qualities is the constant modulation of digital data between states of storage and display, which crucially defines and redefines the relationships within and between the constituent elements of the medium, as well as the relationship between the medium and the external world. As cultural familiarity with the practice and implications of convergence grows into a post-convergent awareness, artists will interact with a growing body of virtuosic users ready to engage with work at many sophisticated and interconnected post-convergent levels, thereby growing our understanding of the potentials and restrictions of this medium.

# Chapter 01: Background



Figure 1: *Virtual Humanoids* by The Men Who Knew Too Much 1998-2002

## Millennial concepts of virtual space and performance art

This research project was initiated in 2003 by an unformed notion that, rather than its utility in portraying or simulating physical space, virtual space may have intrinsic qualities peculiar to itself. It would then follow that such intrinsic qualities may give rise to an artistic, audiovisual practice peculiar to the medium itself, rather than a practice beholden to systems of representation native to prior media. This notion was born of empirical observation of the craft of virtual space when working as a composer and performer on *Virtual Humanoids* (by The Men Who Knew Too Much, 1998 – 2002), a large-scale, live ‘mixed reality’ performance that used RT3D MUVes to augment realworld performance art. This live performance explicitly examined the nature of RT3D MUVes and actively critiqued the dominant fetishisation of virtuality, which at the time was borne out in the pre-millennial immersion fantasies along the lines of popular films, such as *Lawnmower Man* (Dir. Brett Leonard, 1992), *Ghost In The Shell* (Dir. Mamoru Oshii, 1996) and *The Matrix* (Dir. Andy and Larry Wachowski,

1999). It did so by using some (for the time) high tech devices in live absurdist formal performance, but always through a lens of real world or material representation. The ‘alternate’ realities it presented were modeled directly on physical space, using humanoid avatars traversing a space whose scale was constructed in direct relation to these ‘human sized’ avatars. Whilst struggling to construct these virtual environments, it became practically apparent that these environments seemed less like interactive representations of physical space and more like abstract, non-linear, formal space, and as such displayed certain similarities to the compositional or conceptual space of music. Since I was responsible for both the construction of the virtual environments (according to a plan by writer and director Simon Hill), as well as for the composition of the music for the show, I began to examine the possibilities of constructing the virtual environments using a process with more similarities to musical composition (i.e., the manipulation of an abstract, formal system) than to conventional 3D space construction (i.e., a process very similar to the physical notion of building construction and landscaping, with constant reference to physical spatial metaphors, such as ‘rooms’, ‘tunnels’, ‘doors’, ‘inside’, ‘outside’ and so on). Initial sketches and ad-hoc experiments using this musical organising principle proved promising and enjoyable, so I decided to rigorously investigate RT3D MUVE space for its intrinsic qualities rather than its anthropocentric or representational applications. Coming from a background in live, formal, physical performance, I was interested in how these concepts meshed with the medium of realtime 3D, specifically whether this process offered affordances to notions of performance that were unavailable in other media. One such affordance was the potential for non-linear compositional processes. As it was technically simple to place sound samples within the 3D space and animate these in relation to the listener/viewer, and I was able to make extensive use of this as the composer/sound designer for the show. The x,y,z axes of virtual space, unquestioningly understood at that time as nothing more or less than the Cartesian model of rational space, could instead become interrelated axes along which to arbitrarily set up automated controllers and transformations of sound samples. In this way virtual space seemed more akin to a musical experience or musical space than it was to a physical reality or attempts at a

simulation of that reality. This natural technical ability of the MUVE platform to accommodate sound files suggested the need to explore the medium of realtime 3D virtual space even further for other intrinsic qualities that may facilitate the creation of interactive art.

### **Formalist frameworks**

Much of the music composition and sound design I developed with *The Men Who Knew Too Much* emerged from formal frameworks of various structures. This included formal approaches to physical performance based on a contemporary dance philosophy influenced by several formal traditions, most notably that of *Kyogen*, an old Japanese system of formalised movement (Eckersall 171). It also included a formal, absurdist, approach to musical or sonic composition, drawing on the internal relationships of the physical performance to devise a system to determine pitch, rhythm and time. This system owed as much to formal compositional systems from the modernist tradition, including Webern, Berg, Schaeffer, Cage and Eno, as to technical and physical performance expediencies (Prendergrast 31-3, 42-49; Cage 27). Moving away from its relationship with, and metaphor for, ‘real’ or ‘physical’ space, I intended to identify the intrinsic qualities of virtual space in order to develop a system of formal parameters that might be appropriate for developing audiovisual works within this space.

### **Twentieth century formalist frameworks**

Throughout the twentieth century, much work had been done in formal experimentation within the visual realm. Len Lye’s audiovisual experiments in film found echoes and parallels in aspects of time-based audiovisual work by Oskar Fischinger and later Stan Brakhage, who were all aiming for a formal visual composition space (Fischinger, 2006; Brakhage, 2001). Brakhage perhaps can be distinguished from Lye and Fischinger as there is no attempt to relate sound to vision in a linear fashion, whereas the latter two more or less prefigure the rise, in the last quarter of the century, of video editing. Their work is governed more by the tempo and structure of music (especially pop songs), than by a traditional cinematic logic of narrative continuity. Brakhage, Fischinger and Lye can be seen in relation to the visual

experiments and aesthetic philosophy of the modernists Kandinsky and Klee at the Bauhaus, particularly through the investigation in painting and music of notions of simultaneity of the senses. Kandinsky's Point and Line to Plane (1926/1994) stands up to a reading from a real-time 3D perspective, and the influence of Klee's musings on the structure of nature is echoed in Char Davies' Osmose (1995) and Ephémère (1998). Nonetheless, all display a highly formal and abstract (i.e., non-representational) approach to composition. Meanwhile, also at the Bauhaus, experimenter Oscar Schlemmer was enacting formal composition within live performance in the Triadic Ballet (1927), and Laszlo Moholy-Nagy was experimenting with the formal properties of light as a medium, both explicitly with his photograms and implicitly with his photographs, advocating an interrogation of the apparatus to identify or exploit the intrinsic nature of its relationships with light, time and sound (Moholy-Nagy 331-333). None of these addressed virtuality or 3D space in any way other than engaging with the physical senses or, as with Moholy-Nagy, a kind of inverse mixed-reality where light is captured and displayed without a camera, or his inverting of the *reproduction* of the phonograph into *production* of sound via formal inscription on the surface of the recording media itself, as in Brakhage, Fischinger, etc (Moholy-Nagy 331-333). Later crossover or hybrid performances in the contemporary performance art scene also exerted an influence on the formative virtual and *Kyogen* years of the Men Who Knew Too Much as they enacted technologically delimited navigations of a formal space. These performances included Merce Cunningham's bodies in space and chance choreographies that echoed the chance-based formalism of Cage and later Brian Eno (Copeland 6).

### **Hypothesis: RT3D MUVes as formalist frameworks**

Based on this formalised background of art and performance, I developed a hypothesis that RT3D MUVes presented a formal medium for audiovisual experimentation and composition that would potentially result in the production of networked, interactive, audiovisual art that could not be reproduced in any other medium. However, to do this the formal properties of such a system would need to be known. It would obviously be *non-linear*,

since it would inherit non-linearity from the internet, for both the user and the creator. But beyond that, what would be the properties to be dealt with, the parameters to work within? Experimentation was necessary, with clear goals and terms of reference.

### **Selection of action research method**

To understand the creative process within the medium of RT3D MUVES, and to test my hypothesis, I chose an action research methodology. This method consists of a series of iterative design experiments, where a design is formulated and prototyped, then used and evaluated to determine whether it displays any potential aspect or tendency towards the intrinsic qualities of virtual environments. These results are then applied to the formulation of the next design, which is again tested for efficacy and so on. First promulgated by Kurt Lewin in 1946, Rory O'Brien (2001) outlines a five-step process for implementing action research. To begin, a problem is identified and diagnosed. Next, possible solutions or approaches are proposed. From these a plan of action is developed and implemented. The consequences of this action are evaluated. Finally, these findings are interpreted in the context of the success of the action. From these results, the problem is redefined, beginning another iteration of the cycle, which continues until the problem is resolved. This approach has been used successfully as an academic approach to 3D MUVES at RMIT University by Christopher Dodds in his MA exegesis Avatars and the Invisible Omniscience: The Panoptical Model Within Virtual Worlds (2007). In addition, when looked at via the lens of *iterative design*, methodology displays many practical similarities to production work within the game and broader interactive media industry<sup>6</sup>.

Since the research aim of this project was to identify intrinsic qualities of RT3D MUVES as a medium for audiovisual art and performance, this meant the methodology needed to be able to propose and enact an iterative cycle to identify possible difficulties in mounting live performance in MUVES; create works of art within MUVES that might address these challenges; evaluate and interpret the results to redefine the problem and then propose and create

---

<sup>6</sup> Christopher Dodds was my colleague on the BabelSwarm project (Clemens, Dodds, Nash, 2008).

another work of audiovisual art based on these results.

### **Method: iterative design**

To begin, I set about designing works that tried to take their construction cues from the formal framework of the medium itself. The resultant works, and their construction process, were then evaluated for efficacy in terms of whether the works and the process were identifiably intrinsic to the medium itself, and whether they constituted a new kind of artistic practice and experience. Results were then folded into the design of the subsequent work, and so following the methodology outlined above, the cycle began again. From this process emerged a series of discrete experimental works, each drawing on the experience and interpretation of the outcomes of the previous. The method was informed strongly by the contemporaneous artworks being carried out in networked real-time 3D, along with contemporary theories of virtuality, performance and digital culture.

### **Evaluation of experiments**

Since the outputs of the experiments are digital interactive artworks, the results need to be analysed not only as the product of digital craft, but also as an element in an interdependent affect cycle. In addition, they need to be assessed for their viability as art. For evaluation of the digital craft itself, the contemporary iterative design cycle is employed for its empirical and phenomenological testing and adjustment cycle, along with an analysis of the work against close readings of Hayles and Munster. In the evaluation of the affect cycle, the project is guided by Deleuze, with support from DeLanda and insights from Elizabeth Grosz that draw on Darwin. Deleuze talks of a “composition of speeds and slownesses on a plane of immanence” (Deleuze, “Spinoza”, 123), which provides an evaluation tool for the affect cycle; a tool that can integrate easily into Floridi’s model of presence to allow standardised evaluation of the different experiments. To evaluate the experiment’s viability as art, along with the thinkers already mentioned, Badiou’s 15 Theses on Contemporary Art is brought to bear as a formal system with which to gauge a work. As we are dealing with formalism, once again it is especially relevant here to ask Badiou’s incisive question “how can

contemporary art avoid being formalist romantic?” In many ways, each of Badiou’s theses constitute ever more difficult layers of criteria against which to measure art, and the artist is exhausted by the time number 15 yields its bleakly admonishing logical razor: “It is better to do nothing than to contribute to the invention of formal ways of rendering visible that which Empire already recognises as existent.” Badiou’s theses are themselves of course interdependent, and are at once descriptive, prescriptive and invective, almost daring the artist to use them as a gauge, at the same time as being so rigorously defined and systematically structured as to offer a genuinely useful critical tool for systematically and thoroughly evaluating the viability of creative output as art.

### **Context: Early theories of virtuality**

Far from being left behind when we enter cyberspace, our bodies are no less actively involved in the construction of virtuality than in the construction of real life. (Hayles, Immersed 1)

Since real-time 3D emerged in the mid to late 1990s as a viable medium for manipulation by artists on personal computers, much work produced in this medium has equated 3D space with “real” physical space, and has thus spawned academic debates regarding the relationship between the two. In the 1990s, academics such as Katherine Hayles, Michael Heim and Donna Haraway were interested in the implications of the transposition of corporeal existence into the virtual register, and they largely focused on the technology of Virtual Reality to examine these concerns. Virtual Reality was, at that time, restricted to a certain kind of technologically-delimited experience focused on creating a wholly “immersive” sensation for the user. Some of the most discussed works of this time were created by artists with access to the expensive technology required to create such a “virtual reality”. These included Char Davies’ Osmose (1995) and Ephémère (1998), which, according to Anna Munster’s analysis of the works, represented Davies’ attempts to resituate the human body within technology in a phenomenological, or anti-instrumentalist, exercise through enacting the Heideggarian notion of *techne*, the relationship between technology and craft.

This attempt is echoed by Heim's ontological claims that Virtual Reality renews the user's sense of "being in the world" (Munster 111). Munster, and to a certain extent Hayles, see this as an inadequate problematisation of the body and technology in opposition to each other, insisting on more complex and subtle mutating relationships that exist outside simple dichotomies such as body/technology, real/virtual. Munster uses Guattari's notion of actualisations of machines of virtuality. As Munster (112) points out, real-time 3D virtual spaces are visually no more than a sleight of hand, an illusion of immersion similar to that of perspective drawing on a flat piece of paper. Conceptually, however, virtuality itself is, according to Hayles, a "cultural perception that material objects are interpenetrated by information patterns". She sees this perception as an historical construct emerging after World War II, championed by Norbert Wiener's notions of Cybernetics, and one that requires powerful technological artifacts to realise. This perception drives the production of virtual technologies, which in turn reinforces this perception. (Hayles, Posthuman 14).

### **De/Re-territorialisation of the user with the avatar as a result of the multi-sited relationship between materiality and virtuality**

This nuanced view of the multi-sited relationship between materiality and virtuality beyond the simple visual display of realtime 3D echoes Deleuze and Guattari's notion of deterritorialisation and reterritorialisation (Deleuze and Guattari 10). The concept is useful when approaching the *avatar*; the device used to facilitate navigation of virtual space in most commercial examples of real-time 3D, including games and 'sandbox worlds' such as Second Life<sup>7</sup>. The avatar is the digital person visually representing the user, yet represents the paradox of 'virtual embodiment', as it is itself an 'embodiment' of the cultural perception described by Hayles, as well as an example of Munster's *digital embodiment* (Munster 20). With the avatar, the user is presented with several complex de- and re-territorialisation exercises, where the user is supposedly both 'here' and 'there', both 'in' material space and 'in' virtual

---

<sup>7</sup> Not all realtime 3D environments enforce this anthropocentric mediation of virtual space through the rendering of a 'virtual human' as the navigation device. Some environments, like games such as SimCity, offer a 'sandbox' approach to a human-scaled world that is navigated via a 'camera'. However, while the reterritorialisation and deterritorialisation processes here are different, with different imbalances, they still serve to tip the balance in favour of anthropocentric material space, which reterritorialises virtual space into a visual representative role.

space. According to Deleuze and Guattari, movements of deterritorialisation and processes of reterritorialisation are relative, connected and “caught up in one another” (Deleuze and Guattari 10). Therefore the user of real-time 3D is simultaneously deterritorialised by the experience of operating an avatar and reterritorialising the virtual space. However, as Sutton and Martin-Jones point out, these relationships often comprise a power imbalance, where one party will be more re- or de-territorialised than the other (6). In this example of the user/avatar/virtual space relationship, we can see the feedback cycle of Hayles’ cultural perception of virtuality coming to exercise an imbalanced influence over the user’s experience of virtual space. The fulcrum of the entire experience is the visual display - itself based on the sleight of hand of perspective chosen to represent material space - therefore virtual space exists to represent material space, specifically, anthropocentric material space, *i.e.*, material space as perceived in relation to the human body (Hayles, Posthuman 14; Munster 20). The introduction of the humanoid avatar, then, potentially restricts the extents of the experience of virtuality to the visual display.

### **Dematerialised representation, digital embodiment, connection and differentiation, prior space, Badiou’s ‘third subject’**

However, as is often the case with digital networked media, it’s more complicated than that. The introduction of the humanoid avatar also deepens and multiplies the potential sites of material/virtual relationships. As Munster argues, the “embodied self is forced into close proximity with itself as a *dematerialised representation* via the cursor” and other established computer interface devices (Munster 19). In order to access a RT3D MUVE, one must access a computer, and the MUVE remains wholly contained within the (usually 2D) interface of the computer itself. Further, most real-time 3D environments contain a full set of standard mouse and keyboard driven interface elements that exist externally to the 3D environment itself but are necessary for the interaction with the environment. These interface elements include not only devices for adjusting the appearance and behaviour of the environment and the user’s avatar itself, but also the device for “driving” the avatar within the 3D environment, usually through a combination of

keystrokes and mouse clicks. The cursor representing the mouse is always negotiating a 2D plane in order to initiate actions within a virtual 3D space; a space that is always graphically rendered within our perspectival sleight of hand. This simultaneous, layered process is an excellent example of Munster's digital embodiment, a site of alterity where "material and incorporeal forces will continue to engender further connection and differentiation"(Munster 20). I would argue, however, that the introduction of the humanoid avatar into a realtime 3D environment represents an attempt to restrain or simplify digital embodiment, by presenting the simplified equation of "virtual space = representation of material space", in order to acculturate the user to the experience of virtual space via a representational precedent. In some ways, this representational device continues to enact Munster's digital embodiment at the same time as specifically working against it by attempting to re-concretise in faux-material terms the abstracted relationship established by the mouse cursor on the 2D plane. At the same time, the 2D mouse cursor often co-presents with the humanoid 3D representation, thereby introducing a potentially confused, and confusing, reading of this notion of digital embodiment through a too-literal interpretation of both the concepts *digital* and *embodiment*. This confusion can be addressed in terms of Alain Badiou's call for a third notion of subject in his 2005 essay The Subject of Art:

The third possibility that I propose is something like immanent difference, not immanent identity, not transcendent difference, but immanent difference. In that case, the subject is not reducible to its body, so there is something like an independent subjective process. There really is a creation, which is not reducible to the experimentation of the limits of the body. But it's impossible that (sic) exists some separation between the subject and its body. So there is neither separation nor reducibility. And that is the situation of the subject when we can understand it as a process of creation, a process of production, a process, which really organises the relation between the trace of an event and the construction of a new body in the world. (Badiou, On the Subject of Art paragraph 11)

This concept of the subject as a process of creation, neither entirely reducible to the body nor entirely transcendent of it, works well with Munster's concept

of digital embodiment. It is a useful method for thinking about the inter-relationship between virtual environments, the creators of art within them and those who participate in (or, “use”) the artworks. It goes a long way toward conceptualising these relationships in a medium that, because of its novelty, can often fall victim to an over- or under-thinking of its implications for, and position in, the history of art, technology and culture. We will deal more with the implications of Badiou’s third kind of subject when discussing the evaluation of RT3D MUVes as a site for art, and the status of artworks created in this medium.

### **Floridi’s formal model of telepresence**

Floridi (656-667) has a useful formal model of telepresence which might help to understand the interactions of artist and user offered by such an environment, with his notions of *successful observability* and *backward and forward presence* applicable not only in contextualising RT3D MUVes as a performance or art medium, but also for a more formal modeling of Munster’s *digital embodiment*, and the questions of presence and agency raised for both artist and user, particularly around notions of live performance. Floridi defines three possible ways of being present/absent at a given Level of Abstraction in the space of observation, i.e., the virtual environment:

- (1). As a source of action/interaction or change;
- (2). As a property-bearer;
- (3). As both (1) and (2).

### **Deleuze’s heterogenous assemblages and Floridi’s model**

Floridi’s *successful observability* does not distinguish between human and non-human presence, and of course it may not be restricted to *telepresence* alone. Because of this, it can help us understand the nested subjects presented by RT3D MUVes particularly, but not only, when a humanoid avatar is used as a primary navigation device. Each nested level of experience is understandable as a Level of Abstraction, thereby incorporating the entire experience without losing the details of the local phenomena, or what Deleuze might call “heterogenous assemblages in which the components’

differences are not cancelled through homogenization” (DeLanda 205; Floridi 656-667).

### **McLuhan and convergence**

In all of this, we can see McLuhan’s assertion that “the content of any medium is always another medium”, with Hayles’ iterative cycle of formation and production serving to acculturate users to virtual space via familiar tropes of material space (McLuhan 8). This notion of media becoming content is crucial to the understanding of *convergence*, because media *converge* into content; new media *converge* prior media into content, assembling an array of previously established rules and signs from disparate sources, to eventually evolve their own rigorous native language. This implies stages of *pre-* and *post-*convergence as natural consequences of this technosocial process, so we can see how not only is McLuhan’s understanding of media still usefully applicable to the analysis of digital networked media, but also that the notion of *post-convergence* is not restricted to RT3D MUVes, rather it is, has been, and will conceivably continue to be, applicable to all new media as they emerge to converge prior forms. In this sense, I do not use the term *post-convergent* to designate an historical moment or even perhaps a cultural/philosophical shift or innovation as such. Rather, I use it as a term to describe a phase in the life cycle of a medium that occurs at the very moment it is recognised as a medium at all, however long it has operated as such up to that point. Of course, *post-convergent* means, literally, *after convergence*. It is the period in the development of any given medium when, having converged all prior media within itself, ceases to be used solely to recreate those prior media and starts to be used for creating work that is only possible in the new medium.

### **Remediation and the new**

Bolter and Grusin extend McLuhan’s assertion in their theory of *remediation*, holding that digital media exists in a dialectic relationship to previous media; remediating content originally designed for other platforms such as film, TV and radio. Similar to Hayles’ notion of the cultural perception of virtuality, Bolter and Grusin (15) maintain that digital forms both borrow from and seek

to surpass earlier forms. Implicit in this assertion is a rejection of any concept of the “completely new” in relation to digital media. But Sidney Eve Matrix identifies theorists such as Steven Holtzman who champion a search for a new expression in digital worlds, transcending the remediation stage, which is seen as transitional. Matrix recognises that digital media is naturally capable of housing both “old” and “new” approaches; of simultaneously reinforcing precedent and undoing it (Matrix 20). Matrix draws heavily on Haraway to propose that the act of analysing digital media should itself display some of these paradoxical qualities, in order to “critically redescribe the patterns and codings of these complex correspondences, unstable synergies, and paradoxical convergences between technoscience, digital capitalism, cyberpop media, and the subjects who inhabit these ‘technoworlds’” (Matrix 20).

### **Sydney Eve Matrix’ *cyberpoetics* as a *post-convergent* analytical tool**

Proposing a kind of digital analytic poetics called *cyberpoetics*, Matrix identifies what I would term a *post-convergent* ideal that reflects the “conceptual architecture of digital culture as a discursive formation” and acknowledges the subject in this formation, emphasizing interactivity and active, critical, creative users” (Matrix 21). This cyberpoetic approach fits well with the ideas of Hayles, Munster and Haraway, all of whom call to some degree for a messier, mutating, reconfigurable approach to digital media and/or virtuality that rejects simplistic binary configurations such as real/virtual and old/new. This approach is post-convergent because it comes after convergence, after a realisation of the blending of all previous media into a new platform that is constantly reconfiguring itself in response to the dynamic relationships emerging within, through and without it. To expand on a description of these relationships, I would draw attention to what I think are the two aspects, or manifestations, of this post-convergent quality: technical and conceptual.

### **Technical manifestation of post-convergence**

Technically, RT3D MUVES can be seen as one manifestation of these post-convergent notions, since it is literally/technically capable of containing all

other technical media that preceded, and therefore partially constitute, it. This includes not only the already-mentioned visual sleight of hand of linear perspective drawing and other 2D imaging, but also audio, photography, video, TV, radio, cinema, the internet, databases, social networking, email, instant messaging and other virtual presence platforms, and so on. I am referring here purely to the technical capabilities of any given RT3D MUVE, which is quite literally capable of wholly containing any of these media as constituent elements. Crucially, the RT3D MUVE will, by necessity, always bring a range of other elements into dynamic play in order to display (where the term *display* need not mean only *visual* display) any given element. For example, to display a video within a real-time 3D environment, the video file must first be situated explicitly within the virtual 3D space. To illustrate the fundamentally post-convergent nature of this environment, let's place the video file on the front plane of a 3D box that we have "textured" with a 2D image to resemble a realworld television set. We'll need to use the built-in scripting language of the 3D environment to script some buttons, perhaps on/off, volume and channel changer to control playback of the video on the face of the box. Even better, rather than a static video file, let us stream in live video from the web onto the texture map. A user can then use an avatar to operate the virtual TV and watch the video from within the 3D environment. This example process relies on several technical convergences working in an interdependent relationship, each element as important as another: network (to access the environment, since it is online), database (to store references to the video file, the 3D box, the scripts etc.), video, audio, 2D imaging overlays, an over-arching language to assemble and 'parse' this whole scene, so that it can be sent through the computer's graphics hardware to the screen, and so on. Each of these elements is of course itself a complex assemblage containing previous media (a time-based series of 2D images, etc.), but when brought into dynamic interplay within the system of the 3D environment, a post-convergent site is created that is so complex it is impossible to map with any static standardisation.

### **Conceptual manifestation of post-convergence**

Conceptually, RT3D MUVEs can be seen as a manifestation of post-

convergent notions, since the user and/or creator approaches the technical ability of 3D MUVES to contain all previous media, with a conceptual understanding of the social and cultural implications of that. Consider the user “watching” the video on the 3D TV set we constructed in the above example. The experience is simultaneously familiar and somehow new because all of the standard (but still sophisticated) convergences offered by television in the pre-digital world are negotiated, but they are “reconverged” in a dynamic situation that brings into play all of the concepts of digital embodiment along with the technical considerations required to present the scene in 3D space. Again, this enormously complex situation is not mappable via any static standard. Munster echoes the calls for a messier, dynamic method of analysis, proposing a Deleuzian set of *vectors* that head away from technical and cultural standardisation. Such dynamic methods of analysis as Munster’s vectors and Matrix’s cyberpoetics are themselves post-convergent since they acknowledge as crucial the interdependent nature of the constantly shifting, dense network that comprises digital media and virtuality.

### **Post-convergent approach to art: what can be done in this medium that cannot be done in any other?**

Given the post-convergent nature of RT3D MUVES, and given the speed with which digital media seemingly changes or innovates, it is perhaps not surprising that many real-time 3D environments establish the visual representation of material space as the primary metaphor via which to access the environment, in order to quickly establish a sense of familiarity in the users. We know that the post-convergent medium is capable of displaying any previous media within itself, so it is not difficult to plan precedent-based experiences (e.g., ‘broadcast’ radio, host chat channels, ‘screen’ films, play shoot-‘em-ups or Roulette, send email) that will acculturate the user to the space as quickly as possible. What is of interest to the artist in a post-convergent environment is what can be done in this environment that *cannot* be done in any previous media (Matrix 22). This is the question that the artworks constructed for this research attempt to answer.

# Chapter 02: Design of Work

## Pre-convergent practice in RT3D MUVES

Before examining the practical experiments in which I attempted to create some audiovisual works that were unique or intrinsic to the medium of RT3D MUVES, let's look at the international state of creative output in RT3D MUVES before, and during, the time of this research project. First, an example of a transplant of previous media into the RT3D MUVE arena: the famous Suzanne Vega live performance in Second Life (Chin, 2007, and see for concise history of other such performances).

Touted as a *live* performance in Second Life, the artist Suzanne Vega, a singer/songwriter and guitar player, was in fact playing live in a sound studio in real life (Vega, official website, 2008). In Second Life, an avatar *physically* resembling Suzanne Vega was animated on a loop playing a guitar, her hand moving up and down over the guitar, with her mouth opening and closing. The sound of her live performance was being streamed into a *virtual venue* in Second Life, modeled to look like a small music venue in real life. Forty or so avatars gathered in this space to *watch* Suzanne Vega's avatar animate to a live mp3 stream. This is a good illustration of a pre-convergent use of the medium, simultaneously illustrating the technical capability of the 3D MUVE to contain previous media (audio, mp3, internet, etc) and recombine them. It also serves as an excellent example of the essential lack that emerges in pre-convergent use of post-convergent media; a feeling that the parts amount to *less* than the whole. In part this is a fundamental dissatisfaction on the part of the viewer/listener who is denied both the opportunity to engage with the post-convergent medium and the opportunity to engage as usual with a pre-convergent form of media, in this example both the mp3 and Vega's live performance. In other words, it would be a more satisfying performance to only hear the audio, since that is the only part that could seriously be considered as part of a performance by the artist Suzanne Vega because the actual real world performance has happened within a realworld

live radio situation. To quote The Mighty Boosh, it is “elements of the past and the future combining together to make something not quite as good as either” (The Mighty Boosh, BBC3, Series 3, Episode 1, 2007).

### **New forms of pre-convergence within a post-convergent medium**

On the other hand, highlighting this lack actually serves to reveal the post-convergent expression of the RT3D MUVE medium as a collaborative work by practitioners of different technical (largely digital, networked) fields. This collaboration is constructed across non-linear time and space, displaying all of the complex post-convergent vectors of potential and interdependent matrices of relationship that define the interactive structure of post-Web 2.0 digital networked architecture. Does this mean that any work executed within a RT3D MUVE automatically becomes a post-convergent work? Not at all, indeed the very fact that the new medium contains all previous media converged within it, ensures that it is perfectly viable to construct a work that ostensibly displays no post-convergent qualities other than those inherited by default. This of course implies the emergence of different vectors of potential around the wrapping of pre-convergent practice within a post-convergent media. As an example, the YouTube video of the virtual artist Robbie Dingo (real life sound artist and lecturer Rob Wright) constructing Vega’s virtual guitar in Second Life became popular. This illustrates one of Bolter and Grusin’s requirements of remediation, that of the fascination with the medium itself, or *hypermediacy* (Bolter and Grusin 31-44), but that it is subsumed as one potential vector of the post-convergent conversation, since it inherits all of the hypermedia tendencies of Web 2.0 as represented by YouTube in 2006/7.

### **Hypermediacy, immediacy and post-convergence**

Many more examples of pre-convergent usage of the medium emerged in Second Life in 2007, in both the visual art and music fields. These are of a technically and quite literally of a McLuhanistic precedent-based container nature, which Bolter and Grusin attempt to explain as one of the two paradoxical requirements of remediation. The first requirements is that of *immediacy* or a supposed immersion where the mechanical means of delivery

are ignored in favour of an experience. The other requirement, *hypermediacy*, is a conscious awareness on the participants' part of the mediated nature of the experience. Floridi's model of *successful observability* and *backward* and *forward presence* is very useful in helping understand these notions of hypermediacy and immediacy, as it is based on a refutation and replacement of the standard model of telepresence (measured by *epistemic failure*), meaning the model has close parallels with Bolter and Grusin's immediacy (Floridi 656-667; Bolter and Grusin 21-31). Photographs of realworld paintings *texture mapped* onto representations of a frame and hung in virtual galleries that (attempt to) recreate material 3D space, *live* acoustic musicians and *live* DJ sets have emerged as probably the dominant forms of pre-convergent art practice in Second Life. These examples assume a virtual representation of material space, and represent a pre-convergent attempt to privilege the experience of immediacy, thereby promoting, I would argue, the telepresence model of *epistemic failure* by not attempting to engage with the post-convergent nature of both the environment and the user's experience.

Given this, how do artists set about designing works that propose, enact, display or exploit post-convergent qualities?

### **Char Davies**

I have referred to the work of Char Davies previously, and the high tech equipment required to access her work has meant only personal visitors to the work could experience it, i.e., at a gallery. At the outset of this research I had only seen pictures and read descriptions of her work which nonetheless spoke of a playful, abstract environment with curious tendencies that questioned concepts of navigation and being<sup>8</sup>. Both Osmose (1995) and Ephémère (1998) are highly formal works that attempt to use a spatial structure to refer to Gaston Bachelard's Poetics of Space, and possibly highlight the role of the subject via an explicit "self as consciousness" approach to *enveloping space* that privileges the concept of *self-movement through space* and attempts to highlight body awareness through the merging of tactility and proprioception (Davies, website; Hansen 110-111).

---

<sup>8</sup> I was able to experience it much later at Australian Centre of the Moving Image (ACMI) in Melbourne.

### **Tamiko Thiel**

Later, Virtual Reality Mark-up Language (VRML) began to gain some acceptance and be used more widely. Constructed using VRML, and taking its title from a WWII Californian concentration camp, American Tamiko Thiel's beautiful and affecting Beyond Manzanar (2000) was a landmark in virtual art. This work was a mixture of physical realism and abstraction, playing with the medium both technically and conceptually by highlighting notions of escape in the twentieth century. I experienced it first hand, via a cut down version for the web in 2001, then later as an installation version incorporating a joystick and projection. This second experience gave a more detailed version of the sometimes dreamlike, sometimes punishing, 3D environment of the Californian concentration camp, the haunting affect of the experience resonated regardless of the physical interface.

### **Melinda Rackham**

Australian Melinda Rackham's Empyrean (2000) was an interesting and challenging VRML work in non-representational multi-user, experiential art-based worlds that drew on earlier Australian cyberfeminist performative traditions to create astonishingly beautiful visuals that playfully and compellingly engaged the user in an examination of identity and meaning. This was another defining moment in post-convergent virtual art. Empyrean used VNet, an Open Source combination of VRML and Java to create a RT3D MUVE. This was the same technology I had used for Virtual Humanoids and for the first half of the experiments covered by this study. In the introduction to her doctoral dissertation, Rackham explains that Empyrean was an attempt to encourage us to take "a contemplative view of the space of the internet itself as a living organism, one capable of growth, thought and agency" (3). Rackham played with the human proprioceptive experience that was so respectfully, almost reverentially, treated by Davies. With Empyrean, Rackham (7) asked us to interact with a messy space, at once playful and serious, where the question of representation via avatar is

simultaneously circumvented and interrogated by offering choices of “electro-cellular avatars [...] based on biological and immunological creatures like macrophages, mucous colonies or viral simulations. To counter the domination of text in virtual spaces and extend their personalities and uniqueness, these avatars communicate via visual gesture and sound” and the user is encouraged to navigate in “circular, floating motions” (Rackham ii)<sup>9</sup>.

### **Steve Guynup**

Meanwhile, American Steve Guynup had been using a similar VNet setup to do interesting work in visualising poetry as well as educational environments in his Avatar as Content Delivery Platform (1998) and Avatar As Poetry (1999). Guynup’s work played with the notions of embodiment, camera and the avatar, displaying a virtuosic hyper awareness at the same time as generating an immediacy to create didactic spaces for classrooms or more freeform spaces for *visualizing poetry*. Steve would later contribute to Stress Test, as part of this research.

### **Digital embodiment updated to RT3D**

Each of these works cited above display Munster’s digital embodiment via the 2D interface and cursor, but have taken that digital embodiment into the RT3D space, incorporating it as one more layer in the post-convergent experience. Because each of Rackham’s and Guynup’s works were realised through the technology of VNet, as mentioned, they both displayed a certain formal similarity in terms of navigating, or perhaps negotiating, 3D space via formal expediency, for example, to line up certain candidates for avatar choice by use, or to store each digital file used inline in the containing VRML file. This was the environment in which I launched my first experiment, called Memory Plains Returning.

### **Comparing RT3D MUVES with music and sound practice, in terms of abstract, formal composition systems**

At this stage, I was considering RT3D MUVES as an abstract, formal system.

---

<sup>9</sup> I was fortunate to later, in 2005, share a two-artist exhibition called *EtherWorlds* with Dr. Rackham at the Experimental Art Foundation in Adelaide, Australia, curated by Melentie Pandilovski.

Consider again the definition of *post-convergent media* as an interdependent matrix of media-elements (sound, vision, sociality, network, time, etc.). No single media element takes precedent; rather they all exist equally in an interdependent relationship, without which none would be able to exist. It is a formal expression of an abstract system. Music or, after Schaffer, sound is also a formal expression of an abstract system and therefore potentially offers creative experience in exploring a formal abstract system for its intrinsic qualities. In this sense, Schaffer's *objets sonore*, modular and ready to be applied stripped of context, are not a call away from music, even though Schaffer himself claimed them as a means of moving away from the abstraction of music towards a concrete sonic experience. Rather these *objets sonore* can be seen in terms of McLuhan's model of media engagement, i.e., not only are they able to contain music broadly as one of their elements, but also all previous practice within these prior media, and therefore conventions of practice in music and sound, can all converge within it. In this way, we can see Schaffer's *objets sonore* as media-elements in the post-convergent matrix of relationships that is *Musique concrete* when seen as a convergence of all prior music practice and knowledge, just as logically as we can see *Musique concrete* itself as a media-element within the post-convergent assemblage that is the medium of RT3D MUVes (Toop 67; Prendergrast 42). Dealing with the consequences of Schaffer's ideas, along with the ongoing cycle of technological development, music practice (popular and serious) in the second half of the twentieth century developed enormous variety and durability of production within a formal framework, and proved inexhaustibly nimble at sonically remediating its own history.

### **Rickert and Salvo's *distributed Gesamtkunstwerk* as alternative model of convergence in music**

Examples of the advent of technologies providing a new formal framework for composition and performance not only abound in the history of music, but often define music itself, especially in the twentieth century. Each example gives way to the next technological advent, which initially displays a McLuhanist rear-view mirrorism before moving into an exploitation of the new technology's intrinsic qualities, which again provide a new formal

framework. Rickert and Salvo acknowledge this when they argue that musicians have “been at the forefront of the multimedia revolution.” Rickert and Salvo concentrate specifically on their concept of *worlding* in their paper The distributed Gesamtkunstwerk: Sound, worlding, and new media culture as practiced by rock groups of the era such as Yes. According to Rickert and Salvo, not only did the lavish cover art contribute to a virtual fantasy world, but the entire approach and underlying narrative attempted to create a *Gesamtkunstwerk* à la Wagner.

### **Technologically determined formalism**

Before the advent of recorded music, live performances (for example in the classical period) went for hours, and although each performance was transient and unique to the time and space of the event, it was also mechanically or technically defined by the delivery medium; in this case acoustic instruments. With the advent of recorded music in the twentieth century, musicians would often play in order to accommodate the technical limitations of the recorded medium. In this way, a kind of enforced formalism has always distinguished musical effort (Toop 2). Artists and the technology they use create very specific artforms, and the technology or medium always display McLuhan’s maxim that it will be able to contain all previous media. Given the highly technologically-mediated nature of RT3D MUVES, a composer can learn a lot about approaches to the medium by looking at approaches to technically determined formal structures from the history of music and sound design.

### **Deleuze and Guattari’s *Body Without Organs* in relation to RT3D MUVES and music**

With the concept of the *body without organs*, Deleuze and Guattari maintain that music strips bodies of their inertia, of the materiality of their presence: it disembodies bodies. At least one other virtual artist has looked at the parallel between this concept of Deleuze and Guattari’s and the avatar as a kind of literal/technical product of it; Greg Little with Building the Body Without Organs (1997). This work potentially trivialises both the notion of the body without organs, and the potential of the avatar, restricting it to a kind of

fetishised memorial to the outdated body in the kind of immersion fantasy discussed earlier via Lawnmower Man and The Matrix. At the same time, though, Deleuze says that “when music sets up its sonorous system and its polyvalent organ, the ear, it addresses itself to something very different than the material reality of bodies. It gives a disembodied and dematerialised body to the most spiritual of entities” (Deleuze, Bacon, 39). This is an important clue in relation to the effect the works are able to achieve on the part of both the artist and the interactor, because music is well established as a non-visual abstract formal system that is generally capable of affecting listeners. It is important for the artist to ensure an approach that doesn’t privilege any particular media-element of the medium, since there is a danger that RT3D is approached primarily or fundamentally as a visual medium, and in this way Deleuze and Guattari potentially offer guidance when they talk of making a “*body without organs* upon which intensities pass, self and other – not in the name of a higher level or generality or a broader extension, but by virtue of singularities that can no longer be said to be personal, and intensities that can no longer be said to be extensive” (173).

### **Grosz’ music as *excess over survival, affect and the erotic***

Music can potentially provide more than a set of useful techniques for operating creatively within an abstract formal system. Elizabeth Grosz talks about music as an “excess over survival” (Grosz 29). Grosz speaks in terms of the erotic, but in RT3D this need not imply a simulation of an erotic engagement, although perhaps it can be seen as a model, an iterative model, of an erotic engagement, which needn't imply either a diminished form of eroticism or sensuality. Rather, it is related to the affect created in those participating. To my own mind, this implies the first of Badiou’s Theses on Contemporary Art: “Art is not the sublime descent of the infinite into the finite abjection of the body and sexuality. It is the production of an infinite subjective series through the finite means of a material subtraction” (Thesis 1). This is true for the user or interactor just as it is for the artist/composer/creator because the art cannot be said to exist until the artwork is being used. Given its proposed post-convergent nature, the RT3D MUVE may be suited to a generation accustomed to remotely reconfigurable

modules of content. Jenkins describes a mechanical convergence around the beginning of the 2000s, one linked to the commercial imperative and related at points to both the post-McLuhanistic Web 2.0 movement and Munster's digital embodiment. When Jenkins describes convergence as "both a top-down corporate-driven process and a bottom-up consumer-driven process", where the consumers play as important a role as the producers in the production and distribution of media, he is observing the same kind of layered, often ostensibly contradictory, media-sophistication of users in the first decade of the twenty-first century that Sidney Eve Matrix considers so crucial in the analysis and understanding of digital networked culture (Jenkins 18; Munster 20; Matrix 21-23).



Figure 2: *Memory Plains Returning: Memory Boxes* by Adam Nash

### **Memory Plains Returning**

In 2003, as my first attempt at a major work of RT3D since Virtual Humanoids the previous year, I deliberately avoided anthropocentric considerations, whether in attempting to create a humanoid avatar or

character within the environment, presenting cues within the work to reinforce anthropocentric scale, or any explicit causal relationship with the material world external to the built-in digital media interface devices such as mouse, keyboard and visual display. This made construction on the work - Memory Plains Returning – very fast. It meant I could concentrate equally on audio and visual space, creating small self-contained RT3D VRML *worlds* (the conventional name for individual instances of virtual environments). Each of these worlds was linked together spatially and therefore, because of the spatial navigation model of RT3D in this instance, temporally. Like movements in a piece of music or songs on an album, they were separate but linked together in an interdependent set of relationships determined formally. They were united by an underlying theme of memory, specifically the loss of memory accompanying immigration, though this was reflected more in the titles than by any didactic audiovisual sense; an invitation rather than prescription. These self-contained worlds existed together in a series showing difference and continuity, or *difference and repetition*, Deleuze’s term which DeLanda, who explains it in scientific terms of phase transitions and intensive/extensive qualities, explicitly relates to Deleuze and Guattari’s concept of the *actualization of the virtual in space* (DeLanda 70-74). It is potentially similar to Munster’s reading of Guattari’s actualisations of machines of virtuality, if understood as a kind of vector or site of actualization or process of a certain virtuality or tendency (Munster 113). Either way, since they are defining potential formal systems, it is feasible to apply these readings to (construction of, and interaction with) sound and vision, both as technical processes. Munster’s sleight of hand – perspective – as the formal system with which we visualise 3D space, Deleuze and Guattari call “only a historical manner of occupying diagonals or transversals”, a reterritorialisation of those lines of flight (Deleuze and Guattari 329). After freeing Kandinsky’s point and line from a dialectic relationship with each other in a McLuhanistic container, Deleuze and Guattari don’t take Kandinsky’s visionary (pun intended) step of the *plane* which necessarily implies 3D space (at least as represented by/on 2D planes and offers a whole new ‘plane’ of potential); rather, Deleuze and Guattari call perspective the end of a “multiplicity of shapes and the dynamism of lines”, suggesting that

music may offer an example of how to “engage in a becoming” for painting (Deleuze and Guattari 329). Since RT3D space makes no formal distinction between sound and vision, it is similar to the “increasingly rich and consistent material” of Deleuze and Guattari, its increasing richness “the same as what holds heterogenies together without their ceasing to be heterogeneous” (Deleuze and Guattari 329). The music and sounds of Memory Plains Returning were composed and designed with this Deleuzian process in mind.

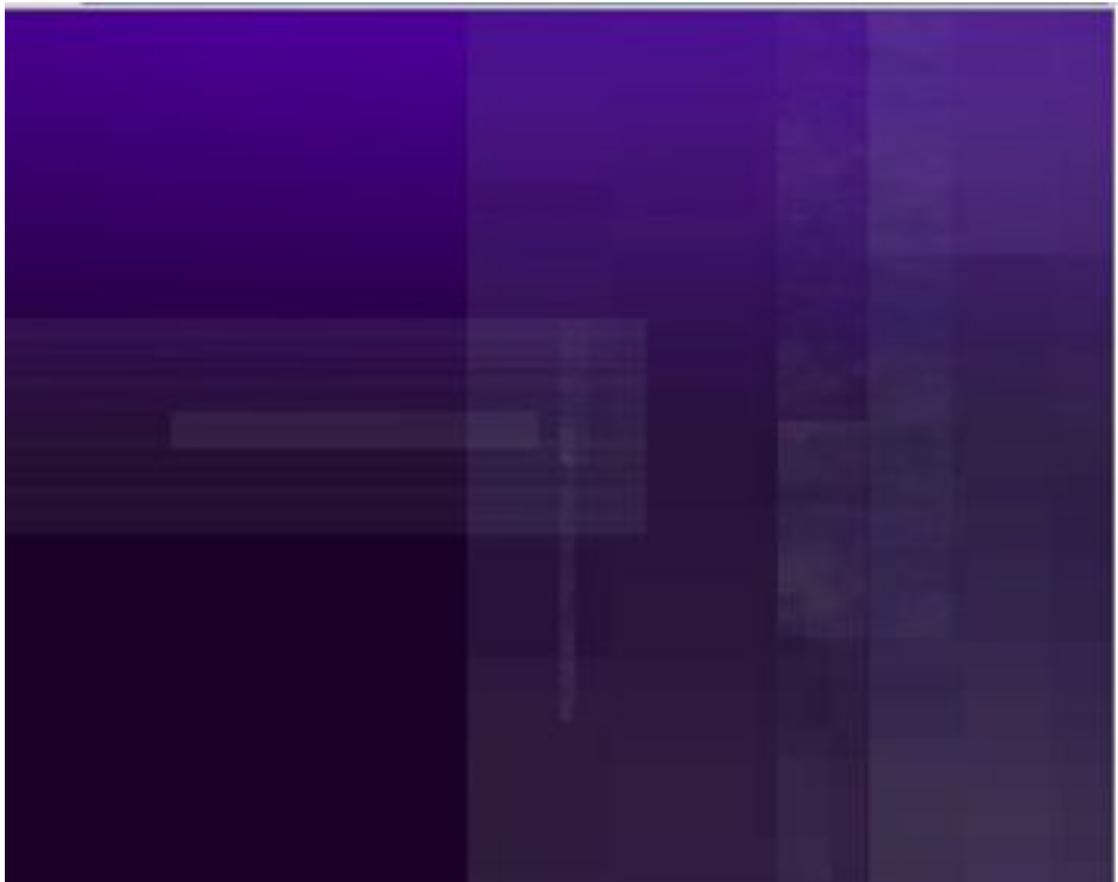
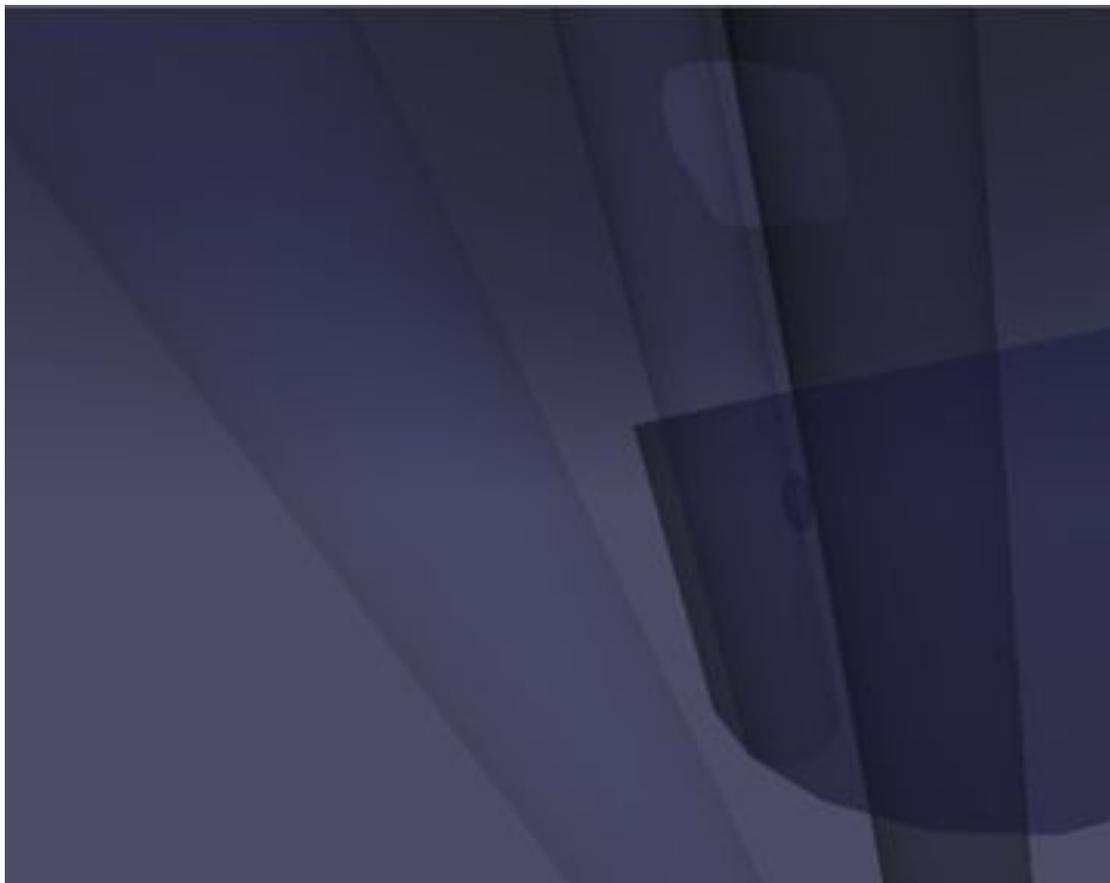


Figure 3: Memory Plains Returning: Memory Sheets by Adam Nash

Again similar to Deleuze and Guattari’s *rich material*, the ability to *inline* (i.e., contain other VRML files as interactive subsets) entire *worlds* (the conventional name for individual instances of virtual environments) into containing worlds arbitrarily is part of a modular approach encouraged by VRML itself, in a very literal (i.e., technological) enactment of McLuhan’s new media content cycle. In terms of it being the product of an experiment, Memory Plains Returning is a simple proof of the concept that inlines all of

the individual worlds that make it up: Memory Boxes, Memory Forest, Memory Sheets, Memory Plains, Memory Epiphany, Memory Used, Memorised Regret. Each of these *movements*, as I called them at the time, were self-contained VRML worlds that may or may not also inline other VRML worlds themselves. The *Memory* part of the title was also a rephrasing of Deleuze and Guattari's assertion that "the musician is in the best position to say: 'I hate the faculty of memory. I hate memories'". This meant something in my case as an artist, particularly because I was searching for a way to inform these works with the loss of memory I experienced after immigration, and that this experience later influenced my apprehension of memory as a multilinear system.

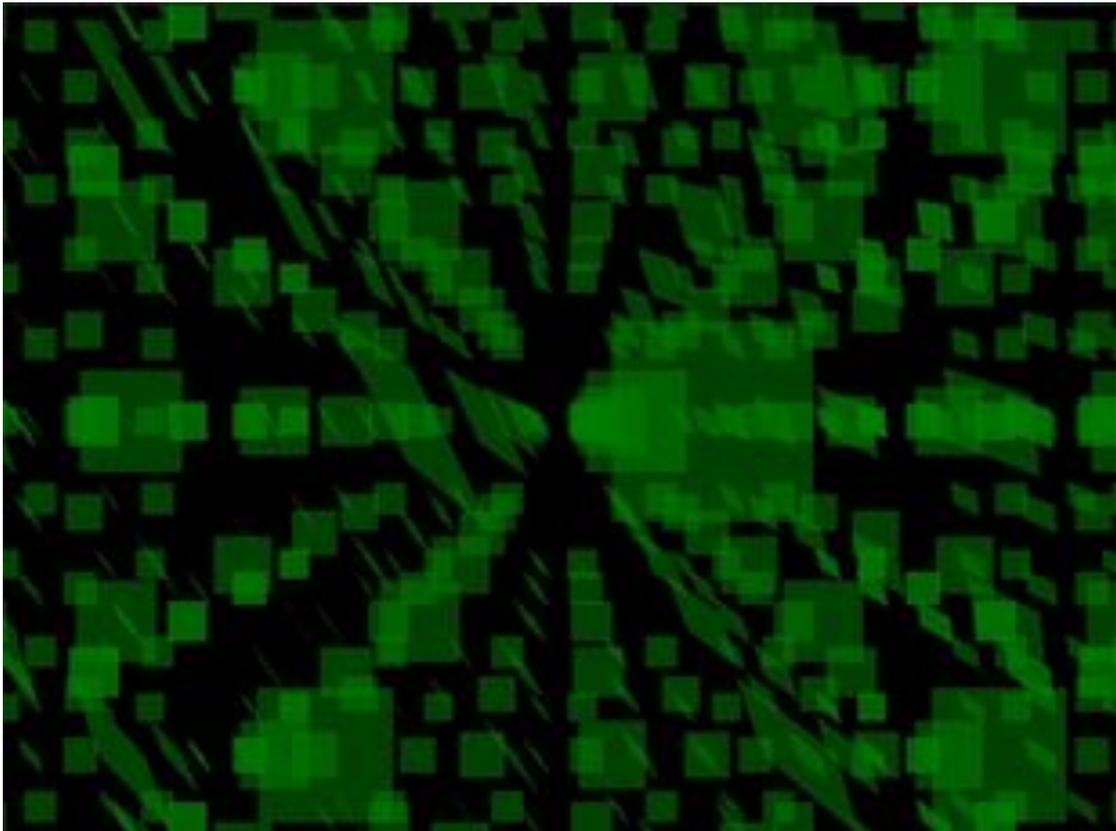


*Figure 4: Memory Plains Returning: Memory Used by Adam Nash*

The lack of any cues or references towards anthropocentric scale or reference made a significant difference practically in terms of ease and speed of working with VRML because it enabled *telescoping* of space into potentially endless interdependent levels. Each of the works manipulated some aspect of

interest within the formal system presented by VRML. For example multiple nested cubes rotate around a common point, each with an attendant sound audible in proportion to proximity, or multiple geometries each rotating on its own axis, or scaling up through exponentially higher and lower stages along one, two or all three of X,Y and Z, or the *scale jumping* or layering available to the camera analogy in RT3D space, where the viewpoint is constantly zooming in and out. All these manipulations invited the user to reflect on the notion of a “multilinear system,” where “everything happens at once” (Deleuze and Guattari 328). Other factors, evaluated as positive, included texturing: some of the works used texture maps, albeit it in a more experimental mode than is customary on contemporary RT3D, while some didn't. The two works that did use texture maps, Memory Boxes and Memorised Regret, evoked a more cinematic composition within the frame, verging on what could be characterised as motion graphic design. Certainly over time what emerged as important was the different ways different VRML browsers render the texture maps, a purely technical consideration that nonetheless significantly influences the visual outcome. Happily, the ease of working without textures also produced a subtle but rich gradient range of colours based entirely on the formal construction of, and interaction between, RGB and opacity (Red, Green, Blue, the basis of all colour rendering within VRML and its underlying 3D rendering system such as OpenGL or Microsoft's DirectX). This range of colours is easily and quickly manipulated via relevant numerical values modified in a text editor, along with other qualities related to light and materials such as opacity, specularly (shininess), etc. Because of the broad standardisation of these fundamental elements of the digital image, this is far more resistant to technical differences between browsers, and is also very much a modular approach, since these small sets of vectors can be transported across many 3D environments. The visual quality shared by the individual works, resulting from the lack of texture mapping, visually contributed to a satisfying sense of relationship between the individual works, a certain sense of heterogenies held together without ceasing to be heterogenies (Deleuze and Guattari 329). The importing of sounds and positioning within the aural 3D environment was also achieved with relative ease via the text editor, inlining the sound file, in this case mp3s,

for internet based performance.



*Figure 5: Memory Plains Returning: Memory Forest by Adam Nash*

As essentially a proof of concept, many formal technical considerations of working within the medium were well established, but the (virtually) linear navigation model and the lack of a real purpose beyond a technical proof of spatialised geometrical animations and sounds, or simply a technical demonstration of the medium's post-convergent potential, clearly remained as problems. This needed urgent redress for the project to cohere and to adequately progress to achieve both Bolter and Grusin's qualities of hypermediacy and immediacy (Bolter and Grusin 21-44). The hypermedia qualities of the work perhaps presented too readily, thereby preventing the ability of any immediacy, or sense of immersion. There was also a lack of affect that needed to be addressed. Was it related to the lack about pre-convergent uses of 3D MUVES mentioned earlier; was that also a lack of affect arising from an uninquisitive use of a medium? Considering Memory Plains Returning as a container, it is useful to think of it in Deleuzian terms as a mode or complex relation of speed and slowness, where "Concretely, if

you define bodies and thoughts as capacities for affecting and being affected, many things change” (Deleuze, Spinoza, 124).

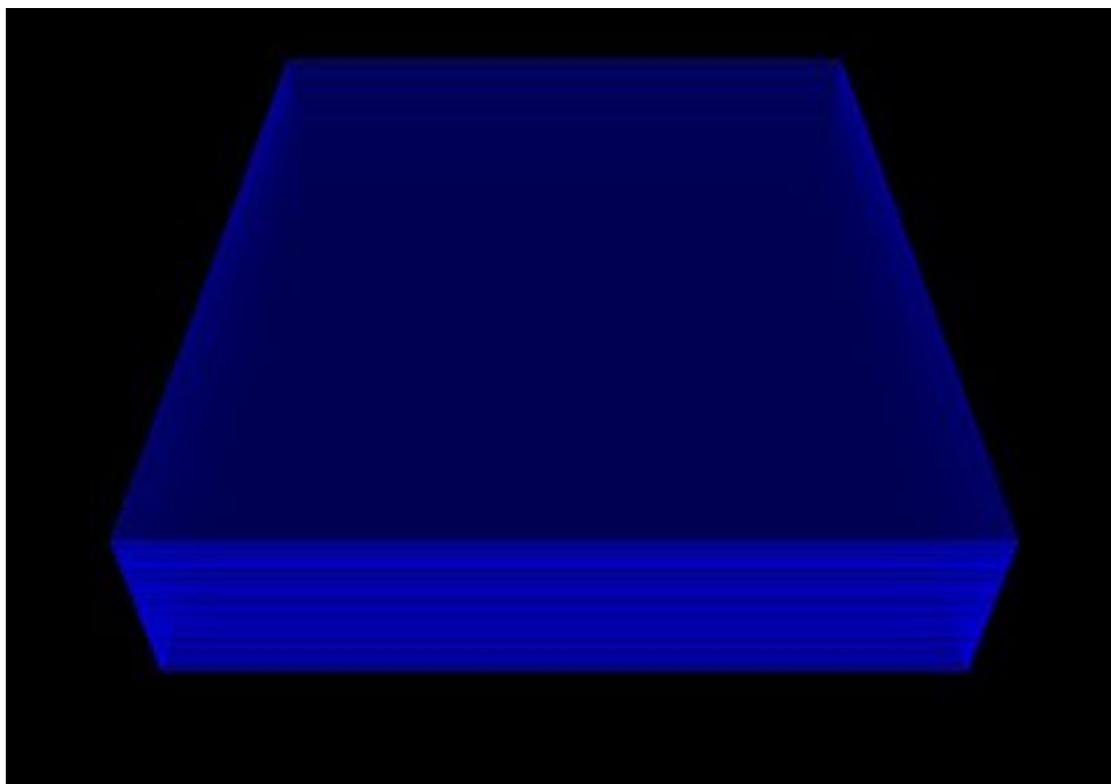


Figure 6: *Memory Plains Returning: Memory Plains* by Adam Nash

A live (what would now be termed) *mixed reality* performance of *Memory Plains Returning* took place at several sites in the UK. There was a performer in the Cornerhouse Gallery in Manchester (Kema Ekpei), one in Bristol (Alex Bradley), and a performer at Folly Gallery in Lancaster (Adam Nash). Audiences came to either the Corner House Gallery in Manchester or the Folly Gallery in Lancaster. In evaluation, this was less than successful because audience unfamiliarity with the work and medium placed a strong performative expectation on the artists themselves to perform in the physical space. There was a lot of narrative conversation between the audience and myself (as artist/performer) about what was happening. This was because the audience was physically gathered in the galleries, watching me or the other performers log in. Had the audience logged in themselves, no explanation would be necessary other than navigational instructions. At the time these experiments were being carried out (2003), RT3D MUVES were still a

reasonably obscure phenomenon even within the digital or experimental art scene. That was the main lesson of the *live* performance. Later, from around 2006 onwards, the term *mixed reality* would enjoy some currency as an adequate description of this live event, and the expectation of a mixed reality performance has become so viable that audience/users will independently log in to experience the work.

As proof of concept, it was encouraging, with further experimentation recommended. Positive points displaying potential intrinsic qualities were the direct manipulation of scale, RGB colour space, opacity, lack of texture maps, and lack of anthropocentric scale of reference. Negative points were a lack of affect, and an episodic nature enforced by a somewhat linear navigation model.

### Stress Test

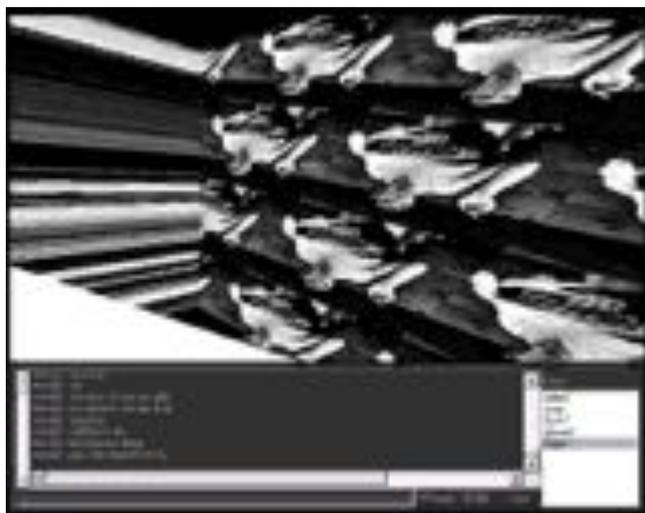


Figure 7: *Stress Test* by Adam Nash, showing avatar by Steve Guynup

Around this time, (2003), the technical problem that required some attention was that of the multi-user part of the equation. VRML was a sophisticated and network aware protocol, but it did not have any built-in support for multi-user capability, which was left for the browser developers to implement. Surprisingly, despite the industry's self-stated aim of realising a Neuromancer or Snow Crash-style multi-user virtual environment, such a thing was in fact

a rarity at that stage<sup>10</sup>. As I have said, I was using VNet, which was an Open Source set of bare-bones programs used to add multi-user functionality to any VRML worlds. The other two potential platforms at this time were ActiveWorlds and Blaxxun<sup>11</sup>. Both of these were commercial products, predating but very similar to Second Life if not in architecture at least in the stated vision of realising a multi-user RT3D universe. The commercial, proprietary status of both ActiveWorlds and Blaxxun meant that, while there were *world building* tools available in these platforms, they were not open to the kind of changes the artist may wish to make at a more fundamental level of code. VNet, on the other hand, was Open Source and therefore *was* open to any kind of changes the artist may wish to make. As mentioned previously, both Steve Guynup and Melinda Rackham had successfully used VNet, but nobody, to my knowledge, had tested it across a network with more than a few people logged on to a server at once. Stress Test was a somewhat ironically named event (in reference to the likely very small attendance rate that, even though tiny, was in danger of crashing VNet at any moment), staged twice, running VNet. At the events Steve Guynup presented a few of his visual poems along with myself presenting some of the sketches from Chromacy. The modifications I had made to the VNet client worked well, but still it was very difficult to get more than a few people to log in for a test.

---

<sup>10</sup> Neuromancer by William Gibson (1984) and Snow Crash by Neal Stephenson (1992), both science fiction novels, are generally regarded as the two major inspirations for massively multi-user online environments. See for example VRML Visions by Mark Pesce, a 1994 post to the www-vrml mailing list at Wired.com, available at <http://web.archive.org/web/20030626011627/www.web3d.org/www-vrml/concepts/visions.html> retrieved May 2nd 2010; Cyberspace by Mark D. Pesce, Peter Kennard and Anthony S. Parisi, a 1993 technical proposal for a 'cyberspace' protocol, available at <http://web.archive.org/web/20030626011152/www.web3d.org/www-vrml/concepts/pesce-www.html> retrieved May 2nd 2010; Dubner, Stephen J. "Philip Rosedale Answers Your Second Life Questions". New York Times. December 13, 2007. Available online at <http://freakonomics.blogs.nytimes.com/2007/12/13/philip-roosedale-answers-your-second-life-questions/> Retrieved May 2<sup>nd</sup> 2010.

<sup>11</sup> Black Sun was the name of a corporation in Neal Stephenson's Snow Crash, and the name of the club where the protagonist first enters a massively multi-user online environment.

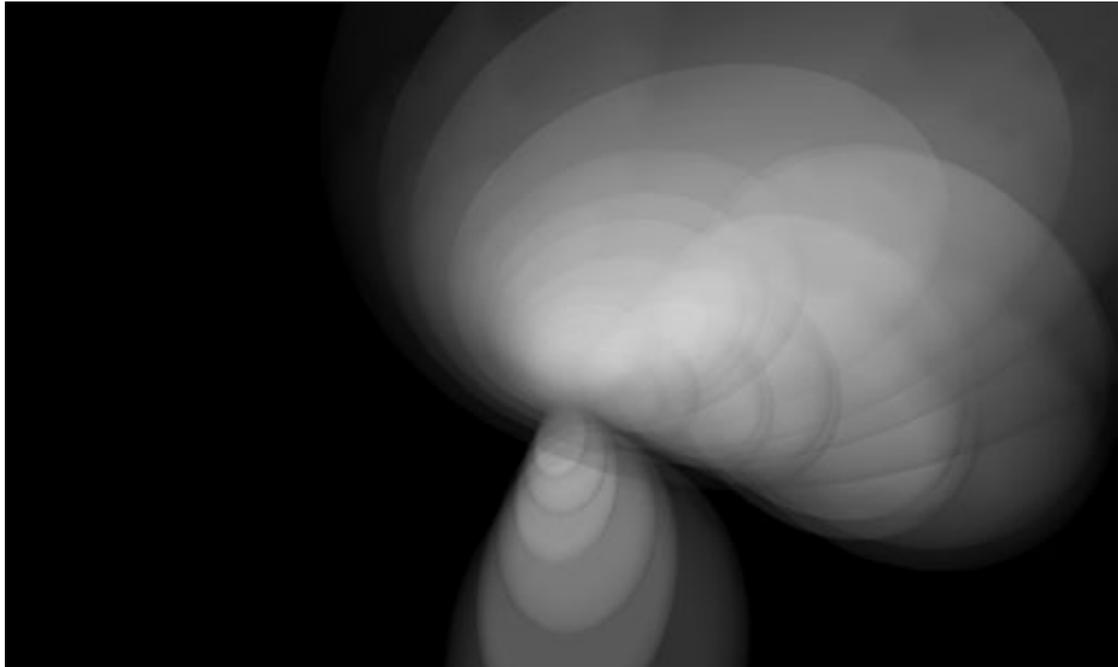


Figure 8: *Chromacy* by Adam Nash

## Chromacy

After Memory Plains Returning, I made a series of experiments that were to later form most of the geometry of Scorched Happiness. These were collectively titled Chromacy in order to be submitted for Web3Dart 2003<sup>12</sup>. Selected by the jury for that award, this was a validation of the attempt at an intrinsic use of the medium via a formal approach and a good indicator of the potential of these tentative steps taken with geometry and sound. Indeed, Chromacy was a collection of experiments, all consciously restricted to the tested approach used in Memory Plains Returning: restricted colour range, musical scale, and shapes made only of the simplest Euclidean figures. In addition to this simplified palette, forms were generated according to ease of working with the underlying material, that is, easily coded geometric shapes on simple animation paths, from which could emerge spatially complex environments. These beginnings of a formal system were going well technically, but the lack of affect still needed to be addressed. I needed to build on the conceptual basis of Memory Plains Returning (and the themes of

---

<sup>12</sup> Web3Dart is the annual international juried competition, an official part of SIGGRAPH. According to the official selection criteria, "Each of the works is considered for it's operational functionality, the content within the 3D visualisation, and its innovation towards the use of 3D in creative works of artists and designers." See <http://www.web3dart.org>

memory and im/migration) to facilitate affect cycles around the formal experimentation.

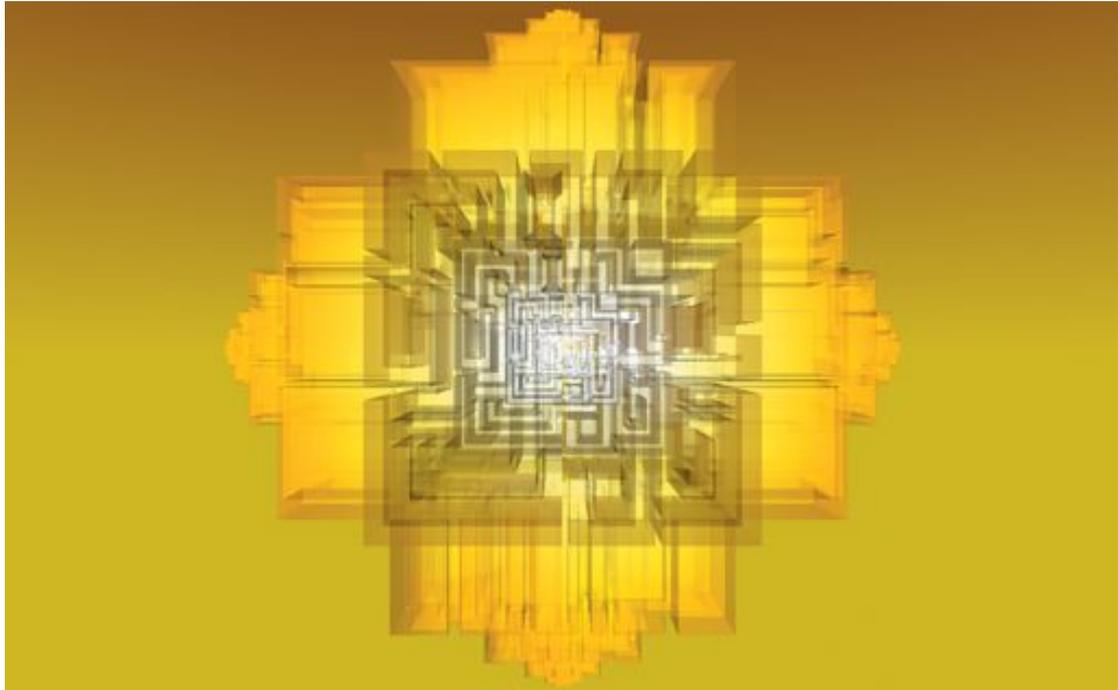


Figure 9: *Scorched Happiness* by Adam Nash

### **Scorched Happiness**

Julia Kristeva's "Toccata and Fugue for the Foreigner" (which is Chapter 1 of her landmark work on foreignness, *Strangers To Ourselves*) is an ideal work on which to base such an experiment, because it deals with the psychology of those who find themselves in a new territory (i.e., the foreigner), whilst being a highly poetical work of literature that prefaces a rigorous deconstruction of the notion of foreignness throughout history to the present. It is a beautiful, confronting work that provides an immense amount of raw emotional material, expertly articulated. Its structure (23 short 'fugues') presents an ideal framework on which to base a performance, since as an immigrant myself the text resonated strongly with me, and formally these fugues lent themselves to the kind of formal structuring that had worked so well in the previous experiments mentioned above.

Rather than *fill a space* with these short fugues, which had previously resulted in an unsatisfactorily linear navigation system, each *fugue* was actually the

geometry for an avatar, one that comes into being when a user logs into an *empty* 3D world and thereby fills the world with its geometry; its presence becomes the environment itself. These highly geometric, abstract, non-humanoid avatars allowed me to explore as many permutations as possible towards understanding the properties of RT3D space. As the foreigner in Kristeva's text explores wildly varied emotional geographies in an attempt to know the new place, so too does the avatar explore the cyberspace in Scorched Happiness. The foreigner is by turns ebullient, aloof, confident, melancholic, multilingual yet mute, ironic yet naive. The avatars in Scorched Happiness become huge, layered, temporally chimeric audiovisual events filling up the space then receding away as they react to one another's manifestations. I was able to continue to use the successful formal elements of the Chromacy experiments whilst giving the work a conceptual basis and direction, so the avatars of the performers took the form of the works themselves (or vice versa). The idea here was that the audience (or *interactors* as Justin Clemens calls them in his 2008 BabelSwarm essay) would interact with the performers, rather than arbitrary demarcations of the space itself which was otherwise a solid, dark background. In practice, this raises the interesting question of how should one represent the virtual presence of the audience – the user need not have a visual representation in order for the system to track the user's state and location or presence, but it is unconventional for the user not to have some form of visual representation, even if for nothing more than to function as a conventional feedback device. Scorched Happiness, in multi-user version, settled for almost completely opaque spheres, in order that the audience/users could interact without visually detracting from the performance. This was an unsatisfactory solution since it is neither enacting a visual lack of marker of a users' presence nor enforcing a strict linear relationship between visibility and presence. In other words, if the performers are not logged in, the space is *empty*. This is analogous to a real world performance situation, since live performances are tied to a specific point in time, but the work itself is accessible on the internet at any time, from any timezone, and therefore not particularly suited to temporally specific performances. As a practical response and also for considerations of archiving, a *single-user* version of the work was also produced

in order that interactors could experience something of the work outside of the times it was actively being performed.

Scorched Happiness, then, used an approach where the avatar was the performer, the performance and the performance space all at once. I came to refer to these entities as *performance avatars*. The primary positive result from the Scorched Happiness performance was the potential that performance avatars showed in developing the concept of live virtual performance<sup>13</sup>. The formal framework functioned well in enabling the production of abstract, non-anthropocentric space and avatars. Similar to writing a piece of music, the framework was able to suggest its own structure from within the parameters of the formal system, although of course this was already highly determined by Kristeva's text, which was *literally* included in the performance as performers typed phrases into the built-in chat box, from the fugue that their particular avatar was based on.

Unfortunately, the showing of Scorched Happiness still displayed a certain unsatisfactory linearity to the navigation, probably because it was based on navigating a line through space. Although the work was designed, drawing on the Memory Plains Returning performances, as an online-only experience specifically for interactors to log in to rather than attend a physical venue, the show was commissioned by Melinda Rackham as part of a major contemporary art exhibition 2004 Australian Art Now at Melbourne's Australian Centre of the Moving Image (ACMI) and National Gallery of Victoria. I had designed Scorched Happiness to be an online-only experience, to be accessed by users from their own homes, so that familiar surroundings gave them time to interact with the show themselves. However, I went ahead with two real world *mixed reality* performances of the work at ACMI, and both were technically successful, but they highlighted (as per the Memory Plains Returning experience, the severe need for an audience willing to log in themselves – if only a fraction of the number who'd attended the ACMI session had logged in instead, it may have been possible to achieve

---

<sup>13</sup> This potential has since been explored in more depth by American artist DC Spensley (aka Dancoyote Antonelli) in *Second Life*.

the tipping point where the non-initiate could have converged the intellectual and material processes of the medium and an accelerated acculturation occurred resulting in an ‘ah-ha!’ moment, but as it was only one audience avatar logged in. This was the major negative lesson from this experiment with live performance – the severe lack of an audience willing to log in and interact. Because of the popularity of Second Life and *Massively Multiplayer Online Games* like World of Warcraft, such experience is now so commonplace as to be able to be thought of as a reliable element in an interactive experience, but at the time Scorched Happiness was presented, it was not. Another major negative was the increasing doubt around the continued viability of VNet as a multi-user platform, due to some legal arrangements between Microsoft and Sun Microsystems, where the so-called *java virtual machine* that VNet required would no longer be made available to the public. Any software requiring it would need to be updated to use the new, legally approved *java virtual machine*.

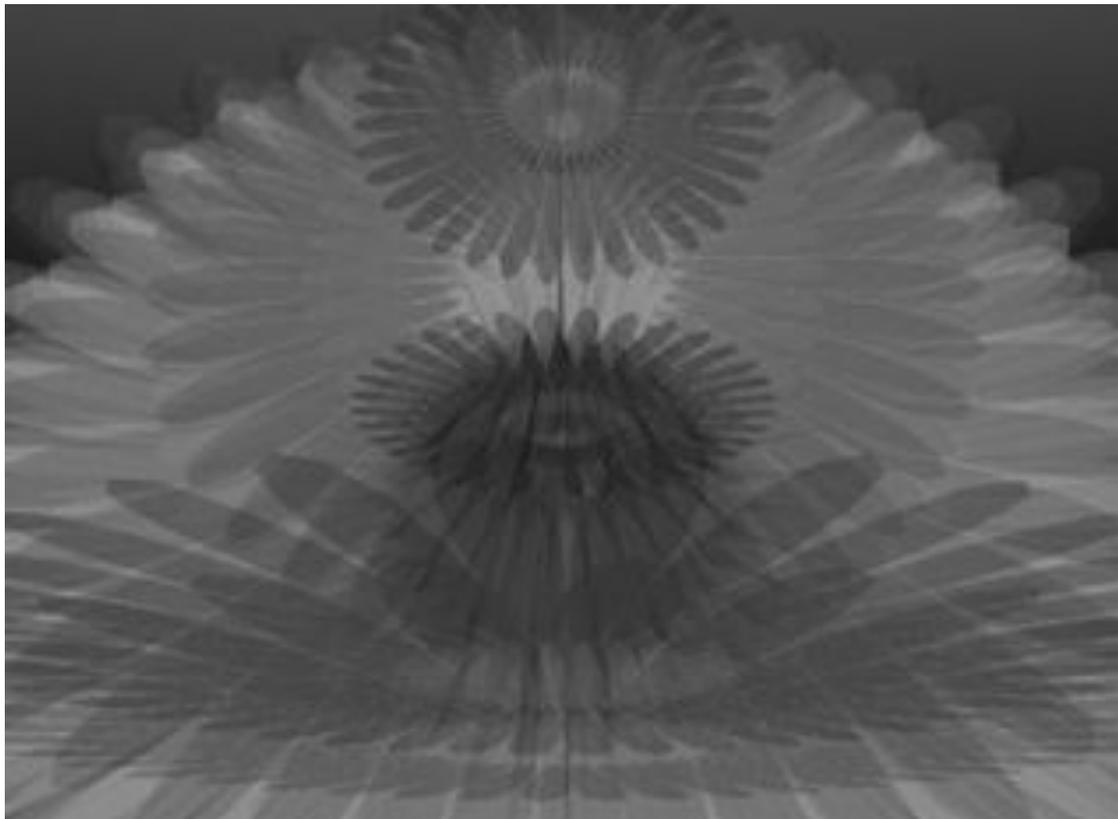


Figure 10: Pale Shining Winter

## **Pale Shining Winter**

In response to the continuing lessons of Scorched Happiness regarding linear navigation, I decided to make a piece that seemed less like a series of smaller works to be traveled to/between, and more like subtle variations and evolutions of a single work based on spatio-temporal interactivity. In response to the difficulty in attracting an online audience for Scorched Happiness, as well as the uncertain viability of the VNet software, Pale Shining Winter was designed and executed as a single-user online RT3D world, where the time based element was purely dictated by the interaction between the user and the work. There was no physical manifestation or mixed-reality performances, it simply exists online for continuous access. This work showed that the time-independent nature of single-user experience was very positive in contributing to an effective performance parameter, along with a surrender to the interactor of the temporal aspect of the performance; in other words, the interactor has total control over spatial navigation and therefore the experience of the work. In a musical sense, the interactor becomes the arranger of the compositional elements I have laid out as composer, consequently when the interactor plays the work, we are both performing it, and in that sense prompts the question: Can Pale Shining Water, as long as it is being used by an interactor, be considered *live* on both our parts? I believe so, in the sense that agency defines presence, and in any case a *live performance* has most certainly occurred when the interactor played with the work. It may seem strange to use my first single-user (ie, not a MUVE, just a 'VE') work to broach the subject of *liveness* and *performance*, but really it makes sense in terms of examining RT3D environments.

## **Blue Line**

Created in 2006, Blue Line was an attempt to take the formal framework as emerged so far in this process to its logical extreme, and create an *infinite* blue line; the blue as fully saturated as is only possible in the digital space of a computer display screen. This sets the formal fields like RGB, opacity, animation and anthropocentric scale to extremes afforded only by the digital space, and the work exists as an online-only VRML world. It is a simple but

comprehensive rendition of these basic formal elements. It also potentially addressed a growing hopelessness on my part in the wait for an audience that was prepared to log in and experiment with RT3D worlds on the internet, but mostly Blue Line examines the nature of RT3D space. An eternal blue line expanding infinitely, rotating through all possible vectors. Blue Line challenges contemporary tendencies to construct RT3D space as representative of material space by posing the question of multiple infinities within the formal structure of 3D computer graphics. In Blue Line, the viewer may freely navigate the space, but it makes no difference to the perception of the work, for the space will have its way with you. The pitch and positioning of the sounds correspond to and reinforce the position and animation of the blue line. As seen in the series of works leading up to Blue Line, simple patterns combine to create complexity.

## **Second Life**

In 2007, a massively multi-user online environment called Second Life emerged, seemingly suddenly, as a viable platform for this research in replacement of the VRML/VNet system. A disadvantage of Second Life was its proprietary modeling and scripting language (compared to the open standard of VRML, which by this time had been renamed in its third version as *Extensible 3D* (X3D) to acknowledge its new-generation XML encoding), and its reliance on a *farm* of servers to enable a single instance of a vast multi-user world. At the time, this approach seemed counter-intuitive, in that other attempts at such software (i.e., MUVES like There.com, ActiveWorlds, Blaxxun or game-based MUVES like World of Warcraft) operated several *instances* of the world that only a few hundred or thousand users could experience, often based on real life geography, whereas Second Life had one single instance of a world running which it claimed could handle millions of simultaneously logged in avatars. Its reasonably quick uptake by hundreds of thousands of users made it a viable medium to experiment with the multi-user aspect of live performance.



Figure 11: *Infra Assemblage*, from *Ramonia*, by Adam Nash

### **Ramonia on Marni**

I set to work in Second Life and, in 2007, completed Ramonia, a garden of immersive audiovisual sculptures; a collection of discrete experiments in audiovisual *sculptures* or assemblages manifesting what could be seen as the inverse of the world-filling geometry of Scorched Happiness, or the vast worlds of Pale Shining Winter and Blue Line. The Ramonia garden of sculptures was scaled and animated in sympathy with the anthropocentric, crudely realist *raison d'être* of Second Life, providing a space through which avatars could move and interact with each of the sculptures, the 3D artworks. The sculptures themselves were nevertheless still manipulating the formal properties for maximum engagement at both the hypermediated and immediate levels, as well as displaying a strong current, or assumption, of Hayes' digital embodiment and Matrix's cyberpoetic approach applied in such a way that did more or less reflect a definingly *cyberpunk* vision (Ondrejka 2). The works had a built-in context in the form of the *island* analogy that Second Life uses to demarcate chunks of virtual real estate and (partly) thereby monetise its multi-user world, with the (mostly) humanoid avatar analogy operating in an anthropocentric world. Again, the experiments are

the inverse of previous experiments in that they are specifically built to be accessed by a humanoid-scaled avatar whose user is familiar with navigation in the 3D environment. On the other hand, they benefited tremendously from the experience in RT3D geometry building via RGB fields and opacity etc, in that they were able to be generated quickly *within* the environment (a distinct advantage of Second Life is that it has *inworld* collaborative building tools). This introduces the Second Life user to a level of interaction with the synthetic environment that is post-convergent in that it displays a programmatic awareness of its existence within the medium via some kind of display of its relationship with the *datasphere* of Second Life eg. Anemochord (virtual wind and virtual cloud operated sculptures, that were animated according to data streams measured from the inworld weather), or physical properties of objects inworld with each other, eg. Infra Assemblage (which spawned virtual balls that fall and bounce on other parts of the sculpture, causing them to emit sounds), or avatars, eg. Eudemonia Stellata or Bell Garden (both of which emit sounds and animated visuals in response to movements and mouse-clicking by users), or some other aspect unique to RT3D. An immediate improvement with Second Life was the audience – many avatars visited and were willing to spend time interacting with the works, none of which required me or any other performer to be logged in, but could be assured to have pliability in the hands of a virtuosic user. This was ideal after so many iterations of my iterations, where the final results had cried for audience/user interaction. All of the experiments in Ramonia, a garden of immersive audiovisual sculptures generated much interest, receiving many inworld messages (IMs) and high usage rates. Restrictions in this platform were *space* in the real estate sense of the term (Second Life enforces a strict land purchase and/or rental model to sustain its multi-user world), and so Ramonia was restricted to one quarter of the particular island where it was sited. That said, Ramonia was very successful at capturing the imagination of those who had recently become used to the environment of Second Life, for its engagement was based on a degree of post-convergent awareness. In this case, that meant an awareness of the essential digital existence of the works to such an extent as to invite a consideration of both the hypermediate and immediate nature of all the interactions between user

and both, these Ramonia works specifically, and the Second Life environment more generally (Bolter and Grusin 21-44).



Figure 12: *A Rose Heard At Dusk* with multiple avatars interacting, at the *Dorkbot* presentation, 2007.

### **A Rose Heard At Dusk**

A limited opportunity to explore a little more space came when Gary Hayes of the Australian Film, Television and Radio School asked me to build an audiovisual installation in a *cavern* below the virtual Sydney Opera House, in the Second Life *sim* (short for *simulator* meaning one island in Second Life jargon) that Gary was building for *Telstra*. The space offered was rectangular, long, quite narrow, and quite low of ceiling, therefore ideal for a *volumetric* audiovisual installation, where volumes of virtual space themselves have certain visual, sonic and interactive properties activated depending on the navigation of the user. The experiment was very successful, and very popular with the *Dorkbot SL* scene (see *Fig. 18*), the Second Life chapter of the realworld association of experimental electronics, who hosted the work for a period. This work re-emphasises co-presence, or co-location within the post-convergent environment. In other words, the work encourages and benefits

from more users.

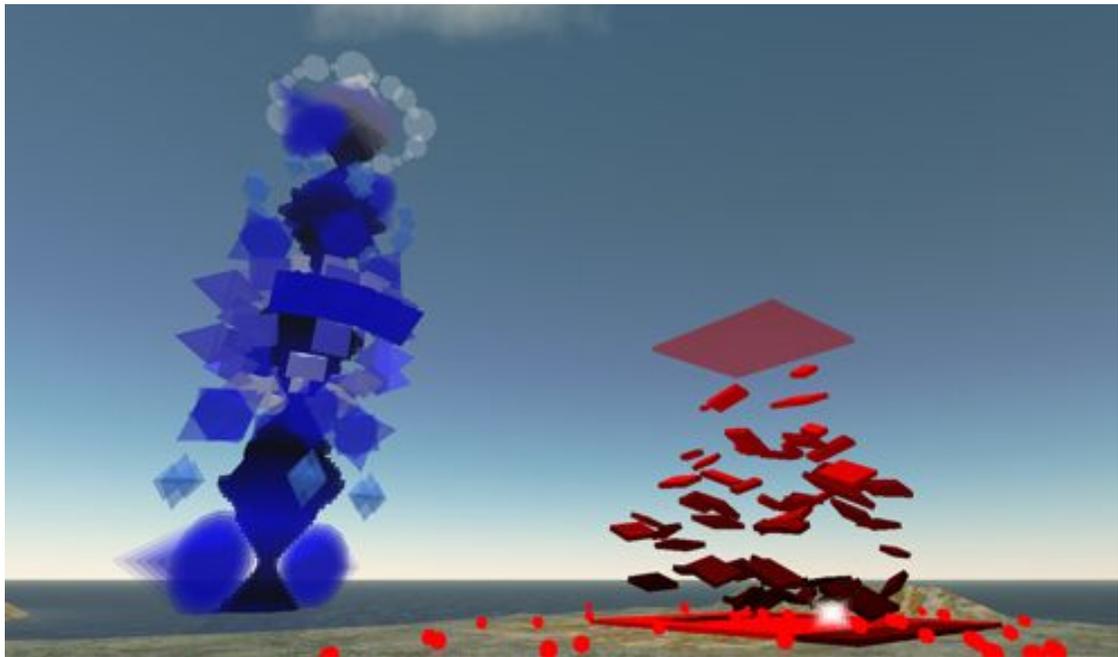


Figure 13: *Disaccumulator and Ultramarine Column*, from *Seventeen Unsung Songs* by Adam Nash.

### Seventeen Unsung Songs

In response to [A Rose Heard At Dusk](#), Odyssey Gallery invited me to construct an island-wide (ie, an entire sim) installation. Odyssey had sponsored the *Dorkbot SL* chapter where I had presented [A Rose Heard At Dusk](#). I produced a suite of works where I hoped to examine, question and respond to the findings so far of the combined experience of [VNet](#)-style VRML worlds, and [Second Life](#) works. Each of these works explored, either explicitly or invitingly, different aspects of RT3D space, time, objects and/or avatars, as well as many of the built-in data sources in [Second Life](#). This included some works constructed with behavioural objects approaching a virtual ecosystem of virtual entities, growing and reproducing within [Second Life](#)'s virtual environment. Along with the technical restrictions inherent in the SecondLife client/server architecture, with its default de-privileging of sound and over-privileging of material simulation, the works that make up [Seventeen Unsung Songs](#) need to approach thesis number 9 of Badiou's [15 Theses on Contemporary Art](#) cautiously. The thesis reads "The only maxim

of contemporary art is not to be imperial. This also means: it does not have to be democratic, if democracy implies conformity with the imperial idea of political liberty.”( Badiou 15 Theses, Thesis 9). It would not be difficult to argue that an artist could not approach this thesis, and possibly therefore all the subsequent theses, from the platform of Second Life since it can be argued that its very structure, its potential, is to be imperial by way of its inherently economic premise. This is a difficult point, that being the ways in which RT3D MUVes reflect the forces of late capitalism, and one that challenges all digital media, not just RT3D MUVes. Previous experiments in this project showed the inherent difficulties in addressing this point when combined with a target audience of contemporary computer users, nearly all of whom use commercial operating systems and software. These are also internet users, which cascades the argument outwards one level to include the telecommunications networks, reminding us that there is really no reason to use this question to declare that contemporary art may not occur within private property. This allows us to examine individual works within the suite.

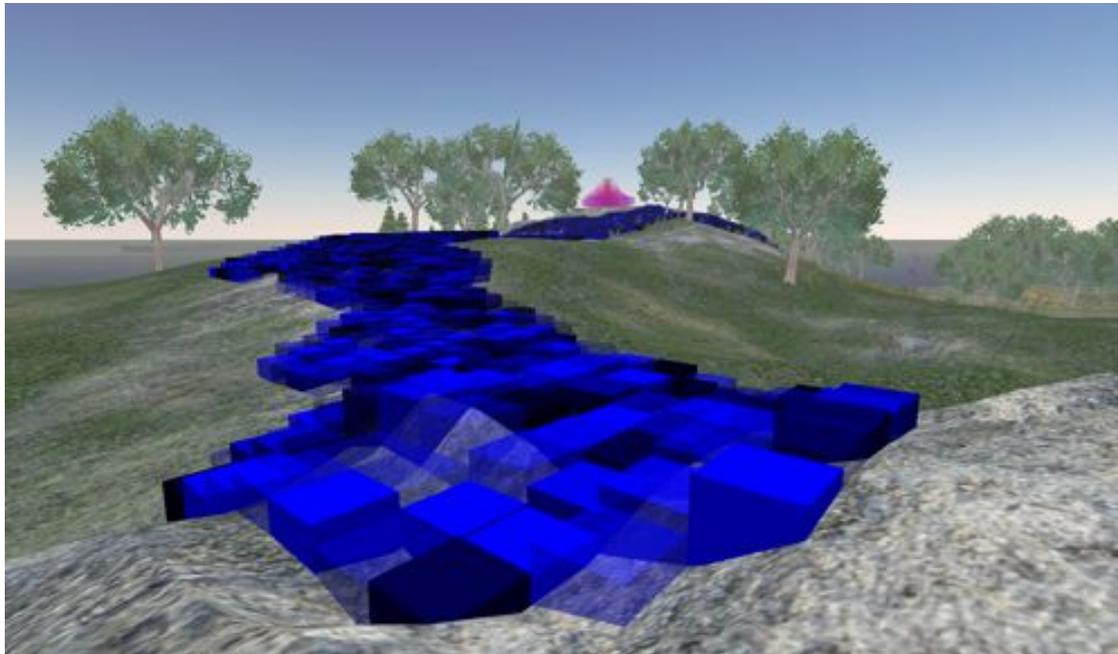


Figure 14: Blue Sound Ground, from Seventeen Unsung Songs by Adam Nash.

Blue Sound Ground allowed both technological and intellectual affordances to load as the entrance work to the island, designed as an *overture* in the

classical music sense. The fixed intervals used to determine the harmonic scale<sup>14</sup> supply a series of numbers that is also applied to determine the extents of the geometry, scale, colour and opacity of the elements constituting this, and all the other works in the suite. Works interacted variously with the rich datasphere of Second Life, with works such as The Moaning Columns of Longing using avatar presence and proximity-sensing to engage with users as emotionally needy digital entities, begging the user to demonstrate their love for the entity by returning to *touch* it to prevent it dying of a broken heart (*touch* is the word Second Life uses to mean *mouse-click*). The Space Between used avatar presence and proximity-sensing to create the very work itself, drawing on the results of A Rose Heard at Dusk to encourage multiple avatar presence and engagement with the resultant work. Mitosis operated on many interdependent levels to interrogate assumptions behind the construction of RT3D MUVE generally but also Second Life specifically (such as its interface-wide use of the word *touch* to mean *mouse-click*), and with a wink and a nod shows us a little insight into the potential of a massive digitally generated environment. Offspring are spawned from a plant-like object once it has been *touched* enough times to stimulate it. Chance then determines whether the offspring will be able to cycle all the way through confused iterations of seed, pupa and insect, finally to drop to earth when themselves *touched* by an avatar, they become a geometric evolving digital life form, each 24 hours spawning a new geometric branch with chance-determined colour, scale, opacity and harmonic tone. This long-term, simulated organic engagement with the virtual environment demonstrates an exciting potential aspect of creating art within MUVEs. Dynamically evolving over long periods of time, this work is initially brought into being by interaction with users, but quickly establishes its own multi-sited relationships with the virtual environment itself, while constantly re-referring to user interaction, but as an independent entity with a claim to autonomous affect within the environment equal to that of a human user.

Other works like Corona, Sidereal Time, New Rose, Crescent and Cloud

---

<sup>14</sup> A base frequency of 77Hz, proceeding in intervals according to ratios of 7 with the whole numbers. I refer to this as the Ramona Scale, after the login surname of my Second Life avatar Adam Ramona.

Chamber were simple formal audiovisual experiments in difference and repetition adapted to the unique MUVE medium, relying on the users' engagement with the Second Life system and the digital colour space to frame the affect cycle generated between user, system and artist/composer.

The work Disaccumulator encouraged the user to collaborate with the work to create audiovisuals. Disaccumulator is empty until it senses the presence of an avatar, at which point it constructs itself dynamically by spawning up to a hundred rectangular tiles within a three dimensional volume of space. These tiles are self-responsible for choosing their colour (specifically the amount of red saturation, based on their height from the ground, with higher tiles being brighter red, i.e., more saturation), angle of rotation (a random choice between zero and 360 degrees about all three of the X, Y and Z axes) and pitch of sound (again, based on height from ground, with higher tiles having a higher pitch). The work then begins dropping balls from above itself at random intervals. These balls, when they collide with the tiles, cause the tiles to play the sound it chose when spawning. The user is able to climb through and within the resulting assemblage, which also causes the tiles to sound, as well as to rearrange the formation of the tiles which in turn causes change in the overall audiovisual nature of the assemblage. Each experience of Disaccumulator is unique to that particular instance, in terms of shape and sound, while always operating within a framework of parameters governing colour, saturation and sound. The resulting work is always a collaborative improvisation between the user and the work.



Figure 15: *Rarer Air*, with multiple avatars interacting, from *Seventeen Unsung Songs*, by Adam Nash

Similar principles were also employed in *Rarer Air*, but this work was intended more for collaborative improvisation between multiple users and the work. A simple geometric pattern of cubes and spheres establishes the empty work as a user approaches. *Touching* (i.e., clicking on) any of the elements causes that element to randomly construct a rhythmic pattern that, depending on the location of the touched element, is either predictably looping or totally open ended. These patterns also manifest a simple visual marker in the form of a hovering rectangular shape with randomly chosen dimensions, opacity and saturation of blue. All of these patterns also randomly choose a time to delete themselves. Other instances of the elements will predictably play one tone once when touched and never delete themselves. Users then interact with these elements to create an improvisational audiovisual assemblage that, as with other cases of the works, is completely unique to that instance of the interaction but will always behave predictably within a given framework of parameters. Like *Disaccumulator*, the resulting work is a collaborative improvisation between users and the work.

*Ultramarine Column* was the anchor for the whole island-wide installation, and in many ways can be seen as the culmination that all the other works are

leading to and supporting. Ultramarine Column visually towers over the rest of the installation, and is designed for the virtuosic user, with very subtle movements resulting in big changes in audiovisual experience. The upper limits of the work reach the very limit of an avatar's ability to fly upward within the Second Life system (without some kind of coded flight enabler), thus it invites the user to slow down their navigation as much as possible. While Ultramarine Column is designed to ask for quite a commitment of time and spatiotemporal navigation from the virtuosic user, empirical results (derived either by directly asking users about their experience, or examining statistical logs of amounts of time spent by users in different locations within the exhibition) showed that many users were indeed willing to make such a commitment.

In total, Seventeen Unsung Songs comprised seventeen separate works, and this suite of works was shortlisted for the Premier of Queensland's National Art Award in New Media and exhibited at the Queensland Gallery of Modern Art. Tellingly, the exhibition was a *mixed reality* exhibition for which I built a custom physical interface, and it was not considered possible by the gallery for my work to be presented in virtual-only form, i.e., on the internet without any form of physical manifestation in the gallery. The role of the physical interface, which consisted of arcade-game cabinet-style joysticks and buttons, without a computer keyboard or mouse, was not only to enable gallery visitors to interact with the works but also to prevent them from, in Second Life parlance, *leaving the island* on which the works were installed. While understandable from the gallery's viewpoint in terms of presenting only the exhibited artist's work and not incidentally presenting others' work, this approach ignores thesis number 15 of Badiou's Manifesto: "it is better to do nothing than to work formally toward making visible what the West declares to exist". This is because the hierarchical, institutional framework tends to legitimise the artifact as 'big A' Art and by this (Western) declaration of existence ironically diffuses any tension between the potentially critical artistic gesture and the predetermined, complicit gaze. More importantly though, the presentation of Seventeen Unsung Songs in this way implicitly rejects – or at least refuses to engage with – the potential opened by the

advent of the multi-user virtual environment as a site for art. Rather, it attempts to restrict, or even close off, those openings in order that the works can be evaluated only according to the criteria that have already been declared to exist (i.e., *before* the advent of the new medium).



Figure 16: *Trace Aureity* by Adam Nash

### **Trace Aureity**

*Trace Aureity* was a commission from the Networked Music Review.<sup>15</sup> The commission was specifically for a Second Life work, and so I was able to apply the results of Seventeen Unsung Songs in a single experiment. *Trace Aureity*, the resulting work, suggested a way forward for the practice of this art by establishing a kind of network of relationships between the user and the environment not only by investing the virtual space itself with interactive audiovisual properties, but also by spawning moving digital agents in order that different traces are inscribed within the environment by the users' interaction with it. These agents are spawned in response to user proximity, but once spawned, begin to describe automatically determined paths through the work. These agents have the same interactive effect on the work as the user, i.e., moving through any particular element of the work will cause that

---

<sup>15</sup> Officially, a commission from the New Radio and Performing Arts, Inc., for Networked Music Review. It was made possible with funding from the New York State Music Fund, established by the New York State Attorney General at Rockefeller Philanthropy Advisors.

element to react in the same way it would were the user to move through it. In this way, the trace that the user inscribes within the space of the work is branching and somewhat aleatoric. This branching trace always maintains a relationship with the user's path through the work, because agents will only be spawned from the user's position. This relationship between the user's and the agent's paths becomes weaker over time as the agent gains independence from its provenance. At the same time, since the agents always spawn in response to the user's movements, a non-linear network of relationships is established where the semi-autonomous behaviour of the agents can never be completely independent of the user. In other words, it is always the user that is playing the work. In this way, Trace Aureity can be seen as an example of a multi-sited, or non-linear, avatar that transcends the linear mapping between human user and the user's humanoid avatar. This was the major progression that Trace Aureity presented, the first steps towards transcending the human avatar metaphor. Because of this, the user is invited to navigate the work in a reflective manner, to experience as many sites of interactive relationship as possible, to *play* the space in a virtuosic sense as a result of removing all tendencies toward a forward or linear navigation or interaction model. An expectation is implicit within the manifestation of the work of a virtuosic ability on the user's part to use the telescoping nature of the camera or viewpoint of the avatar within the RT3D MUVE, in order to be able to perceive different aspects of this multi-sited avatar. It is not a necessary requirement for enjoyment of the work, but the work rewards a conscious teasing-out on the part of the user, encouraging the user to experiment with multiple levels of camera work and navigation. Similarly with the sounds, an expectation is on the user to listen and become familiar with sonic patterns encoded in the nested virtual colour spaces constituting the work, and experiment accordingly, thereby entering into a new relationship with the work, one closer to a *performer* of the work. Trace Aureity points the way to an investigation of non-linear data flow in virtuosic artist/user interactive relationships, along the lines of Deleuze's "composition of speeds and slownesses on a plane of immanence" (Deleuze, Spinoza 123).

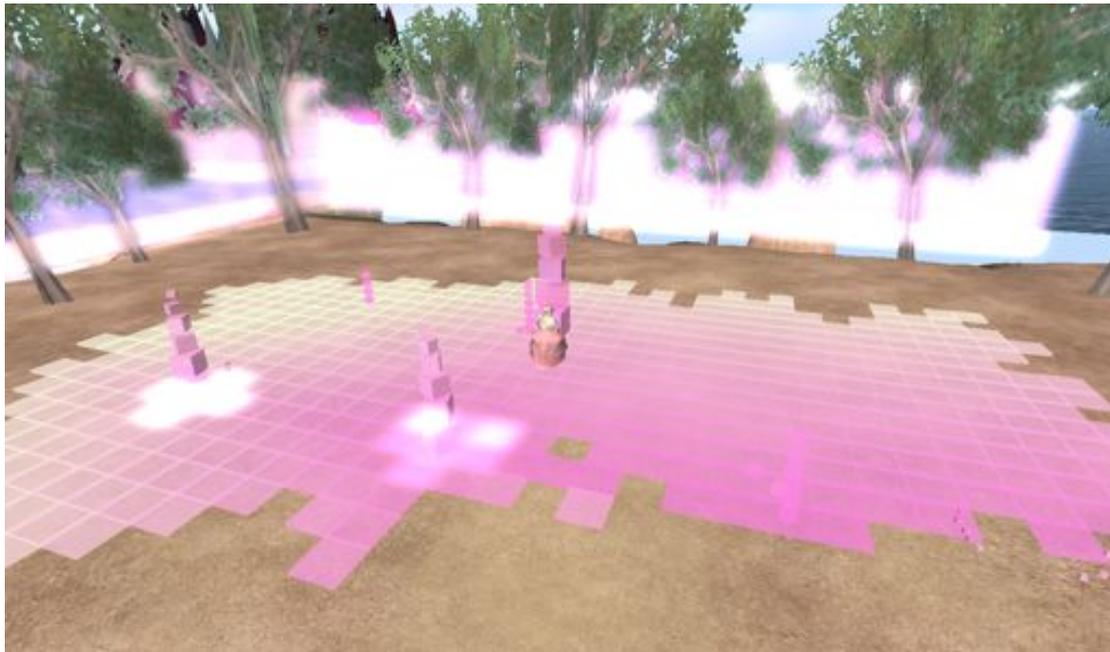


Figure 17: *One, Another* by Adam Nash

### **One, Another**

Encouraged by the results of Trace Aureity, the next experimental work in the project was able to be realised as a result of a request from Dr. Gary Zabel, who teaches at the Philosophy department of the University of Massachusetts, Boston, to create a work for his New Caerleon art gallery in Second Life, as part of his Virtual Art Initiative. The resulting work was titled One, Another. Visually this work was a large flat platform constructed of tiles in various saturations of pink. These tiles chose their own saturation levels based on distance from the centre, or heart, of the platform. Users could either wander around in the work to interact with it and trigger behaviour, or simply wait for the artificially intelligent elements to start doing something. The work consisted of several instances of these elements, including nine nodes that spawn little artificial lifeforms at random intervals, or when approached by an avatar. The spawned artificial lifeforms wander around purposelessly in a purposeful manner, seeking to connect with one another, but always failing to do so since they have not been provided with a parameter framework that would allow them to, until they either hit Second Life's grey goo fence (a Second Life-wide algorithm that detects self-replicating entities and prevents them from self-replicating too many times in order to prevent system overload) or delete themselves randomly. The sounds, of

which there were 103, were produced according to the same rational scale, or harmonic system, that I had developed for Seventeen Unsung Songs, based on ratios of whole numbers to seven (ie, 8:7, 9:7, 10:7 and so on).

Conceptually, One, Another extended an exploration of the notions raised by Moaning Columns of Longing, which questioned the nature of love in a digital environment by exploring concepts of self-organisation, transference, lack, desire. In Plato's "Symposium", Diotima tells Socrates that Love is the child of Poverty and Resourcefulness. She tells him that Love takes after his mother and is "always poor; far from being sensitive and beautiful, as is commonly supposed, he's tough, with hardened skin" and he "always lives in a state of need." On the other hand, taking after his father, "he schemes to get hold of beautiful and good things. He's brave, impetuous and intense" (Plato, Symposium 39-40). Diotima then goes on to explain to Socrates how love is essentially a lack, a desire that must be, but cannot be, filled by the other. Slavoj Zizek calls this "an excess in its very heart", and then quotes Jacques Lacan as saying "what the one lacks is not what is hidden in the other", and therefore love is based on an illusion that the encounter of these two lacks can successfully create a new harmony. It is part of the Lacanian idea of the big Other, which exists only as a subject's presupposition to help guarantee the consistency and meaning of the subject's experience (Zizek 66-67). On the other hand, Julia Kristeva writes in Tales Of Love, that

imagination is a discourse of transference - of love. Through and beyond desire that longs for immediate consummation, love is edged with emptiness and supported by taboos. The fact that today we have no love discourse reveals our inability to respond to narcissism. Indeed, amatory relationship is based on narcissistic satisfaction on the one hand, on idealization on the other.... For transference, like love, is a true process of self-organisation. (Kristeva, Tales of Love 178)

In composing the parameters for One, Another, I attempted to apply these concepts of lack, transference and self-organisation to the formal construction

of the work. As with Trace Aureity, traces of the user's movement within the work were amplified and multiplied audiovisually. Taking on a volition of their own in interacting with the work, this resulted in similar feedback loops of interactions triggering other interactions, until the point that insignificant actions on the user's part created a complex branching out of interactive and audio visual consequences that would sometimes resonate for hours afterwards as the artificial entities played out their own data-derived versions of transference, lack and self-organisation. This continued the experimentation with the interdependency of sound, vision and data within the interactive realm of multi-user virtual environments, along with a formal methodology of investigating harmonic structures audibly independent of the well-tempered scale, and visually exploiting the unique properties of the digital colour spectrum. As Elizabeth Grosz says, "Each of the arts is concerned with a transmutation of bodily organs as much as it is with the creation of new objects, new forms: each art resonates through the whole of the sensing body" (Grosz 82). In this, Grosz is following Deleuze, who says "In art... it is not a matter of reproducing or inventing forms, but of capturing forces. For this reason no art is figurative. The task of painting is defined as the attempt to render visible forces that are not themselves visible. Likewise, music attempts to render sonorous forces that are not themselves sonorous" (Deleuze, Bacon 40). In the next chapter, we'll see how these concepts compare with Alain Badiou's concepts of art in relation to the experimental works produced in this project.

# Chapter 03: Results: Realtime 3D Multi-User Environments as a *post-convergent* medium, and as a site for art

Let's proclaim at a stroke an end to all ends, and the possible beginning of all that is, as of all that was, and will be. Alain Badiou, Polemics 134

## What are the intrinsic qualities of RT3D MUVES?

According to the results of the experiments conducted within this creative experimental research project, what is it that defines RT3D MUVES as a medium for the performance of audiovisual art? What are the intrinsic qualities of the MUVE? Or in other words, what can the artist do in this medium that cannot be done in any other, and consequently what existing or potential practices, methods or concepts have been identified as useful to the artist in the construction and execution of audiovisual work within RT3D MUVES?

## Convergence leads to post-convergence

Firstly, from the point of view of the artist or practitioner, RT3D MUVES are a *post-convergent* medium. This means that a range of media elements (for example, sound, vision, network, time, interactivity, social interaction) form a complex matrix of interdependent relationships where no individual media-element, or user experience, exists without the other, and all affect each other but not necessarily equally. Rather these elements and relationships are in a dynamically changing ebb and flow based on interaction with the user and other contingencies that characterise the medium (for example, lag, non-linear time relationships, etc.). This complex system converges all prior media as content and, as we have seen, the practitioner can focus on one of these threads if desired, but needn't. For example, it is possible to use video as a texture map within a RT3D MUVE; it could be a live streamed video, or a YouTube video. Similarly, sound can be used in a 3D spatial manner, or to

stream in music, soundtracks or live dialogue. A cinematic equivalent of this distinction would be the difference between *source* (sounds seeming to emanate from within the story world, like the sound of the footsteps of a person we can see walking in the shot) and *score* (a layer of musical sound that *overlays* the world, like the swell of French horns we hear when a character experiences an epiphany). Both of these examples show the intrinsic use of the network to enable this, and enact the sociality and non-linear time model of the internet. This convergence of prior media into a new technical medium is part of an ongoing cycle within media history, as described by McLuhan (8) whose observations have remained relevant through the inception and growth of digital, networked media. Convergence is thought of in a slightly different sense by Henry Jenkins, who describes the technical convergence of, for example, the web with mobile phones as leading to a degree of cultural convergence of media users across media platforms, with Web 2.0 his touchstone. In other words, Jenkins characterises the rise of Web 2.0 as an interdependent relationship between technical innovation and cultural transformation (2-3). Both these meanings of convergence make sense in the context of this notion of *post-convergence*, in that the convergence has happened, consequently presenting to the artist or practitioner an environment in which to carry out work which itself also enacts a convergence of all previous practices, methods and concepts of the practice of art. This was borne out in the practical experiments I carried out, where all my previous work in music, imagery, sound, design, composition, video, digital interactivity, networking, recording and live performance converged into a new approach, recombining all these prior elements into what Deleuze would call “heterogeneous assemblages in which the components’ differences are not cancelled through homogenization” (DeLanda 205). Indeed, this is a satisfactory way to describe the experiments I produced during this research project, and it allows us to induce, from these types of progressions, that the history of media and even communication is one of cycles of *convergence*, where new media *converge* prior media into content, and therefore a three-phase cycle of *pre-convergence*, *convergence*, and *post-convergence* might be seen as a logical result of our technosocial cycle not restricted to any particular instance of new media, digital or otherwise, recent or old. All media

converges and is converged, and these experiments show that the *post-convergent* phase of a new medium to be a rich, deep potential site for experimental art.

### **Pre-convergent art practice is possible in a post-convergent medium**

So, although RT3D MUVES provide a medium that contains all other media as content, the medium itself benefits in terms of artistic output when viewed, developed and treated as a post-convergent medium. While it is logically and technically possible to recreate other, pre-convergent performances or artworks within the medium, that in itself would not qualify as using the medium for its intrinsic qualities, but rather would be a mechanical demonstration of the historical fact of convergence. Even though artists Eva and Franco Mattes have shown the crucial role that such a demonstration can play in explicitly highlighting the post-convergent nature of the medium in both their Second Life recreations of famous historical performance art works, and their super-glossy fashion-mag fetish photographic portraits work 13 Most Beautiful Avatars (2006), it remains a practice wholly situated at the point of convergence, still primarily encountering the medium through its relationship with prior media, rather than the kind of heterogeneous assemblage that represents a post-convergent concept, design and production process.

### **A temporally non-linear collaboration between the virtuosic user and artist redefines the concepts of *live performance* and the agency of the artist**

Given this cycle of media convergence, then, the concept of performance within such a post-convergent environment must itself converge existing conventions of performance practice and situate itself within the post-convergent context. In the case of live performance, this means bringing to the existing notion of virtuosic performer, the very post-convergent notion of the virtuosic *user*. The work itself cannot really be said to be in existence until it is being used by the user – and at that point it becomes a collaboration between the artist and the user. Since it is happening in real-time for the user, the user is playing the work live. The result is a non-linear live performance

between the user and the artist. This raises questions of agency and presence, since it is potentially non-intuitive to think of a live performance by a performer who is not present at the performance site (i.e., the artist). But these questions are by no means limited to RT3D MUVes, with Floridi's notions of *successful observability and backward and forward* presence useful not only in contextualising RT3D MUVes as a performance or art medium, but also for a more formal modeling of Munster's digital embodiment, and the questions of presence and agency raised for both artist and user (Floridi 656-667). In Floridi's three possible ways of being present/absent at a given Level of Abstraction, (See Chapter One, Floridi's formal model of telepresence), the assertion of non-linear live performance and collaboration between artist and user holds as both (1) and (2), and therefore is (3). To be clear, the works I have made in the 3D MUVes are a "dynamic source of action/interaction or change" as well as "property bearers" in the space of observation, i.e., the virtual environment (Floridi 656-). Floridi's successful observability does not distinguish between human and non-human presence, therefore it appears that the works I have composed/constructed in the virtual space *themselves* are present. I would argue as part of the results of this experimentation process that the works themselves, meaning the *digital assets* themselves, in a purely phenomenological sense fulfill only criterion (2) in Floridi, i.e., merely as a property-bearer. The works *themselves* do not fulfill Floridi's criterion (1), i.e., as a source of action/interaction, until the humans are introduced, the artist and the user/s. The artist can of course also participate as user in the work, and often must do so as part of the digital craft process, but these experiments show also a uniquely post-convergent ability for the user to participate as artist/composer/arranger in real-time.

In other words, the results indicate that the presence/absence, if not the agency, of the artist/composer is invested intrinsically in the post-convergent phase of non-linear, digital, networked, virtual performance, such that it is possible to assert that when a user is interacting with one of these works, this constitutes a form of live performance between the artist and the user, because it is happening in that user's real time (i.e., *live*), it is unique to the

interaction between the user and the work, little multi-sited relationships of non-linear time. Again, the artist and user occupy simultaneously the same and different ontological presences within different Levels of Abstraction that constitute the space of observation within a MUVE. Awareness and manipulation of this telescoping of the subject become elements to be played within the performance, forcing us to acknowledge if not the agent-like, at least the enabling power of digital networked tools that are intrinsic or endemic to the virtual environment itself. The results presented in this research project arising from the switch in technology from the VRML/Java client/server architecture to Second Life argue strongly and definitively for two things: firstly, for the utility and convenience of inworld collaborative building tools, and secondly for a large user base. The much discussed popularity of Second Life does seem to indicate that a large number of people are prepared to download a lot of software and use a lot of bandwidth, pretty much to the limit of the broadband market's capacity for middle class users in developed countries, in order to participate in RT3D MUVEs. This creates a vigorous and fertile environment within which to practice art; an environment which continually evolves according to artist/user interaction.

### **Digital colour, opacity and time as intrinsic qualities**

Certain practices emerged in the digital crafting process over the iterative cycle of this project's experiments. Since each housing of the works in this project was entirely digital space, and the works are primarily designed to be interacted with via a computer screen, visually the artist is presented with the ability to work very precisely with extremely saturated colours, such as are only commonly visible in the digital vision space. It follows that colour, as a technosocial media-element within RT3D MUVEs, converges all prior artistic potential and practice regarding colour and its (media) history, but equally should it not be surprising that the artist will continue the exacting, relentless search for extraordinary expressions and methods of colour. As one of the relationship assemblages within the overall product, the artist is able to work with very detailed subtlety in the interactions between shades of colours, particularly when used in concert with *opacity*, which is a uniquely

digital parameter, despite its relationship with the physics of both light and material implicit in its name.

As a means of orchestrating colour and other audio visual attributes to a very precise degree, time- and value-based animations can be applied to useful effect through assemblages of simple patterns producing a complex, layered whole. Within server/client-based RT3D MUVes, (particularly if there is a physics model being applied environment-wide), data-exchanging relationships can be problematic when used in conjunction with animation if time-accuracy is required, since the client may be experiencing a slightly different spatio-temporal state than the server due to lag. Therefore, it is more promising to weave *lag*, or non-linear spatio-temporal unity, intrinsically into the conception of the artwork, as one of its environmental conditions.

### **Virtual environments are entirely composed of data**

Since the environment is entirely composed of digital data, it is possible to extract data from the environment itself and its interactions with users, and use the data to populate the values assigned to such animations; in other words, virtual environments can be data mined for input back into the environment, culminating in complex RT3D feedback effects. This allows a surety that each instance of the interaction between (the experience of) an artwork and user is unique to that interaction in realtime, so that even repeat visitors will experience different interactions. This reassignment of data can occur because an intrinsic quality of the environment is the ability to move data: within the virtual environment; between the virtual environment and other digital networked environments and between the virtual environment and the material world. This flow of data, re- and de-modulated over and over, requires a more sustained intellectual interrogation. I attempt the beginnings of such an interrogation in the next chapter.

### **RT3D MUVes as a site for art**

At the same time as affording unique opportunities for the artist to explore the intrinsic qualities of RT3D MUVes, a platform such as Second Life has

significant problems or restrictions technologically and architecturally. It also raises particular cultural issues as a platform or site for art when measured against Badiou's 15 Theses given that the libertarian capitalist Web 2.0 economic model and simulation metaphor on which Second Life relies could be seen as a flawed or compromised foundation when compared to many of Badiou's criteria, which are concerned with not serving the needs of contemporary capitalism, what Badiou calls global "economic liberalism" (Polemics 139). However, it is possible to argue that while this may be true of Second Life's specific implementation of a RT3D MUVE, it is not necessarily intrinsic to the medium itself. Adopting this view at least allows an evaluation of any putative artworks using RT3D MUVEs as a site for their realisation.

### **Alain Badiou's 15 Theses on Contemporary Art**

In this section, I want to use Alain Badiou's 15 Theses on Contemporary Art (published in the journal Lacanian Ink, and subsequently in Polemics as Third Sketch of a Manifesto of Affirmationist Art; I will be referring to both versions) to consider how art might be possible in virtual environments, at the same time that Badiou himself would likely not recognise these as genuine sites for art. I am therefore attempting to extend Badiou's philosophy into a place it has not yet been. Ian Bogost has previously attempted to do this, albeit in a completely different manner, as he does not talk about art itself, rather how Badiou's philosophy might specifically be applied to video games (Bogost 123).

Despite his radicality as a philosopher, Badiou's own theory of the arts (as seen in all his works, but especially Handbook of Inaesthetics where he talks of poetry, dance, theatre, prose fiction and cinema), never deals with digital or virtual media in any way. In fact, the limit of art for Badiou is cinema, which he sees as the most impure medium, and at the very limit of what can be done with art:

With cinema, the most impure and hybrid of all arts, Badiou is clearly tempted to

give up any particular method of enquiry. In fact, "the basic unit of investigation" may not even be "the film in its totality". (During, Art footnote p 92-93)

However, as an artist attempting to think rigorously about what appeared to be a new medium, I was struck by Badiou's 15 Theses in their stark simplicity that seemed to offer so much for thinking about the implications for art of the digital global network, and specifically RT3D MUVes. Accordingly, the following section is not designed to contribute to the scholarship of either Badiou or philosophy, rather it is an explication of my rigorous attempts to think about the nature and implications of the works created in this project, using Badiou's 15 Theses as a guide.

### **Theses 1 to 3**

1. Art is not the sublime descent of the infinite into the finite abjection of the body and sexuality. It is the production of an infinite subjective series through the finite means of a material subtraction.

2. Art cannot merely be the expression of a particularity (be it ethnic or personal). Art is the impersonal production of a truth that is addressed to everyone.

3. Art is the process of a truth, and this truth is always the truth of the sensible or sensual, the sensible as sensible. This means: the transformation of the sensible into a happening of the Idea.

For Badiou, art is a truth process. This means it is concerned with bringing into the sensible an idea that has yet to be recognised, which is also the creation of an idea. Badiou as a philosopher, and as a Platonic philosopher especially, believes that, to quote Socrates, "the unexamined life is not worth living." For a platonic philosopher, examining one's life requires turning towards an idea. As the French psychoanalyst Jacques Lacan phrased this, "one paves the way for science by rectifying one's ethical position" (Écrits 645). In other words, for a philosopher, a life lived without ideas is no life at all (Badiou: Logics of Worlds 507-514). The crucial problem for an artist in

Badiou's terms is to struggle with embodying an idea in the work. The idea is oxymoronicly expressed as a formless form, and I will explain this further below. The idea doesn't preexist its expression, but when expressed it is possible to discern its retroactive power on existing thought. This becomes obvious with post-convergence, which renders certain principles of prior media clear, even independently of their new relationship with post-convergence. As Justin Clemens and I argued in our Seven Theses on the Concept of "Post-convergence":

When we speak, then, of "post-convergence", the concept itself presupposes this earlier moment, of the recognition of "convergence"; as it does so, it splits the time of the concept into at least four: 1) The moment of post-convergence; 2) The moment of convergence, which post convergence references and presupposes; 3) The moment of pre convergence, which only emerges in its difference with respect to the different differences of modern media that make convergence apparent; 4) The recapitulation and seizure of this triple division of moments in another moment, that of the concept itself. (Clemens and Nash Thesis 2)

With his first three theses on contemporary art, Badiou is speaking against what he calls *romantic formalism*, or art that engages with what he calls the contemporary "war between enjoyment and sacrifice" (Badiou, Subject of Art paragraph 10). This includes any art where the artist is consciously indulging personal or emotional feelings in a heroic or therapeutic manner. It also includes art that is specifically aimed at commercial markets, since such art is only capable of reinforcing ideas already thought of as true by the structures of global capitalism, which Badiou refers to here as *Empire* and in later versions as *the West*. Since art is concerned with the bringing forth of unrecognised truths, it is necessarily an impersonal process, and therefore Badiou, rather than recognising individual artists, prefers to talk of *series*. A series is a sequence that identifiably succeeds in bringing an idea into the sensible, and such a sequence may be a single work, or a group of works, whether by a single artist or multiple artists. Such sequences are identifiable only later, since the artists responsible necessarily can not consciously create such a work. Rather, an artist must remain attendant to the singularity of the

work itself, by remaining cognisant of the principles Badiou describes, which involves a struggle with the materials and techniques of the medium, demands that must be negotiated in order to produce works that are new. The artist only becomes an artist in that struggle with the materials and techniques themselves. In this way, the creation of work becomes a process of experimentation. In the case of the works I have presented in this project, I identified, in Badiou's terms, an *event* that I have named *post-convergence*. Having named the event, I then set about exploring the nature and implications of this identification for the work, since the identification seems like a revolution in thinking about the work. What are the conditions that the event is in excess of, what are its consequences, and how can the artist create work that brings forth a *subject* of this event, if this is indeed even possible. The work shouldn't create something that is only a logical outcome of its materials, rather it should create new possibilities of patterns without being merely reducible to a pattern. In other words, everything gets transformed in the making of the artwork and the artist must invent new ways of struggling with the materials, transforming their own power to come up with new solutions. It doesn't matter how I personally feel about this, rather it becomes my compulsion to rigorously investigate, experimenting to see if something genuinely new is brought forth, or if in fact the works are merely reworking ideas that are already known to exist. For Badiou, this can never be known for the artist and is a subtle and complex task. In the case of RT3D MUVes, it is first a matter of identifying, as I have laid out in this exegesis, those elements and qualities of the medium that can be said to be *intrinsic* to the medium, and those that are reworkings of already existing elements or qualities. It brings into question everything you (as the artist or interactor) thought you knew. One of the things the artwork does is make that separation apparent, indeed the *work* of the work of art is separating the mixed media aspects from its intrinsic aspects, in order to present the idea as new, showing that it can not be done with any other medium, though nor would it simply emerge from the medium without the work of art.

Badiou believes that the artist is neutral and transitory in the process of art. These notions of the neutrality of the artist can be seen as similar to the ideas

of Martin Heidegger's in his essay The Origin of the Work of Art (1935), where he writes, "the artist remains inconsequential as compared with the work, almost like a passageway that destroys itself in the creative process for the work to emerge" (166). It is very interesting to look at this notion in terms of data-as-medium, particularly as explored in the works from this project such as Moaning Columns of Longing, Disaccumulator, Mitosis, and One, Another. These works partially hand over the process of the work to the data that, remodulated, constitutes the work itself, and therefore perhaps take (too?) literally Badiou's call for the neutralising of the artist as individual. Elements of the work itself are responsible for carrying out the process for constituting the work, the display of which will be different every time the work is interacted with.

In these theses, Badiou is talking about the artwork bringing into sensible perception an idea that lies at the edge of sensory perception, i.e., it is already visible and yet has not been sensed until the finite nature of the artwork forces an opening through which a new subject is created. This raises interesting questions in regards to virtual art, since Badiou (and Heidegger) rely on the artwork having some kind of finite form through which the idea is realised. Artworks produced in virtual environments clearly have a form, but it is very difficult to characterise them in material terms of finitude, rather the forms serve the purpose of remodulating the insensible into the sensible without themselves adopting a material form, that is, they remain as data modulated into the audiovisual display register. The works enter into a complex assemblage, as demonstrated by Munster, Hayles and Matrix, between the technical means of display (computer, internet), the artist and the interactor in a manner that I characterise in this exegesis as post-convergent. However, this by no means excludes them from the process described by Badiou's third thesis because ultimately we are still dealing with forms that work to bring an idea to the range of the sensible. These forms will not be recognised as finite forms as such, even as they bring a new form of thinking into being; they are formalisations, not simply forms already recognisable as such. In the future, it may be the case that these forms will be recognised as reasonable or familiar, different from their current status as

indiscernible or even chaotic in relation to contemporary practice.

#### Thesis 4

4. There is necessarily a plurality of arts, and however we may imagine the ways in which the arts might intersect there is no imaginable way of totalizing this plurality.

This thesis is important in relation to the concept of post-convergence I propose in this exegesis, because of its status as emerging from the convergence of all prior media as content. Badiou's thesis reminds us to resist any totalising tendencies this may engender in terms of its relation to those prior media. I have identified the possibility of *pre-convergent* (or, in McLuhanistic terms, *rear view mirroristic*) work within a post-convergent environment as being a logical outcome of post-convergence. Often, such rear view mirrorism is used as an acculturation device, relying on precedent based knowledge. Second Life's primary interface analogy of material space with ground, gravity, sky and land is an example of such an acculturation device. In Badiou's terms, this is an example of an *opening* as opposed to a *point* (Logics of Worlds 82). An opening is a practice in the new medium that refers to prior practice in order to allow the audience some knowledge base from which to encounter this new medium. A point, in contrast, is a practice that specifically concerns itself only with the qualities that are unique to the new medium, or what I have identified as the medium's *intrinsic* qualities. In Logics of Worlds, Badiou gives an example from serial music at the beginning of the twentieth century, a movement that Badiou identifies as a sequence that conforms to his criteria as outlined in these theses. He identifies the work of composer Alban Berg as an *opening* into the new world of serial music because his music used forms and conventions familiar to listeners through precedent, such as the opera, and nineteenth century symphonic forms. Anton Weber's compositions, on the other hand, are given as an example of a *point* because they dealt specifically with the implications and potential offered by the new compositional techniques of serialism, such as sections of silence and, in relation to precedent, very short pieces of sound, barely recognisable as music at all on the basis of received conventions. Thus,

Berg's music was well received at the time, whereas Weber's was misunderstood until contemporary culture had processed the concepts of serialism and accepted them as a legitimate aspect of musical culture (Badiou, Logics of Worlds 79-89). Weber's uncompromising experiments within the new dodecaphonic regime can retrospectively be seen to have literally extended the definition of music.

However, Badiou's fourth thesis reminds the practitioner to remain concerned only with the singularity of the work itself, in order to resist any totalising tendencies regarding the prior media that have been converged within the medium. When seen in its post-convergent condition as merely the creation of a new medium (realised in data) in excess of the technical convergence of all prior media that constitute it, there is no need to aspire to a totalising of all sensory or media experience. Its very nature as a container of prior media should ensure that its practitioners will remain aware of its own plurality, in a recursive dialogue with the conventions of its constituent elements and the possibilities afforded by their convergence. Indeed, such practitioners should, in Badiou's terms, attend only to singularities and sequences in the creation of work, remaining aware of the relationality of all other media within the virtual medium, without mimicking or competing with any of the art forms that may combine to constitute the post-convergent medium. Badiou's concept of openings and points can act as a very effective guide for the practitioner in this process. The specific danger of the virtual medium is that it presents itself from the beginning as a totalisation of all the prior media that constitute it, but this doesn't mean that it totalises either those media or that that self presentation is not itself a received fallacy.

In regards to the works presented in this project, each individual work represents an experiment that consciously manipulates sets of individual elements, empirically examining the changes, or results, that emerge from the explicit questioning of the nature of the plurality that constitutes each work. Each work relies in many ways on the openings created by precedent, in particular those sited in Second Life because of that platform's fundamentally precedent based approach to the interaction metaphors. In terms of

totalisation, the aim of the creation of each work was to attempt to create a genuinely new work that, while acknowledging and in some cases relying on precedent, manipulated in some way the *intrinsic* qualities of the medium. Eventually, this was done free from any totalising tendencies in respect to the prior media that had been converged within the new medium, although it is true that at the beginning of the project I did indeed suffer from a teleological illusion regarding the potential of the new medium to render prior media obsolete. As a result of the rigorous thought and research around this, however, I soon came to realise that, precisely *because* of the new medium's ability to converge prior media, the new medium is crucially *in excess* of its constituent elements. Therefore the new medium does not imply any notion of competition with, or erasure of, any prior medium that may partially constitute it. Indeed, an historical fact of media history is that no given medium ever ends. Rather, at the moment of post-convergence, the prior medium splits in two; one part continues as if unaffected by its convergence into a new medium, while the other part enters into a new, symbiotic relationship with the post-convergent medium, which continues to develop as part of the process of the post-convergent medium. Recognition of this fact should prevent any totalising tendencies on the part of the artist working in the post-convergent medium.

### **Theses 5 to 8**

5. Every art develops from an impure form, and the progressive purification of this impurity shapes the history both of a particular artistic truth and of its exhaustion.

6. The subject of an artistic truth is the set of the works which compose it.

7. This composition is an infinite configuration, which, in our own contemporary artistic context, is a generic totality.

8. The real of art is ideal impurity conceived through the immanent process of its purification. In other words, the raw material of art is determined by the

contingent inception of a form. Art is the secondary formalisation of the advent of a hitherto formless form.

Thesis five follows logically from the discussion of form as related to the first three theses, but is of course also related to the resistance of any totalising tendencies. Here again, Badiou is talking of the capacity of an artwork or series to bring an idea into the sensible, starting with an unrecognised idea that is brought forth via the finite formalisation of the work. Each singular work is necessarily impure because it is dealing with the paradox that denies the perfect expression of the idea at the same time that it expresses it in an imperfect manner, thereby changing the idea itself. The finitude of the work, for Badiou, is its presentation of something intrinsic to that medium, within the medium itself, in a way that could not otherwise be shown. Nor could it be expressed propositionally, for example by a philosopher, and part of the way it shows this is in its capacity to affect. Series of works progressively refine this engagement, always in this paradoxical recursive relationship with the idea itself. In some ways, this process becomes the very material that the artwork is composed of, and the works themselves become *subjects* of this, in Badiou's terms, truth process. This is crucially related to Badiou's ideas of a new subject of art, as outlined in his 2005 essay The Subject of Art. In this essay, he calls for a new kind of subject that is neither the strictly materialist concept that rejects any distinction between a subject and a body, nor the metaphysical concept that entirely separates the subject and the body, rather a subject that is a *process* of "immanent difference, not immanent identity, not transcendent difference, but immanent difference." (Paragraph 11). In Badiou's subtle and complex philosophy, a subject is the "process of a relationship between the trace [of an event] and the body" (Subject of Art paragraph 6), and in this way it can be related to the first thesis' notion of an "infinite, subjective series." (15 Theses Thesis 1). In my case, the trace of the event is what I have named post-convergence, and the series of works I have made are part of my attempt to follow through on the question of whether post-convergence is indeed the basis for all new media today. Therefore is art possible within this and, if so, what manner of works can embody a new idea of art?

In this process, I have attempted to identify intrinsic qualities of the virtual environments in relation to their post-convergent nature. This is in order to create works that engage with unrecognised ideas that may yield specifically to the unique conditions established by the leveling process of the modulation into digital data that all elements constituting a virtual environment must undergo (this process is discussed in detail in Chapter 4). This is not to say that, in the creation of the works, I as the artist am in any way able to determine whatever those ideas may be or even that they do exist. Rather, it is a process of experimentation necessitated by the recognition of the newness of the virtual environment. In Badiou's terms, the results of these experiments may bring forth a new subject, that is, the connection or relationality between the finite form of the works at any given time, the dynamic nature of the data informing its formalisation, the interactor, the artist and the virtual environment itself. Badiou's notion of a new kind of subject is particularly relevant to the virtual environment given the questions it technosocially raises about the status of the users, the artworks and the artist in ways discussed earlier in relation to Munster, Hayles and Matrix. These questions of digital embodiment, layered subjectivity and telematic agency are not what Badiou is referring to in these theses, but they do partially constitute the form through which artwork in virtual environments is forced to present itself, and therefore partially constitute the new subject created by virtual artworks, should such subjects emerge, of which there is certainly no guarantee.

### **Theses 9 to 11**

9. The only maxim of contemporary art is not to be imperial. This also means: it does not have to be democratic, if democracy implies conformity with the imperial idea of political liberty.

10. Non-imperial art is necessarily abstract art, in this sense: it abstracts itself from all particularity, and formalises this gesture of abstraction.

11. The abstraction of non-imperial art is not concerned with any particular

public or audience. Non-imperial art is related to a kind of aristocratic-proletarian ethic: Alone, it does what it says, without distinguishing between kinds of people.

These highly political theses show how seriously Badiou takes the role of art in the contemporary world. There are a couple of related strands running through these theses, that of an art that is for all people, but is so without furthering the cause of global capitalism. These are, ostensibly, difficult standards to apply to any work created in virtual environments, relying as they do on the global network and commercial hard/software to even be interacted with. On the face of it, it doesn't seem possible that any virtual artwork could do anything other than further the cause of global capitalism by appealing to a specific sector of people affluent enough to afford computers and internet access. At the same time, this could be said to be true of many (if not all) other artforms, given the pervasive nature of global capitalism's communications networks. Certainly, cinema could be said to rely entirely on the production, distribution and communication structures of global capitalism, and yet Badiou is willing to acknowledge certain practitioners and works of cinema as attaining the status of art his Manifesto would have them aspire to. In terms of appealing to no particular public, it could be argued, since the internet is used by a far greater sector of society than would constitute the audience for any individual contemporary art form, that a far broader audience is in fact an intrinsic potential of any artworks sited in a RT3D MUVE. But one assumes Badiou is not being so instrumental in his call for "art for all", and is talking rather of the artist's need to concentrate on the truth process of the work itself, instead of being concerned with who the audience may be, or whether it will bring *success* for the artist within the global art economy. Again, this is no different than for any other art form, if one bears in mind that the medium that is often *used* explicitly for the communication of capitalism is not *the same as* such communication. Regarding the works presented in this project, they were each created solely in attendance to each work's singularity, without regard to any projected demographic or audience. This is a complex point because the nature of the medium requires that the works are designed to be interacted with in order to expose the mathematical or geometrical or

algorithmic principles being tested in each work. Most of the time, though not always, the works are required to be interacted with by people, and therefore cannot possibly have been built without prior thought of such people, but this is a very different thing from designing them for a particular audience, with all the socio-economic profiling that term implies. Indeed, it is one of the intrinsic consequences of data as a medium that a person is no more or less important as an interactor than any other parameter within that data-driven environment, be it a robot, a software program, stock market data or a person. At the same time, I have said that many of the works are designed to be interacted with by *virtuosic users*. This, however, is a different thing from designing for a particular audience, in that all forms of art require the audience/interactor to attain some level of knowledge particular to its form. This is easy to forget when comparing with a medium like painting, which has been used and internalised by people for thousands of years, and is yet still capable of confounding viewers. Once such knowledge is established, new potentials are opened by the ability of works within virtual environments to establish one-to-one connections between interactors and artists, even though such interactions are carried out on the network of global capitalism. This constitutes an intrinsic quality of virtual artworks – the ability for interactors to engage with the work on a very intimate level, removed from any physical staging or curating circumstances such as an art gallery or a concert hall. Indeed that interaction cannot not be considered constitutive of the artwork itself, in that the work relies on such an interaction to bring it into existence. The levels, the types and the rhythms of these interactions are some of the qualities I have explored in these works. For example, the sensual and emotional blackmail that occurs in Moaning Columns of Longing is not what usually occurs in capitalism's use of interactivity, (i.e., a standard exchange of commodities), rather it calls into question the instrumentality of not only the technological interaction itself, but also the very means by which such an interaction can take place and the relationship between love and technology.

In his book Polemics, Badiou gives an explication of thesis number 10, where he talks of relying on mathematics and, specifically, geometry to achieve this

kind of abstraction. He says that “intelligible deformations” are desirable in art, and that these can be attained through a manipulation of the logic of “hidden invariants” via mathematics and geometry (147). He specifically references the twentieth century modernist geometric painters and calls for art to reacquaint itself with geometry. It is worth pointing out that Badiou is not talking about some hidden spiritual secret or pattern that underlies the universe, because he very seriously believes that “mathematics is ontology” (Being and Event 4). In thesis 10 he is calling for a rigorous and sustained exploration of the implications of mathematics in art, but he is not necessarily calling for artists to *use* mathematics or geometry in the composition of artworks; rather he is referring to the depersonalised connection with being and idea that rigorous mathematical experimentation engenders. Nonetheless, it seems highly appropriate that the site for such an exploration would itself be constituted in mathematics, and RT3D MUVEs certainly are.

Similarly, the works presented here themselves are intrinsically constituted and realised through mathematical experimentation with geometry, existing dynamically in a complex system of de- and re-modulation of data that fundamentally operates via mathematical algorithms. In this way, Badiou's call for artists to reacquaint themselves with geometry becomes literally an operation in the medium of virtual environments. Most of the works in this project can be viewed as rigorous attempts at exploring “intelligible deformations” (Badiou, Polemics 147) produced by the complex interaction of geometry through a dense matrix of interrelationships with the virtual environment, the data that constitutes it, and the (human and non-human) interactors with the environment and the works. All of these elements are constantly re- and de-modulated into data-as-data and data-as-display according to a range of mathematical operations, some of which are predetermined by the specific instantiation of the MUVE (ie, in the case of these works, VRML/VNet or Second Life) and some of which are contingently determined at the time of the interaction itself.

Construction of the works, as we have seen, relies on a rigorous process of iterative experiments that manipulate various parameters of mathematics and

geometry in order to construct works that express, to a greater or lesser degree, some kind of geometrical truth that apparently exists independently of the works, the artist or the interactors, but can only be observed at the point they are modulated from data-as-data into data-as-display. At that point, these “hidden invariants” (Badiou, Polemics 147) are instantiated uniquely for the interactor, but are the result of an impersonal production that is not particular to any egoistic expression. It is important for the artist to remember that just because the media is itself constituted through mathematics and geometry, it does not follow that all works created in this medium will automatically fulfill Badiou's demands because for Badiou, nothing automatically fulfils these demands.

### **Theses 12 to 15**

12. Non-imperial art must be as rigorous as a mathematical demonstration, as surprising as an ambush in the night, and as elevated as a star.

13. Today art can only be made from the starting point of that which, as far as Empire is concerned, doesn't exist. Through its abstraction, art renders this inexistence visible. This is what governs the formal principle of every art: the effort to render visible to everyone that which for Empire (and so by extension for everyone, though from a different point of view), doesn't exist.

14. Since it is sure of its ability to control the entire domain of the visible and the audible via the laws governing commercial circulation and democratic communication, Empire no longer censures anything. All art, and all thought, is ruined when we accept this permission to consume, to communicate and to enjoy. We should become the pitiless censors of ourselves.

15. It is better to do nothing than to contribute to the invention of formal ways of rendering visible that which Empire already recognises as existent.

The final four of Badiou's theses are perhaps the most difficult in relation to

the works created in this project, and indeed any art. This is because they are very stark in their insistence on a duty that Badiou feels an artist has to cleave to the truth process, and to reject the machinations of global capitalism. The rather florid thesis 12 is trying to illustrate what Badiou feels are the three imperatives facing contemporary art: consequence, which relates to the mathematics of being; surprise, which relates to the real, or the exception; and elevation, which relates to the symbol or distance. We have already discussed how the works presented here deal with mathematical truths, in that all the works are constituted by, and are experiments in, mathematical algorithms in both their individual execution and in their situation within a virtual environment. In this way they are quite literally demonstrations, though perhaps not in the exact nuance with which Badiou uses the term. Some of the works hang together better than others, in ways that have been discussed in the individual evaluations of the works. In terms of surprise, certainly some of the works opened surprising possibilities if only within the limited parameters of the experiments themselves, i.e. as works exploring their contextual relationship with the medium of RT3D MUVES and implications for further experiments. In as much as the works were well received by institutions with an interest in the field (the National Art Award in New Media and the arts arm of ACM SIGGRAPH, the international computer graphics' industry's peak body), they can be said to have at least asked questions of the medium and its contemporary context, although such institutions would almost certainly be viewed by Badiou as organisations designed to further the cause of that which is already visible to global capitalism, and here I would agree with him.

Thesis 14, which echoes William Burroughs' phrase "everything is permitted, nothing is true" from his 1980 novel Cities of the Red Night, reminds the artist to stay attendant to the truth process in the creation of work. This is related to Badiou's thoughts in The Subject of Art about the requirement of contemporary art to find a new subject that does not succumb to what he characterises in that essay as the contemporary world's "war between enjoyment and sacrifice" (Paragraph 10). In the present world, there is a tendency to claim that, since everything is subject to a commercial imperative

in one way or another then firstly, we cannot make a distinction between commercial and non-commercial arts, and secondly, we should therefore when appraising the arts, praise commercial arts as well. Badiou is completely opposed to this conflation, which is why he wants to stress the exceptional and distant relation of a true work of art from any commercial exigency. In terms of the works presented in this project, it is possible only to say that I attempted to maintain a rigorous approach to the singularity of the works themselves, except in the initial work Memory Plains Returning, which in some ways expressed an egoistic particularity on my part designed to appeal to the vocabulary of curators to help make the work a success. Just because this work did not, in fact, achieve any form of commercial success does not excuse it from its commercial aspirations.

Badiou's final thesis is, as I have said, bleakly admonishing. As discussed earlier, it is very difficult to think about the works in this project along these lines, but the results of the experiments have at the very least opened potential points of interest regarding the cultural context in which virtual artworks exist, and pose some small questions around how works created in RT3D MUVES may change contemporary understanding of art.

# Chapter 04: The Ontology of Data and The Status of Artworks in Virtual Environments

## Modulation

As discussed in the previous chapter, the constant movement of data in a symbiotic process of modulation, demodulation and remodulation is one of the defining characteristics of virtual environments as a medium, and can be identified as one of its prime intrinsic qualities. Regardless of the final display characteristics of any given element (for example, colour, animation, audio, navigation, depth, time, etc.), that element is constituted through this constant process of the modulation of data. To be clear, *modulation* in this sense means the process of changing some phenomenon from one register into another an arbitrary number of times, usually for the purpose of storage and/or transmission. The term modulation has several uses in contemporary technical and artistic parlance, all of which represent a nuance of this basic underlying meaning of transforming a signal from one register to another. For example, in telecommunications, it specifically means the process of transmitting a message signal inside a carrier signal. In music, modulation means changing the *key* a piece of music is played in. In electronic music, it usually means using the qualities of one sound to *shape* another sound. In all cases, the end result is that the original signal arrives *intact* in a different register. It is *the same, but different* (think of the similarities and differences between a human voice heard in person and the same voice heard over a telephone, which is simultaneously recognisable as both a human voice and *not* a human voice), and this point is of key interest when examining the nature of data. All digital data constantly undergoes this process of modulation, demodulation and remodulation, in order that it may be perceived by humans. Virtual environments are entirely composed of digital data.

## Modulation example

To give an example taken directly from the works examined in this project, consider the sound of a particular Australian Magpie singing its song in a tree in North Melbourne on a particular day in 2007. I recorded this song using a digital audio recorder, uploaded the audio file to a computer for processing and editing before uploading the resulting audio file to Second Life, where it is scripted to play under certain conditions. Several modulations occur in this process. First, the physical analog sound (itself *modulated* by the air that carries it) is *captured* by the microphone of the digital recorder, which encodes it as binary data (i.e., modulates it from an analog signal to a digital signal) and stores it on its onboard memory card. This encoded signal is then transmitted via USB cable to a computer. While it may seem counterintuitive to characterise this stage of the process as modulation since we are culturally used to expecting the digital copying process to result in *exact copies*, it is entirely likely that the memory card on the recorder and the hard drive on the computer have completely different filesystem architectures and therefore protocols must be negotiated in order to ensure the binary information is transmitted *correctly* when modulating the information from one storage medium to another. Once on the computer, I use a sound editing program to play back the sound, in other words the sound editing program works with the computer's digital audio hardware to demodulate the binary signal into an analog audio signal that can be transmitted through the air to my ears via the speakers attached to the computer. While listening to (or, *monitoring*) the sound, I apply any number of digital audio processes to modulate the sound (eg., isolating certain frequencies, removing background noise, boosting volume and harmonic presence of relevant frequencies) until I arrive at a sound that I feel has a good chance of being perceived by humans as *the sound of a magpie*. Once this is achieved, this new version of the sound is once again saved to the computer's hard drive (i.e., modulated) as binary information, and then modulated again into the particular format that is required by Second Life. Then I upload this sound to Second Life, a process which is itself a series of modulations, demodulations and remodulations contingent on such factors as a wireless network, a cabled network and the hard drives of

both my computer and the computer in Second Life's *server farm* that is responsible for storing and cataloguing the digital file. Once the file is stored on the Second Life server, it can be accessed from within the Second Life client program, which again involves the file first being de- and re-modulated from its storage format,<sup>16</sup> transmitted over wired and wireless networks in order that it is once again stored on my computer's hard disk. From this hard disk it is once again de- and re-modulated until it reaches my ears over the air via my speakers, whilst all the time being adjusted in a realtime stereo mix by the Second Life client software to maintain the illusion of 3D space (i.e., the sound is coming from *over there in that tree*). This technical process is constantly undergone by all the elements that constitute a virtual environment, along with a more conceptual kind of modulation that may be said to be taking place (un)consciously on the part of the user, who is constantly adjusting perceptory stimulation received from the virtual environment in order to negotiate the multilayered and recombinant process of digital embodiment (discussed earlier) that is required to engage with the artwork sited within the virtual environment as well as the technical phenomenon of the virtual environment itself.

### **Data is the medium, modulation is the action**

From this train of processes, we can see that data is the medium, and modulation is the action that enables artworks to exist within that medium. But, what is the ontological status of data? What are the consequences of this constant modulation from one register to another, where everything is the same but different as/from itself, and what is the status of artworks produced within such a medium? These are the questions this chapter attempts to approach.

If data is the medium, what are its properties? We have briefly seen that modulation is the process by which the medium is transmitted, stored and, since the consumption of any work created within the medium relies on some kind of transmission, constituted. This can give us a clue as to the properties

---

<sup>16</sup> the delightfully named, and open source, format known as *Ogg Vorbis*.

of the medium itself. Since, in the digital realm, data is simply data, decoupled from the semantic intention of its original signal, (any kind of data can be demodulated into any register), parameters must be established to ensure that the intention of the original signal is reconstituted upon its demodulation into its destination register. For example, it is quite possible to demodulate a digital image (such as may be taken by a digital camera of a material scene) into a sound editing program and play the data as sound, therefore parameters must be rigorously established that govern how any given digital data is de- and re-modulated. The notion of protocols or standardised processes that abound in the contemporary technical sphere (such as govern the internet, image compression, audio reproduction and so on) are expressions of this codification of parameters – both sides of a modulation exchange agree to adhere to a set of parameters in order that the intended result is achieved.

### **Data-as-data and data-as-display**

The digital camera image example is conceptually fairly straightforward with centuries of optical technology now in our grasp, but virtual environments, as we have seen, are entirely composed of digital data, and many of the elements and phenomena that constitute a work within the virtual environment originate from within this environment only without reference to external parameters that might logically or obviously govern them. The establishment of parameters therefore emerges as one of the fundamental processes, or acts, that the practitioner must engage with when creating work within a virtual environment. To effectively engage with this, it is crucial to acknowledge the distinction between digital data-as-data (i.e., devoid of any semantic content) and digital data as its demodulated result (ie, its display, where *display* here does not prescribe *visual* display, rather any means of allowing a digital signal to be perceived by a human, whether it be visual, audible, written, haptic, etc.). This may be thought of in prior terms as the difference between *data* and *information*, where epistemologically information comprises a collection of data, with information leading to knowledge. We could perhaps characterise digital data as *data*, and its display as *information*,

with the affect it elicits in the user being *knowledge*. In contemporary society, though, the terms data and information are increasingly used interchangeably, with some commentators explicitly encouraging such a blurring of definition (Economist). This is perhaps to be expected in a society where data proliferates at a seemingly incredible rate, and where money is to be made in the collection and analysis of the *data exhaust* of users - reverse engineering the trails of mouse clicks any individual may describe while web surfing in order to more and more precisely target advertising *tailored* to the individual.

### **Parameters for modulation**

The practitioner creating artwork within virtual environments must remain very aware of the distinction between digital data-as-data and its demodulated display and therefore needs to maintain conscious control over the establishment of the parameters governing the modulation of this data. Since these parameters are governing elements that have originated within an environment constituted purely by digital data, it is entirely possible for the practitioner to create entities that can choose their own parameters. This kind of recursive manipulation of the properties can certainly be thought of as intrinsic to the formal qualities of virtual environments as a medium, and is possible only when data is thought of as decoupled from any semantic intent. Further, since once again the virtual environment is composed entirely of digital data, this recursive practice can be extended ever inwards upon itself, where an element can be constituted via parameters originating in the demodulated expression of another element (for example, the *height* of a column determining the *colour* of a box or, to take an example from the works in this project, the *wind* and *cloud cover* in the Second Life environment determining the colour and audio volume of columns in the Anemochord work in Ramonia on Marni). Similarly, since the virtual environment resides on the international digital network, the recursivity can be extended ever outwards, using digital data gleaned from sources external to the virtual environment to establish the parameters of creation within the virtual environment (for example, the frequency and nature of search results on a

particular name determining variously the size, colour, opacity, sound and animation patterns of geometric audiovisual sculptures within the virtual environment, such as was the case in Autoscopia, my 2009 collaboration with Justin Clemens and Christopher Dodds, commissioned by the National Portrait Gallery of Australia). Naturally, it can extend again into the realm of so-called *mixed reality* where actions or stimuli in the material world determine phenomena in the virtual and vice versa; in many ways this mixed reality realm is the easiest to approach since much in the material world has pre-established parameters external to the practitioner's control, though the parameters associated with such interaction are by no means limited to these predeterminations. With such a recursively vast and dense matrix of potential interrelationships constantly re-informing and re-configuring each other, it is important that the practitioner have a good understanding of the nature or quality of the parameters being established, both technically and conceptually. It follows that the selection and manipulation of such parameters will also be subject to this constant modulation back and forth between data and its display, but also more broadly between considerations of parameters of purely virtual art and those of art in general.

### **Data in relation to the *hyperreal* and Benjamin**

In some ways this can be seen as an expression of what Anna Munster calls “a set of potential movements produced by forces that differentially work through matter, resulting in the actualization of that matter under local conditions”, a situation where the virtual neither precedes nor proceeds from material reality (90). In other ways, to think about the consequences of manipulating data that originates entirely from within a virtual environment to affect, or create, other data that also originates entirely from within data, is to take Baudrillard's concept of the *hyperreal* to its logical extreme. Katherine Hayles characterises Baudrillard's concept as being “when the chain of displacements connecting a series of imitation to an original becomes so attenuated that the original is lost as a referent”, and goes on to give an example of a digital audio recording that is constructed from various sources, citing this as a “simulacrum, a copy without an original” (Hayles, Immersed

9). This is perhaps a mutation of the assertions of Walter Benjamin in his famous essay The Work of Art in the Age of Mechanical Reproduction, where he suggests that technology would eliminate any material distinction between original and copy, thereby generating new kinds of perception and relationships between the subject and object of artworks (Benjamin 235; Cooper 47). Today, when dealing with art in virtual environments, this practical inversion – or even removal – of the original/copy question is commonplace and yet it is still difficult to conceptualise in resultant practice that confronts this inversion.

### **Retrieval as opposed to access**

The contemporary art theorist and critic Boris Groys, in his 2008 book Art Power, deals simultaneously with Benjamin's ideas and the question of the modulation from data-as-data to display. He maintains that, rather than technology ensuring exact identity between original and copy (as Benjamin predicted), technology has in fact diversified the production and distribution of copies. This diversification results in a radical proliferation of differences between copies so that, ironically, each copy is unique. This is an interesting point, and subtly but substantially different from the Buadrillardian simulacra, but Groys insists on ascribing a strange mixture of religion and overly-fetishised spatial topology to what I am ascribing to the process of modulation. He calls *Invisible*, with a capital *I*, the state that data enters upon its modulation into a storage medium and asserts that the subsequent remodulation back into display is somehow analogous to the sacrilegious act of visualising the face of god, an analogy that seems to unnecessarily ascribe some kind of extra-human or spiritual power of being to data, when in fact it should be looked upon as the opposite; exclusively and necessarily the product of humans. Perhaps Groys is trying to make the point that data and the concept of god share a similar provenance in the human social psyche. He mixes this with an overly material reading of the concept of the Uniform Resource Locator (URL), which is commonly referred to as an *address*, such as in a web site address. While his observation that every copy is in fact a new and genuinely unique original (thereby contemporising a synthesis of

Benjamin and Baudrillard) is crucial, the “territorialised...topology” of which he speaks is not the prime determining factor in this process (Groys 87). Rather it is merely an index for locating the stored data-as-data. He misses the point that, upon its modulation to data-as-data, a signal doesn’t become *invisible*, it becomes *data*. Its remodulation into display (and Groys insists on dealing only with visual display, thereby restricting himself to a pre-convergent reading of digital media as defined by the history of visual art) is the point at which diversification, and thus the proliferation of a multitude of originals, takes place. Indeed, the URL scheme illustrates one of the fundamental aspects of the storage and transmission of digital data on the international network. The URL of a given digital file is used as an index to allow the relevant software to retrieve it<sup>17</sup>. The term *retrieve* is crucial to this discussion, and is in opposition to the word *access*, which is often mistakenly conflated with the word *retrieve*. This ostensibly pedantic distinction is key to understanding the ontology of data because whenever a file is retrieved via the internet, a *copy* is made of the digital data, and this copy is downloaded to the retriever’s computer. As we have seen, this process of downloading a copy involves the layered process of de- and re-modulation. This is in contrast to the word *access*, which would erroneously imply that somehow the user is *going to* or *entering* some location on the internet.

### **Sites of de- and re-modulation, MP3 example**

As implied by the example of retrieving a file via the internet, I would suggest that in fact it is possible to speak of an exact copy when in the state of data-as-data, if only in terms of contingency upon a very specific set of parameters establishing a process for the demodulation of the data. In practice, this set of parameters is often played fast and loose, especially in internet-based propagation, and this is what creates the diversification of which Groys speaks. An obvious example is the proliferation of *one* image: from mobile phone-camera to another phone by MMS, to Facebook over the web, to

---

<sup>17</sup> Technically, a URL is part of a URI (Uniform Resource Indicator) scheme, but the distinction is not relevant to this discussion. For details of the URI scheme, see [Report from the Joint W3C/IETF URI Planning Interest Group: Uniform Resource Identifiers \(URIs\), URLs, and Uniform Resource Names \(URNs\): Clarifications and Recommendations](#), Request for Comments 3305, Network Working Group, M. Mealling and R. Denenberg, Eds. Retrieved May 15<sup>th</sup> 2010.

email inboxes via the internet. Each step along the way is often (but not always) the site of *recompression* of the image in order to optimise transmission, resulting in a *different* image, at best a recasting or impression of the *original* image, but certainly distinct from it. A similar process has occurred with audio on a worldwide scale since the popularisation of portable MP3 players like the iPod. MPEG-1 Audio Layer 3 (commonly called MP3) is an audio compression format specifically designed for decreasing file size while attempting to maintain empirical, audible, sonic quality<sup>18</sup>. The higher the compression ratio, the more degraded the audio signal becomes (much like in the previous analogue technology of cassette tape copying), but the more songs you can fit on your iPod. When a song is copied and redistributed via the internet, the copy will often involve further recompression just like in the example of the digital image. These sites of recompression followed by redistribution are sites of de- and re-modulation, and are a defining intrinsic quality of digital culture.

The use of MP3 compression is often conflated with what has come to be known as *The Loudness Wars* in commercial digital audio production (Jones; Southall). This refers to the process by which recorded music is made to seem as loud as possible through the technical process of mastering using excessive amounts of compression resulting in an empirically *louder* piece of music at the cost of reduced dynamic range (Jones; Southall). The Loudness Wars are an excellent example of the apparent instrumentality of a technical medium in the creation of art and popular culture, being a direct result of the advent of digital recording and mastering techniques (specifically, as introduced with the Compact Disc in the 1980s) which have an increased dynamic range and lower noise floor than their previous analogue counterparts, allowing for much louder-sounding output. The Loudness Wars really took off as a result of the quick proliferation of cheap speakers and headphones concomitant with the rise of web-surfing and iPods. Such speakers and headphones generally have low audio range and quality, prompting music producers to create ever louder, more compressed mixes to try to compensate for the low

---

<sup>18</sup> MPEG-1 is an international standard as defined by the International Standards Organisation. Details available at <http://mpeg.chiariglione.org/standards/mpeg-1/mpeg-1.htm> . Retrieved May 15th 2010.

quality of the end-listener's equipment (Jones; Southall). This leads some writers, like Rolling Stone magazine's Robert Levine, to equate the practice with the "age of the MP3" (Levine). But neither this practice, nor the protestations it attracts, are unique to the digital era: witness Phil Spector's legendary *Wall of Sound* production techniques in the 1960s, sonically *sculpted* specifically to sound good on the low quality speakers via which the majority of Spector's target audience of teenagers listened to music (Southall). Indeed, the entire history of music can be seen in these terms of a dialectic between technological means and artists/composers/musicians, rather than a simplistic notion of instrumentality ascribed to technology.

### **Paul D. Miller's *multiplex consciousness*, sampling and mashups**

Perhaps it is not surprising that this complex, recursive matrix of interrelationships forced by the paradoxical nature of digital data-as-data should form one of the key qualities for the artist working with a medium that is contemporary with such a deluge of data in everyday society. As Paul D. Miller (aka DJ Spooky That Subliminal Kid) notes in *Rhythm Science*, "the twenty-first-century self is so fully immersed in and defined by the data that surrounds it, we are entering an era of multiplex consciousness". (61) Miller's *multiplex consciousness* is an excellent descriptor of the kind of reception (i.e., interaction) to be expected for works created in a post-convergent medium. The process of creating in a medium where there are no formal distinctions between any of the display characteristics formerly thought of as discrete (for example, *sound* and *vision*), due to the data modulation process, itself reflects the multiplex consciousness by which the work will be received and interacted with. Miller himself often produces works in hip-hop, a form that has acknowledged and gleefully manipulated this dense matrix of interrelationships since the beginning of the last quarter of the twentieth century (Rose 2). Miller's stage name (DJ Spooky, That Subliminal Kid) explicitly references a character from William S. Burroughs' *The Nova Express*, the landmark work of the literary *cut-up and fold-in* technique. This technique can be seen as a kind of *proto-sampling*, given that it uses

manipulated texts of multiple authors, and presents a book intended to be more *interacted with* rather than simply, or passively, *read* by the reader, relying as it does on what I would term *remodulations* of existing or assumed cultural knowledge (Murphy 104; McLuhan, Burroughs 519). Miller's referencing of Burroughs provides a recursive dialectic (or, in my terms, remodulation) between late modernist and science fiction literature, just as Burroughs' work does the same between the technologically mediated late modern period, science fiction and modernist fiction works such as those by Joyce and Stein (Murphy 104; Hayles, Posthuman 216). Similarly, the mid-to-late 2000s cultural trend of *mashups*, where disparate sources of data are mixed together to create a new work, or at least a new perspective on the data-ingredients, display an intuitive acceptance of Miller's multiplex consciousness, or what I am suggesting is the continuing techno-cultural dialectic of de- and re-modulation. It is relevant that, in a mashup, no single element is given priority over another, and this leveling extends temporally through context and history, so that, for example, a pre-digital-era film is just as fair game as the latest stock market data.

Exemplary of this approach is the The Grey Album by DJ Dangermouse (real name Brian Burton), a mashup and remix of The Beatles' album The Beatles (popularly known as *The White Album*) with an *a cappella* version of rapper Jay-Z's The Black Album. Burton did not have legal permission to use either of these sources, and the internet-only release of the album caused somewhat of a controversy, with EMI (legal owners of the copyright of the Beatles' music) sending Burton, and the websites hosting the downloads, lawyer-approved *cease and desist* letters. This legal controversy and the organised, internet-based civil disobedience actions it prompted, resulting in EMI dropping all legal action so that the album remains available online to this day, have been well documented elsewhere (Rimmer 133; Illegal Art). What is important to this discussion is Burton's artistic intention in the creation of The Grey Album. As Burton says:

I stuck to those two [albums] because I thought it would be more challenging and

more fun and more of a statement to what you could do with sampling alone. It is an art form. It is music. You can do different things, it doesn't have to be just what some people call stealing. It can be a lot more than that. (Rimmer 133)

This is exemplary of Miller's multiplex consciousness on the part of both artist and, for want of a better word, *audience*. The artist is attempting to create something entirely intrinsic to the digital medium (because such a project would basically be impossible for an artist such as Burton without the facility provided by digital audio software) that, fundamentally and consciously, manipulates cultural product from a prior era and is then distributed via the international digital network specifically for an audience to consciously participate in the layered, nuanced cultural dialogue required to understand and enjoy the created music, as well as to understand and manipulate the technical means required to find, retrieve and play back the music. Such an operation takes place entirely outside of the legal and cultural frameworks established for the distribution and consumption of music, thereby participating in the creation of a new form of cultural product that is explicitly produced from a sophisticated process of de- and re-modulations, technical and cultural. This dialectic between the historico-cultural convention, the technological means of production and distribution, and the creation and *consumption* of the work, is an important defining factor in understanding the nature of data as a medium. It is also possible to see this practice, as well as the entire concept of modulation that I've been discussing, as a stage of the pre- to post-convergence cycle, wherein prior media and their practices are folded into a new medium in order to simultaneously catalogue and recast them in the light of the new medium. It is certainly possible to read this practice in terms of Benjamin's prediction of a *deepening of apperception* resulting from mass exposure to technological production and distribution of art and cultural product when understood in relation to the continuing dialogue that has taken place between technology, culture, artists and *audiences* since Benjamin's essay was written, even if contemporary cultural output may not align with Benjamin's view of politics and the instrumental role technology may play in its realisation (Benjamin 224, 235). Key in Benjamin's essay is the framing of the question regarding technology and art – it should not be framed as “is the new medium art?”, rather “how

does the new medium redefine our concept of art?" (Benjamin 225).

### **Modulation and dialectics**

We can also see in this recursive process of de- and re-modulation the demise, over the course of the twentieth century, of the distinction between *high* and *low* culture. This is implicit in Benjamin's essay, in contrast to his contemporary Theodor Adorno, who did not believe that *popular culture* was capable of a dialectical engagement with its own history in the same way as art, even though Adorno evidently believed in the "dialectical salvation of the commodity" (Adorno, Letters To Benjamin 62). Taking as a reference Adorno's theory of dialectics, Perry Meisel shows in his 2010 book The Myth of Popular Culture that it is no longer possible to consider that popular culture does not enter into a dialectic with its own cultural history and conventions. As Meisel quotes Adorno defining *dialectics* in his 1966 book Negative Dialectics:

As a sense of nonidentity through identity, dialectics is not only an advancing process but a retrograde one at the same time... The concept's unfolding is also a reaching back, and synthesis is the definition of the difference that perished, "vanished", in the concept... Only in the accomplished synthesis, in the union of contradictory moments, will their difference be manifested (Meisel xiii).

Regardless of Adorno's political philosophy in relation to this, we can see how the kind of recursive de- and re-modulation discussed so far accords with this description of dialectics. Thus, from William Burroughs' experiments with cut-up text and tape recorders, through John Cage's, Joe Jones' and Brian Eno's experiments with aleatory music, to the culturally and technically sophisticated, sustained project that is hip-hop, we can see a concomitant rise of technology and cultural dialectics within cultural output. This has culminated in the digital era, which is the era of data, in which all constituent elements occupy an equal value, whether they are technical or cultural elements, and regardless of their final display register.

## Parameter manipulation

This returns us to the realisation that, in the medium of data where every element has equal value, the selection and manipulation of parameters emerges as the primary concern of the artist working in this medium; parameters for generation, for proliferation and, ultimately, for display. It is worth repeating that the term *display* is not restricted solely to *visual* display, but includes any means by which the element may be perceived by another entity (human or not), whether such means be visual, aural, textual, data or whatever. The experiments in this project have allowed *parameters* to be seen as an intrinsic quality available to the artist when working in RT3D MUVES, a quality that defines this medium as different from any previous medium. This is not to say that working in previous media did not require the selection and manipulation of parameters in the creation of work. Rather, it is different because work in the RT3D MUVE requires all elements to be modulated into data-as-data. This data then occupies a strange kind of neutral ontological state from which it can be remodulated into any form of display that may or may not be semantically related to its origin. Therefore, the artist needs to decide the framework of parameters by which the data will be remodulated. In other words, it could be remodulated in *any* way but it must be remodulated in *some* way, and therefore the construction of parameter frameworks becomes one of the artist's primary occupations in the creation of virtual works. The parameter framework is a primary constituent of the techniques and materials with which the artist must struggle, as discussed in relation to Badiou above. This is the primary aspect that allows the artist to create work that is intrinsic to the medium. All other qualities that have been discussed as *intrinsic* to this medium (for example, digital colour, network lag, geometry etc) arise because of the parameter manipulation necessitated by the process of de- and re-modulation between data-as-data and data-as-display. Therefore these other qualities can be seen as *secondary* intrinsic qualities in relation to parameter manipulation.

## Examples of parameter manipulation from this project

All of the works created for this project necessarily have parameter

manipulation as the primary means by which I as the artist brought the works into being, but let's examine the simple example of A Rose Heard At Dusk. Every aspect of this work requires selection, by the artist, of the parameters by which the data constituting the work will be modulated into display. The work relies on the sensing of avatars entering the work, and here is the first set of parameters that must be decided. What parameters of the data (for avatars are datasets within the virtual environment) should be sensed? The size of the visual display of the avatar, the speed at which the avatar is moving, the name attached to the avatar, or simply the presence of the avatar? All of these parameters are used in A Rose Heard At Dusk to determine the behaviour of the work itself. The question is then how the work behaves in response to these parameters, which is itself a question of parameter selection. The individual volumes of space that constitute the work change various of their parameters in response to the sensed data of the visiting avatar, including colour, opacity, audio and animation. Should the volumes be programmed to make their own decisions as to how these changes are affected, within a predetermined framework or range? Or should they be programmed to predictably change the same parameter in the same manner every time? In the case of A Rose Heard At Dusk, it is the latter, simpler case. Each volume is programmed to change its colour, opacity, audio and animation predictably. But since these volumes of space are nothing but data, they can be changed to *any* other colour, opacity, audio and animation, therefore the artist needs to be aware of the range of the parameters that are available to each of these registers. For example, colour in this particular instance of a RT3D MUVE must be modulated into a normalised range of 0 – 255 in each of the red, green and blue channels; opacity has a normalised range of 0 – 1; audio is measured in terms of length in milliseconds and volume in a range of 0 -1; animation has an open-ended range based on the passage of time, which itself has a range of options by which it can be measured, including whether it should be linear or looping. The artist must therefore remodulate their already existing knowledge, based in the precedent of the material world, of colour, opacity, audio and time, into the specificities of the virtual environment in order to be able to produce display outcomes that are intelligible to the environment itself and by

extension, to the person operating the avatar that is interacting with the work. Attempting to modulate any of these elements into ranges outside the frameworks established for the particular environment will result in an error of some kind. Naturally, the exploration of these errors forms part of the artist's struggle with the techniques and materials of the environment, and indeed can even constitute elements of the final work, given that the work exists in a medium entirely constituted by data modulated into display. Ultimately, though, the artist needs to become intimately familiar with the parameter frameworks established for any given environment in order to be able to produce something new within the environment. Even if the desired outcome of the work is to give *all* responsibility for parameter selection to the elements constituting the work, the artist must still be very familiar with all of the relevant parameter frameworks in order to create such a work. This is because there is no *natural* or *material* predetermination for the way in which data must behave. Any predetermination that may ostensibly exist (for example, simulated gravity in Second Life) is artificial behaviour that has been consciously programmed by those people responsible for programming the environment itself, and therefore will itself be open to manipulation, via parameters, by the artist. Thus, the creation of works within virtual environments is a complex matrix of modulations, taking into account all of the multifarious ways in which data is manipulated into display.

### **RT3D MUVES in relation to other digital media**

All digital media are based on the underlying mechanics of data modulation, but this does not necessarily mean that all digital media can automatically be defined as post-convergent. Many forms of digital media do display post-convergent qualities, or are effectively used in a post-convergent manner, and many do not or are not. Of those that do not, many of these may be post-convergent media that are used in a pre-convergent manner. An example of this would be a newspaper website that is used simply to recreate a physical newspaper. The web, which is the medium, is technically post-convergent because it is quite literally and technically capable of converging all prior media (text, music, television, video, etc.) while creating something that is in excess of its constituent elements. To use the web simply to recreate a

newspaper is a pre-convergent use of the post-convergent medium, where the excess that defines the medium needs to be elided in order to simulate a prior medium. We have seen that pre-convergent practice is often used as an acculturation method to prepare the way for post-convergent practices, which are genuinely new. Examples of a post-convergent use of the web might include Wikipedia, which emerges from the excess created from the convergence of the web's constituent elements and creates a new phenomenon that relies on both the understanding of these constituent elements as well as an understanding of the new entity that is in excess of its constitution. Other examples given earlier, such as the mashup, may also qualify. In this sense, the precise nature and meaning of post-convergence may be, perhaps unsatisfyingly, elastic and somewhat dependent on value judgement. However, what is most definitely not elastic is whether or not the constituent elements of any work or medium are required to undergo modulation into digital data. The examples of the newspaper website, Wikipedia and a mashup certainly all involve modulation of data in order to appear, but it is possible to say that they do not theoretically *require* modulation into digital data in order to appear. In other words, it is theoretically possible to imagine all three examples appearing in other, non-digital, media. The newspaper, certainly, already exists in the medium of paper and text. Wikipedia is an idea that could, at least theoretically, be carried out without the use of digital data. A mashup, be it video or audio or both, is also possible without recourse to digital data, through the use of magnetic tape and so forth. On the other hand it is not even theoretically possible to think the notion of RT3D MUVES without digital data. A RT3D MUVES is a nonsensical notion without digital data because it necessarily emerges from the process of modulation into digital data. The point of modulation into data, even if the element that is being modulated has its provenance in the material world such as is the case with motion capture of human bodies, is the point at which it loses any technical connection with the semantic meaning of the originating signal and becomes *intrinsically* an element in the RT3D MUVES. The choice as to how to remodulate the signal, which has become data-as-data, into data-as-display is arbitrary and therefore creative because there is no materially predetermined method by

which the remodulation should be carried out. Whether or not to remodulate the signal into display in a manner that resembles its originating signal (for example, to use motion capture data to drive the animation of a humanoid figure in the virtual environment) can only be called a creative decision. This is because it is simply not possible to *exactly* simulate a material phenomenon in a digital environment and therefore decisions must be made as to what is important, and such decisions can never rely on anything more materially deterministic than simplified conceptual models and cultural convention, which is why the term *simulation* in the digital sense should more properly be called *representation*. Modulation is necessarily modulation into another register in which the originating source *does not already exist*. It is simply not possible, for example, for a human to walk in a digital environment. A human walks naturally, and only, in a material environment. Any appearance of a human walking within a virtual environment is a representation of that material phenomenon and representation is always a creative act.

# Chapter 05: Conclusion

## Iterative design experiments

The results of this long, iterative series of experiments in the realisation of interactive audiovisual artwork show that realtime 3D Multi-User Virtual Environments (RT3D MUVES) are a *post-convergent* medium capable of technically and conceptually containing all previous media as content, all enmeshed in an interdependent digital network of potential sites of relationship and affect.

The iterative design process worked in this research project by enabling small, tightly focused experiments, each building on the findings of the previous one. In the early stages of the project, the major obstacle to be overcome was the question of the audience, on which depended technological affordances and vice versa. For the first half of the project, an audience of users was not so easy to locate, and therefore the works could not grow properly in response to the interaction between users, artist and artwork. For the second half of the project, these problems dissipated with the sudden viability of Second Life as a RT3D MUVE research platform. The display (be it visual or otherwise) of digital 3D space share the same principles of craft and construction across platforms, chiefly involving the identification and manipulation of parameters. Accordingly, principles and practices that were identified in the VRML phase of the research were translated to the new environment of Second Life, suggesting that indeed RT3D space displays some intrinsic qualities that may be manipulated by the artist.

The most liberating aspect of the findings is presenting specific evidence in support of the fact that RT3D MUVES do not exist outside of the history and development of media, in support of a McLuhanist reading of media history that shows there have been, and will continue to be, many post-convergent phases. This allowed me to understand the place of realtime 3D

environments in the multiple contexts of contemporary art, live performance, music, and Massively Multi-user Online (MMO) games. Working with the strengths of the medium is a technologically enforced formalism very familiar to the material world, and it holds just as well for RT3D MUVE craft – non-linear spatiotemporal engagement with temporal lag is the default engagement environment for users of RT3D MUVEs, so the artist should be prepared to consciously utilise this when planning and constructing the parameter frameworks from which artworks will emerge.

Many aspects of the question that began this research project, *What constitutes the intrinsic qualities of RT3D Multi-User Virtual Environments?*, have been interrogated and some potential approaches have been outlined as useful in the process of creating interactive audiovisual artwork of a post-convergent nature. This is of potential benefit to artists and practitioners working in or with realtime 3D space, especially in MUVEs as they grow in acceptance and usage internationally.

The aim of the research project, to conduct a series of experiments in iterative design of interactive audiovisual artworks for RT3D MUVEs has been fulfilled and many potential, or actual, practices or approaches towards the intrinsic qualities of RT3D MUVEs as a platform or site for the creation of interactive audiovisual art have been identified. Chief among these was the identification of the fundamental nature of virtual environments as existing as digital data, which display no materially predetermined behaviour or characteristics and therefore can be modulated into any display register.

### **Identification of post-convergence**

Post-convergence is identified as a common phase of media history as described by McLuhan, where all new media contain (i.e., *converge*) all prior media as content. Post-convergence is the phase after the new media has established itself by demonstrating its convergent ability, and before it is itself converged within the next new medium. Haraway, Hayles, Bolter and Grusin, Munster, and Matrix have all proposed various useful approaches that attempt to accommodate the network of multi-sited relationship

potentials which define digital engagement in the spatiotemporal and intellectual senses, and many of these approaches were employed within the design of the experiments. I was able to create a series of works displaying to a greater or lesser degree some aspects of a *post-convergent* nature. Much more work can be carried out in this area.

This medium allows the artist to work quickly and precisely, particularly in the visual and spatial realm – in the audio realm it is less efficient, and this has been true as a general statement about RT3D MUVES since their inception. Nonetheless, it is quite viable to quickly produce a series of works to explicate or interrogate any desired aspect. With the introduction of Second Life, the twin boons of a large audience of users and inworld collaborative building tools was offset by the loss of formal freedom offered by the initial VRML solution employed in this project. All media have technosocial restrictions and affordances in their design and usage.

The practical technological consequences of the post-convergent nature of virtual environments as a medium include a long list of media or cultural elements that are converged within the MUVES. Sound, vision, network, time, interactivity and human/computer interface, social networking, databasing, lag, non-linear spatiotemporal presence (the list contains all prior media) coming together in a matrix of interdependent relationships where no element can exist without the other, and all affect each other equally. Acknowledgement of its post-convergent nature is the most important thing to be considered when approaching virtual environments as a platform or site for the performance of interactive audiovisual art. In relation to notions of composition and live performance, this means that all prior practices are converged within this medium (in this case, *this* performance) as content. In particular, pre-convergent music and sound design can offer help in formally defining performance practice within the medium, given their existence as formal abstract systems that facilitate a strong affect cycle. This was borne out in the design and construction of each of the individual experiments comprising this research project.

## Data and modulation

Of crucial importance is the acknowledgement of virtual environments as being constituted entirely by digital data, and that all and any elements that appear in the environment must first undergo modulation into digital data, or remodulation if such elements already exist as digital data. This modulation is a levelling process that renders all elements equal within the environment, in that any data can be remodulated into any display register, independently of its provenance or the semantic intent of its originating source. The term *display* does not refer only to visual display; rather it means any manner by which any other (human or non-human) entity can become aware of the data being displayed, and this may be by audiovisual or any other means.

## Current contemporary practice

As RT3D MUVES gain more exposure and purchase in mainstream culture, we can expect to see a growing number of innovative and interesting examples of the challenges and potentials afforded by RT3D MUVES as a site for art. As of early 2010, many Australian artists have begun to take up these challenges, most notably Andrew Burrell, Kate Richards, Christopher Dodds and John McCormick. In the UK, Annabeth Robinson has produced several compelling works in Second Life, as well as collaborating with the celebrated musician and sound artist Brian Eno to create a Second Life version of his work Five Million Paintings in 2009. Second Life-specific artists are numerous and many interesting works have been created by Gazira Babeli, Cao Fei, DC Spensley, Juria Yoshikawa, Chi5 Shenzhou and Glyph Graves, among others. Chinese artist Cao Fei in particular has seen significant success with her Second Life work, which was shown at the 2007 Venice Biennale, and has been exhibited at other venues. Dr. Gary Zabel, who teaches in the Philosophy department of the University of Massachusetts at Boston, USA, curates many virtual art, and so-called *mixed reality* exhibitions as part of his Virtual Art Initiative. At the Ball State University in Indiana, USA, Associate Professor of Electronic Art, John Fillwalk, runs the Institute for Digital Intermedia Arts (IDIA), which produces many interesting

virtual art projects. The University of Western Australia has established a Second Life art competition that steadily grows in popularity and quality. In Australia, at least two major cultural institutions have exhibited or commissioned works in RT3D MUVES, being the Queensland Gallery of Modern Art (the exhibition of the Premier of Queensland's National Art Award in New Media in 2009, for which the work presented in this project, Seventeen Unsung Songs, was shortlisted) and the National Portrait Gallery of Australia (the Doppelganger exhibition of 2009, which included a work I collaborated on with Christopher Dodds and Justin Clemens, called Autoscopia).

### **Future avenues of pursuit**

The results of this research project establish some avenues of pursuit for myself as an artist. Chief among these avenues is a sustained investigation into the implications and consequences of data modulation as technique and material, hand in hand with a continuation of my investigation into the implications and consequences of the identification of post-convergence.

### **BabelSwarm**

Along these lines, since the completion of the works presented in this project, I have collaborated on several projects that explicitly explore this avenue within a post-convergent context. These projects include BabelSwarm, a 2008 collaboration with Christopher Dodds and Justin Clemens, a result of the inaugural Australia Council Second Life Artist In Residence grant. This project explicitly examined the nature of de- and re-modulation of data and parameter frameworks by capturing chat (text and voice) data, which was then used as the basis for the generation of artificially intelligent entities which engaged in various forms of data exchange between themselves to create emergent, dynamic, self-organising audiovisual sculptures. The project was informed by notions of swarm intelligence as applied to the generation of language, with explicit reference to the biblical story of Babel. The project was sited in Second Life, connected via the internet to a physical exhibition at Lismore Regional Gallery in Australia.

## **Autoscopia**

A further collaboration with Christopher Dodds and Justin Clemens, called Autoscopia, was commissioned by the National Portrait Gallery of Australia in 2009. This project again explicitly examined the de- and re-modulation of networked digital data and parameter frameworks by using search results from a wide range of internet search sources to form the basis for dynamically generated, artificially intelligent audiovisual sculptures in Second Life, as well as dynamically generated composite images and websites that intrinsically fed back into future search results. The project questioned the nature of identity in the context of the international digital network and the era of social networking.

## **SquareTangle**

At the time of writing, I am also engaged in a long-term collaboration with choreographer and programmer John McCormick. The project, called SquareTangle, is a deep and sustained exploration into the modulation of data for audiovisual performance, using concepts and techniques of artificial intelligence, genetic algorithms, gesture recognition, motion capture and geometrical mathematics. In developing this project, we have been artists in residence at Ars Electronica Futurelab in Linz, Austria, and artists in residence at Neutral Ground Gallery in Saskatchewan, Canada. We also received an Australia Council Connections residency to be artists in residence at Hidden Cove Solutions, a technology company in Melbourne, Australia, where we developed techniques for single-projector full-dome immersive projection, motion tracking and data modulation software.

## **Conclusion**

The results of this research project suggest that the medium of RT3D MUVES is in the early stages of development but presents a vast range of potential for the creation of post-convergent art work in the twenty-first century. In this exegesis, I have provided an account of the virtual environments, which to a great extent dominate and define our present. The key terms I have developed in an attempt to capture something essential

about this situation include: post-convergence, modulation and experiment. My own artwork has itself been an attempt to experiment with the new possibilities of virtual media, and I will continue to do this. Yet the success or failure of such experiments is, as I outlined in my account of the theses of Alain Badiou, secondary to the necessity of making the attempt. Nobody yet knows what the new media are really capable of but I believe that art will be one crucial way in which this future will be forged.

# List of Works Cited

ActiveWorlds. Computer software. ActiveWorlds Inc. 1997.

Adorno, Theodor. "Letters to Walter Benjamin." New Left Review. 81. September-October (1973). 16 May. 2010.

<<http://www.newleftreview.org/?view=14> >

Badiou, Alain. "Fifteen Theses on Contemporary Art." Lacanian Ink. 23. Ed. Zizek, Slavoj and Jacques-Alain Miller. New York: The Wooster Press, 2004. 103-119.

---. Handbook of Inaesthetics. Trans. Alberto Toscano. Stanford: Stanford University Press, 2005.

---. Being and Event. Trans. Oliver Feltham. London: Continuum, 2006.

---. "Third Sketch of a Manifesto of Affirmationist Art." Polemics. Ed. and Trans. S. Corcoran. London: Verso, 2006. 133 - 148.

---. "The Subject of Art." The Symptom, Online Journal of Lacan.com. 6. Spring (2005) 18 December. 2008

<[http://www.lacan.com/symptom6\\_articles/badiou.html](http://www.lacan.com/symptom6_articles/badiou.html).>

---. Logics of Worlds: being and event 2. Trans. Albert Toscano. London: Continuum, 2009.

Benjamin, Walter. "The Work of Art in the Age of Mechanical Reproduction." Illuminations. New York: Schocken Books, 1969. 217-252.

Blaxxun. Computer software. Blaxxun Technologies. 1995.

Bogost, Ian. Unit Operations: an approach to videogame criticism. Boston: MIT Press, 2006.

Bolter, J. David and Richard Grusin. Remediation: Understanding New

Media. Cambridge: MIT Press, 2000.

Brakhage, Stan. By Brakhage – Anthology – Criterion Collection. DVD. Produced by Criterion Studios, 2001.

Burroughs, William. Cities of the Red Night. New York: Picador, 2001.

Cage, John. “The Future of Music: Credo.” Audio Culture: Readings in Modern Music. Ed. Christoph Cox and Daniel Warner. London: Continuum, 2004. 25-28

Chin, Bettina M. “Regulating Your Second Life: Defamation in Virtual Worlds.” Brooklyn Law Review. 72.4 (2007):1303 – 1349.

Clemens, Justin. BabelSwarm. Online. December. 2008  
[http://www.babelswarm.com/pdf/Babelswarm\\_essay.pdf](http://www.babelswarm.com/pdf/Babelswarm_essay.pdf). 2008.

Clemens, Justin, Christopher Dodds, and Adam Nash. BabelSwarm. Lismore: Lismore Region Gallery, 2008.

Clemens, Justin, Christopher Dodds and Adam Nash. Autoscopia. Canberra: National Portrait Gallery of Australia. 2009.

Clemens, Justin, and Adam Nash. Seven Theses on the Concept of “Post-convergence”. Online article. 2010. April 2. 2010  
 <[http://www.acva.net.au/blog/detail/seven\\_theses\\_on\\_the\\_concept\\_of\\_post-convergence](http://www.acva.net.au/blog/detail/seven_theses_on_the_concept_of_post-convergence).>

Cooper, Simon. Technoculture and Critical Theory. London: Routledge, 2002.

Copeland, Roger. Merce Cunningham: The Modernizing of Modern Dance. New York: Routledge, 2004.

Davies, Char. Osmose and Ephémère Website. December 18. 2008  
 <<http://www.immersence.com>. >

Delanda, Manuel. Intensive Science and Virtual Philosophy. London: Continuum, 2005.

Deleuze, Gilles. Spinoza: Practical Philosophy. Trans. Robert Hurley. San Francisco: City Lights, 1988.

---. Francis Bacon: The Logic of Sensation. Trans. Daniel W. Smith. London: Continuum, 2005.

Deleuze, Gilles and Félix Guattari. A Thousand Plateaus: Capitalism and Schizophrenia. Trans. Brian Massumi. London: Continuum, 2004.

Dingo, Robbie. Suzanne's Guitar. December. 2008  
<<http://au.youtube.com/watch?v=edi1g4zSFo8>. 2006. >

Dodds, Christopher. Avatars and the Invisible Omniscience: The panoptical model within virtual worlds. MA exegesis. RMIT University, 2007.

During, Elie. "Art." Alain Badiou: Key Concepts. Ed. AJ Bartlett and Justin Clemens. Durham: Acumen, 2010. 82 – 93.

Eckersall, Peter. "‘Mistook sign’ – Australian responses to Nō." Nō Theatre Transversal. Ed. Stanca Scholz-Cionca and Christopher Balme. Germany: IUDICIUM, 2008. 164-177.

The Economist. Data, data everywhere. February 25. 2010. Online article. May 10. 2010  
<[http://www.economist.com/specialreports/displayStory.cfm?story\\_id=15557443](http://www.economist.com/specialreports/displayStory.cfm?story_id=15557443)>

Fischinger, Oskar. Oskar Fischinger: Ten Films. DVD. Produced by The Center for Visual Music in association with The Elfriede Fischinger Trust and Jack Rutberg Fine Arts, 2006.

Floridi, Luciano. "The Philosophy of Presence: From Epistemic Failure to Successful Observability." Presence: Teleoperators and Virtual Environments. 14.6 (2005): 656 – 667. Cambridge: MIT Press.

Gibson, William. Neuromancer. New York: The Berkley Publishing Group. 1984.

Grosz, Elizabeth. Chaos, Territory, Art: Deleuze and the Framing of the Earth. New York: Columbia University Press. 2008.

Groys, Boris. Art Power. Cambridge: MIT Press, 2008.

Hansen, Mark B. N. Bodies In Code. New York: Routledge, 2006.

Haraway, Donna. "A manifesto for cyborgs: Science, technology, and socialist feminism in the 1980s." The Postmodern Turn: New Perspectives on Social Theory. Ed. Steven Seidman. Cambridge: Cambridge University Press, 1994. 82 - 118.

Hayles, N. Katherine. "Embodied Virtuality: Or How To Put Bodies Back Into The Picture." Immersed In Technology: Art and Virtual Environments. Ed. Mary Anne Moser & Douglas MacLeod. Cambridge: MIT Press. 1996. 1 - 28.

Hayles, N. Katherine. How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics. Chicago: University of Chicago Press. 1999.

Heidegger, Martin. "The Origin of the Work of Art." Basic Writings. New York: Harper Collins, 2008. 139 - 212.

Illegal Art (Website). The Grey Album Legal Battle Summarised. 2004. May 16. 2010 <<http://www.illegal-art.org/audio/grey.html>. >

Jenkins, Henry. Convergence Culture. New York: NYUP, 2006.

Jones, Sarah. "The Big Squeeze." Mix Magazine. Online article. (2005). December 18. 2008 <[http://mixonline.com/mag/audio\\_big\\_squeeze](http://mixonline.com/mag/audio_big_squeeze)>

Kandinsky, Wassily. Point and Line to Plane. Courier Dover, 1979

Kristeva, Julia. Strangers to Ourselves. Trans. Leon Roudiez. New York: Columbia University Press, 1994.

Kristeva, Julia. "Tales of Love." The Portable Kristeva. Ed. K. Oliver. New York: Columbia University Press, 2002. 137 – 179.

Lacan, Jacques. Ecrits. Trans. Bruce Fink. New York: Norton, 2006.

Levine, Robert. "The Death of High Fidelity: In the age of MP3s, sound quality is worse than ever." Rolling Stone Magazine. 2007. Online article. December 18. 2008

<[http://www.rollingstone.com/news/story/17777619/the\\_death\\_of\\_high\\_fidelity](http://www.rollingstone.com/news/story/17777619/the_death_of_high_fidelity) > Currently (2010) unavailable at this address. Possibly copyright-infringing copy available at May 14. 2010 <<http://www.audio-constructions.com/highfidelity.html> >

Little, Gregory, Building Myself a "Body Without Organs." Kent State University, 1997. December. 2008.

<[http://www.gregorylittle.org/avatars/bwo\\_text.html](http://www.gregorylittle.org/avatars/bwo_text.html).>

McLuhan, Marshall. "Notes on Burroughs." The Nation. 28<sup>th</sup> December (1964): 517-519. May 16. 2010<<http://realitystudio.org/criticism/notes-on-burroughs>>

McLuhan, Marshall. Understanding Media: The Extensions of Man. New York: Routledge. 2001.

Matrix, Sidney Eve. Cyberpop: Digital Lifestyles and Commodity Culture. New York: Routledge. 2006.

Mattes, Eva and Franco. 13 Most Beautiful Avatars. 2006. December. 2008 <<http://www.0100101110101101.org/home/portraits/thirteen.html>>

---. Synthetic Performances. December. 2008

<<http://www.0100101110101101.org/home/performances/index.html>. 2007.>

The Men Who Knew Too Much. Virtual Humanoids . Melbourne: Next Wave Festival. 1998; Melbourne: Melbourne Planetarium. 2000; Melbourne: Gamma Space Gallery. 2001; Bristol: Arnolfini. 2002; Manchester: Watermans Theatre. 2002.

Miller, Paul D (aka DJ Spooky that subliminal kid). Rhythm Science. Cambridge, Massachusetts: Mediawork/The MIT Press, 2004.

Moholy-Nagy, László. "Production-Reproduction: Potentialities of the Phonograph." Audio Cultures. Ed. Christoph Cox and Daniel Warner. London: Continuum, 2004. 331 - 333.

Morningstar, Chip and F. Randall Farmer. "The Lessons of Lucasfilm's Habitat." Cyberspace: First Steps. Ed. Michael Benedikt. Cambridge: MIT Press, 1991. 273 – 302.

Munster, Anna. Materializing New Media: Embodiment in Information Aesthetics. Hanover: University Press of New England. 2006.

Murphy, Timothy S. Wising Up The Marks: The Amodern William Burroughs. Berkley: University of California Press, 1997.

Nash, Adam. Memory Plains Returning. 2003. Online artwork. December 2008. <<http://yamanakanash.net/3dmusic/mprintro.html>>.

---. Chromacy. 2004. Online artwork. December 2008. <<http://yamanakanash.net/3dmusic/chromacy.html>>.

---. Scorched Happiness. 2004. Online artwork. December 2008. <[http://yamanakanash.net/scorched\\_happiness/index.html](http://yamanakanash.net/scorched_happiness/index.html)>.

---. Pale Shining Winter. 2005. Online artwork. December 2008. <<http://yamanakanash.net/3dmusic/winter/>>.

---. Blue Line. 2006. Online artwork. December 2008.

<<http://yamanakanash.net/3dmusic/blueLine/>>.

---. Ramonia on Marni. 2007. Second Life. December 2008.

---. Seventeen Unsung Songs. 2007. Second Life. December 2008.

---. Trace Aureity. 2008. Second Life. December 2008.

---. One, Another. 2009. Second Life. October 2009.

Ondrejka, Cory. Escaping the Gilded Cage: User Created Content and Building the Metaverse. New York Law School Law Review, Forthcoming. December. 2008

<[http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=538362](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=538362). 2004. 2006.  
>

Plato. The Symposium. London: Penguin, 1999.

Prendergrast, Mark. The Ambient Century. London: Bloomsbury, 2003.

Rackham, Melinda. Empyrean. <http://www.subtle.net/empyrean>, 2000-2003.

Rackham, Melinda. Empyrean: Soft Skinned Space – investigating and challenging the persistence of realism in electronically constructed and populated online Virtual Reality environments. Diss. College of Fine Arts, University of New South Wales, 2004.

Rickert, T. and M. Salvo. “The distributed Gesamtkunstwerk: Sound, worlding, and new media culture.” Computers and Composition. 23. 3 (2006): 296 - 316.

Rimmer, Matthew. Digital Copyright and the Consumer Revolution: hand off my iPod. Cheltenham: Edward Elgar Publishing, 2007.

Rose, Tricia. Black noise: rap music and black culture in contemporary America. Middletown: Wesleyan University Press, 1994.

Santos, Filipe, Benjamin? Fonseca, Paulo Martins and Leonel Morgado, "Negotiation of Spatial Configurations in Collaborative Virtual Environments." Current Developments in Technology-Assisted Education. Ed. A. Méndez-Vilas, A. Solano Martín, J.A. Mesa González and J. Mesa González. Spain: FORMATEX, 2006. 1472 – 1476.

Second Life. Computer software. Linden Research Inc. 2002.

Southall, Nick. "Imperfect Sound Forever." Stylus Magazine. Online article. (2006). December 18. 2008  
[http://www.stylusmagazine.com/articles/weekly\\_article/imperfect-sound-forever.htm](http://www.stylusmagazine.com/articles/weekly_article/imperfect-sound-forever.htm)

Stephenson, Neal. Snow Crash. New York: Bantam Books, 1992.

Sutton, Damian and David Martin-Jones. Deleuze Reframed. London: I.B. Tauris, 2008.

Tamiko Thiel. Beyond Mazanar. Manchester: Cornerhouse, 2003.

There.com. Computer software. Makena Technologies. 2003.

Toop, David. Haunted Weather: Music, Silence and Memory. London: Serpent's Tail, 2004.

Vega, Suzanne. Official Biography. December. 2008  
 <<http://www.suzannevega.com/suzanne/biography>.>

VNet. Open Source Software. 1998. Discontinued. See  
<http://tecfa.unige.ch/vrml/vnet/>

World of Warcraft. Computer software. Blizzard Entertainment. 2004.

Žižek, Slavoj. Enjoy Your Symptom!. New York: Routledge, 2008.



# Bibliography

ActiveWorlds. Computer software. ActiveWorlds Inc. 1997.

Adorno, Theodor. "Letters to Walter Benjamin." New Left Review. 81. September-October (1973). 16 May. 2010.  
<<http://www.newleftreview.org/?view=14>>

Attali, Jacques. Noise: The Political Economy of Music. Trans. Fredric Jameson, Susan McClary and Brian Massumi. Minneapolis: University of Minnesota Press. 1985.

Bachelard, Gaston. The Poetics of Space. Trans. Maria Jolas. Boston: Beacon Press, 1994.

Badiou, Alain. Deleuze: The Clamor of Being. Trans. Louise Burchill. Minneapolis: University of Minnesota Press. 2000.

---. "Fifteen Theses on Contemporary Art." Lacanian Ink. 23. Ed. Zizek, Slavoj and Jacques-Alain Miller. New York: The Wooster Press, 2004. 103-119.

---. Handbook of Inaesthetics. Trans. Alberto Toscano. Stanford: Stanford University Press, 2005.

---. "Philosophy and art". Infinite Thought. Trans. & Eds. Oliver Feltham and Justin Clemens. London: Continuum. 2005.

---. Being and Event. Trans. Oliver Feltham. London: Continuum, 2006.

---. "Third Sketch of a Manifesto of Affirmationist Art." Polemics. Ed. and Trans. S. Corcoran. London: Verso, 2006. 133 - 148.

---. "The Subject of Art." The Symptom, Online Journal of Lacan.com. 6. Spring (2005) 18 December. 2008  
<[http://www.lacan.com/symptom6\\_articles/badiou.html](http://www.lacan.com/symptom6_articles/badiou.html)>

- . Logics of Worlds: being and event 2. Trans. Albert Toscano. London: Continuum, 2009.
- Balsamo, Anne. "The Virtual Body In Cyberspace." The Cybercultures Reader. Ed. David Bell and Barbara M. Kennedy. New York: Routledge, 2000. 489 - 503.
- Barlow, John Perry. A Declaration of the Independence of Cyberspace. December 18, 2008 <<http://www.eff.org/~barlow/Declaration-Final.html>. 1996. >
- Bartle, Richard. Designing Virtual Worlds. Indianapolis: New Riders, 2004.
- Barwell, Graham and Kate Bowles. "Border Crossings: The Internet and the dislocation of citizenship." The Cybercultures Reader. Ed. David Bell and Barbara M. Kennedy. New York: Routledge, 2000. 702 - 711.
- Baudrillard, Jean. Simulacra and Simulation. Trans. Sheila Faria Glaser. University of Michigan Press, 1994.
- Benjamin, Walter. "The Work of Art in the Age of Mechanical Reproduction." Illuminations. New York: Schocken Books, 1969. 217-252.
- Bergson, Henri. Matter and Memory. Trans. Nancy Margaret Paul and W. S. Palmer. New York: Courier Dover, 2004.
- Blaxxun. Computer software. Blaxxun Technologies. 1995.
- Bogost, Ian. Unit Operations: an approach to videogame criticism. Boston: MIT Press, 2006.
- Bolter, J. David and Richard Grusin. Remediation: Understanding New Media. Cambridge: MIT Press, 2000.
- Brakhage, Stan. By Brakhage – Anthology – Criterion Collection. DVD. Produced by Criterion Studios, 2001.

Burroughs, William. Cities of the Red Night. New York: Picador, 2001.

Cage, John. "The Future of Music: Credo." Audio Culture: Readings in Modern Music. Ed. Christoph Cox and Daniel Warner. London: Continuum, 2004. 25-28

Castronova, Edward, Julian Dibbell, Dan Hunter, Greg Lastowka et al. Terra Nova: exploring virtual worlds. December. 2008  
<[http://terranova.blogs.com/terra\\_nova/](http://terranova.blogs.com/terra_nova/) 2003-2009.>

Chin, Bettina M. "Regulating Your Second Life: Defamation in Virtual Worlds." Brooklyn Law Review. 72.4 (2007):1303 – 1349.

Chion, Michel. Audio-Vision: Sound on Screen. Trans. Claudia Gorbman. New York: Columbia University Press, 1994.

Clemens, Justin. BabelSwarm. Online. December. 2008  
[http://www.babelswarm.com/pdf/Babelswarm\\_essay.pdf](http://www.babelswarm.com/pdf/Babelswarm_essay.pdf). 2008.

Clemens, Justin, Christopher Dodds, and Adam Nash. BabelSwarm. Lismore: Lismore Region Gallery. 2008.

Clemens, Justin, Christopher Dodds and Adam Nash. Autoscopia. Canberra: National Portrait Gallery of Australia. 2009.

Clemens, Justin and Adam Nash. Seven Theses on the Concept of "Post-convergence". Online article. 2010. April 2. 2010  
<[http://www.acva.net.au/blog/detail/seven\\_theses\\_on\\_the\\_concept\\_of\\_post-convergence](http://www.acva.net.au/blog/detail/seven_theses_on_the_concept_of_post-convergence).>

Cooper, Simon. Technoculture and Critical Theory. London: Routledge, 2002.

Copeland, Roger. Merce Cunningham: The Modernizing of Modern Dance. New York: Routledge, 2004.

Crawford, Chris. The Art of Interactive Design. San Francisco: No Starch

Press, 2003.

Davies, Char. Osmose and Ephémère Website. December 18, 2008

<<http://www.immersence.com>. >

Debord, Guy. The Society of The Spectacle. New York: Zone Books, 1995.

Delanda, Manuel. Intensive Science and Virtual Philosophy. London: Continuum. 2005.

Deleuze, Gilles. Spinoza: Practical Philosophy. Trans. Robert Hurley. San Francisco: City Lights. 1988.

---. "The Method of Dramatization". Desert Islands and Other Texts. Los Angeles: Semiotext(e). 2004. 94 – 116.

---. Difference and Repetition. Trans. Paul Patton. London: Continuum. 2004.

---. Francis Bacon: The Logic of Sensation. Trans. Daniel W. Smith. London: Continuum. 2005.

Deleuze, Gilles, and Félix Guattari. A Thousand Plateaus: Capitalism and Schizophrenia. Trans. Brian Massumi. London: Continuum. 2004.

Dick, Philip K. The Simulacra. London: Gollancz, 2004.

---. Ubik. London: Gollancz, 2006.

Dingo, Robbie. Suzanne's Guitar. December. 2008

<<http://au.youtube.com/watch?v=edi1g4zSFo8>. 2006. >

Dodds, Christopher. Avatars and the Invisible Omniscience: The panoptical model within virtual worlds. MA exegesis. RMIT University, 2007.

During, Elie. "Art." Alain Badiou: Key Concepts. Ed. AJ Bartlett and Justin Clemens. Durham: Acumen, 2010. 82 – 93.

Eckersall, Peter. "‘Mistook sign’ – Australian responses to Nō." Nō Theatre Transversal. Ed. Stanca Scholz-Cionca and Christopher Balme. Germany: IUDICIUM, 2008. 164-177.

The Economist. Data, data everywhere. February 25. 2010. Online article. May 10. 2010  
<[http://www.economist.com/specialreports/displayStory.cfm?story\\_id=15557443](http://www.economist.com/specialreports/displayStory.cfm?story_id=15557443)>

Egan, Greg. Permutation City. HarperCollins, 1995.

---. Diaspora. Turtleback Books, 1999.

Fischinger, Oskar. Oskar Fischinger: Ten Films. DVD. Produced by The Center for Visual Music in association with The Elfriede Fischinger Trust and Jack Rutberg Fine Arts, 2006.

Floridi, Luciano. "The Philosophy of Presence: From Epistemic Failure to Successful Observability." Presence: Teleoperators and Virtual Environments. 14.6 (2005): 656 – 667. Cambridge: MIT Press.

Friedberg, Anne. The virtual window: from Alberti to Microsoft. Cambridge: MIT Press, 2006.

Gibson, William. Neuromancer. New York: The Berkley Publishing Group. 1984.

Grau, Oliver. Virtual Art: From Illusion to Immersion. Cambridge: MIT Press, 2003.

Gromala, Diana. "Pain and Subjectivity in Virtual Reality." The Cybercultures Reader. Ed. David Bell and Barbara M. Kennedy. New York: Routledge, 2000. 598 - 608.

Grosz , Elizabeth. Chaos, Territory, Art: Deleuze and the Framing of the Earth. New York: Columbia University Press, 2008.

Groys, Boris. Art Power. Cambridge: MIT Press, 2008.

Hansen, Mark B. N. Bodies In Code. New York: Routledge, 2006.

Hansen, Mark B. N. New Philosophy for New Media. Cambridge: MIT Press, 2004.

Haraway, Donna. "A manifesto for cyborgs: Science, technology, and socialist feminism in the 1980s." The Postmodern Turn: New Perspectives on Social Theory. Ed. Steven Seidman. Cambridge: Cambridge University Press, 1994. 82 - 118.

Hayles, N. Katherine. "Embodied Virtuality: Or How To Put Bodies Back Into The Picture." Immersed In Technology: Art and Virtual Environments. Ed. Mary Anne Moser & Douglas MacLeod. Cambridge: MIT Press. 1996. 1 - 28.

---. How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics. Chicago: University of Chicago Press, 1999.

Heidegger, Martin. "The Origin of the Work of Art." Basic Writings. New York: Harper Collins, 2008. 139 - 212.

Heim, Michael. The Metaphysics of Virtual Reality. Oxford: Oxford University Press. 1993.

Illegal Art (Website). The Grey Album Legal Battle Summarised. 2004. May 16. 2010 <<http://www.illegal-art.org/audio/grey.html>. >

Jenkins, Henry. Convergence Culture. New York: NYUP, 2006.

Jones, Sarah. "The Big Squeeze." Mix Magazine. Online article. (2005). December 18. 2008 <[http://mixonline.com/mag/audio\\_big\\_squeeze](http://mixonline.com/mag/audio_big_squeeze)>

Kandinsky, Wassily. Point and Line to Plane. Courier Dover, 1979

Koster, Raph. A Theory of Fun for Game Design. Arizona: Paragraph Press,

2005.

Kristeva, Julia. Strangers to Ourselves. Trans. Leon Roudiez. New York: Columbia University Press, 1994.

Kristeva, Julia. "Tales of Love." The Portable Kristeva. Ed. K. Oliver. New York: Columbia University Press, 2002. 137 – 179.

Lacan, Jacques. Ecrits. Trans. Bruce Fink. New York: Norton, 2006.

Leary, Timothy. "The Cyberpunk: The individual as reality pilot." The Cybercultures Reader. Ed. David Bell and Barbara M. Kennedy. New York: Routledge, 2000. 529 - 539.

Lefebvre, Henri. The Production of Space. Trans. Donald Nicholson-Smith. London: Blackwell, 1995.

Levine, Robert. "The Death of High Fidelity: In the age of MP3s, sound quality is worse than ever." Rolling Stone Magazine. 2007. Online article. December 18. 2008

<[http://www.rollingstone.com/news/story/17777619/the\\_death\\_of\\_high\\_fidelity](http://www.rollingstone.com/news/story/17777619/the_death_of_high_fidelity)> Currently (2010) unavailable at this address. Possibly copyright-infringing copy available at May 14. 2010 <<http://www.audio-constructions.com/highfidelity.html>>

Lewin, K. "Action Research and Minority Problems." Journal of Social Issues. 2(4): 34 – 46. 1946.

<http://www.audio-constructions.com/highfidelity.html> >

Little, Gregory, Building Myself a "Body Without Organs." Kent State University, 1997. December. 2008.<  
[http://www.gregorylittle.org/avatars/bwo\\_text.html](http://www.gregorylittle.org/avatars/bwo_text.html)>

Manovich, Lev. The Language of New Media. Cambridge: MIT Press, 2001.

McLuhan, Marshall. "Notes on Burroughs." The Nation. 28<sup>th</sup> December

(1964): 517-519. May 16. 2010 <<http://realitystudio.org/criticism/notes-on-burroughs>>

McLuhan, Marshall. Understanding Media: The Extensions of Man. New York: Routledge, 2001.

Matrix, Sidney Eve. Cyberpop: Digital Lifestyles and Commodity Culture. New York: Routledge, 2006.

Mattes, Eva and Franco. 13 Most Beautiful Avatars. 2006. December. 2008 <<http://www.0100101110101101.org/home/portraits/thirteen.html>>

---. Synthetic Performances. December. 2008 <<http://www.0100101110101101.org/home/performances/index.html>. 2007.>

Meadows, Mark Stephen. Pause & Effect: the Art of Interactive Narrative. Indianapolis: New Riders, 2003.

The Men Who Knew Too Much. Virtual Humanoids . Melbourne: Next Wave Festival. 1998; Melbourne: Melbourne Planetarium. 2000; Melbourne: Gamma Space Gallery. 2001; Bristol: Arnolfini. 2002; Manchester: Watermans Theatre. 2002.

Miller, Paul D (aka DJ Spooky that subliminal kid). Rhythm Science. Mediawork/The MIT Press. Cambridge, Massachusetts, 2004.

Moholy-Nagy, László. "Production-Reproduction: Potentialities of the Phonograph." Audio Cultures. Ed. Christoph Cox and Daniel Warner. London: Continuum, 2004. 331 - 333.

Morningstar, Chip and F. Randall Farmer. "The Lessons of Lucasfilm's Habitat." Cyberspace: First Steps. Ed. Michael Benedikt. Cambridge: MIT Press, 1991. 273 – 302.

Munster, Anna. Materializing New Media: Embodiment in Information Aesthetics. Hanover: University Press of New England, 2006.

Munt, Sally R. "Technospaces: inside the new media." Technospaces: inside the new media. Ed. Sally R. Munt. New York: Routledge, 2001. 1 - 18.

Murphy, Timothy S. Wising Up The Marks: The Amodern William Burroughs. Berkley: University of California Press, 1997.

Nakamura, Lisa. Cybertypes: Race, Ethnicity, and Identity on the Internet. New York: Routledge, 2002.

Nash, Adam. Memory Plains Returning. 2003. Online artwork. December 2008. <<http://yamanakanash.net/3dmusic/mprintro.html>>.

---. Chromacy. 2004. Online artwork. December 2008. <<http://yamanakanash.net/3dmusic/chromacy.html>>.

---. Scorched Happiness. 2004. Online artwork. December 2008. <[http://yamanakanash.net/scorched\\_happiness/index.html](http://yamanakanash.net/scorched_happiness/index.html)>.

---. Pale Shining Winter. 2005. Online artwork. December 2008. <<http://yamanakanash.net/3dmusic/winter/>>.

---. Blue Line. 2006. Online artwork. December 2008. <<http://yamanakanash.net/3dmusic/blueLine/>>.

---. Ramonia on Marni. 2007. Second Life. December 2008.

---. Seventeen Unsung Songs. 2007. Second Life. December 2008.

---. Trace Aureity. 2008. Second Life. December 2008.

---. One, Another. 2009. Second Life. October 2009.

O'Brien, R. (2001). "Um exame da abordagem metodológica da pesquisa ação [An Overview of the Methodological Approach of Action Research]." In Roberto Richardson Ed. Teoria e Prática da Pesquisa Ação [Theory and Practice of Action Research]. João Pessoa, Brazil: Universidade Federal da Paraíba. (English version). June 22<sup>nd</sup> 2008.

<<http://www.web.ca/~robrien/papers/arfinal.html> >

Ondrejka, Cory. Escaping the Gilded Cage: User Created Content and Building the Metaverse. New York Law School Law Review, Forthcoming. December. 2008

<[http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=538362](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=538362). 2004. 2006. >

O'Neill, Shaleph. "Presence, Place and the Virtual Spectacle." PsychNology Journal 3 (2005): 149-161.

Prendergrast, Mark. The Ambient Century. London: Bloomsbury, 2003.

Plato. The Symposium. London: Penguin, 1999

Rackham, Melinda. Empyrean. <http://www.subtle.net/empyrean>. 2000-2003.

Rackham, Melinda. Empyrean: Soft Skinned Space – investigating and challenging the persistence of realism in electronically constructed and populated online Virtual Reality environments. Diss. College of Fine Arts, University of New South Wales. 2004.

Ray, Sheri. Gender Inclusive Game Design. Massachusetts: Charles River Media, 2004.

Rickert, T. and M. Salvo. "The distributed Gesamtkunstwerk: Sound, worlding, and new media culture." Computers and Composition. 23. 3 (2006): 296 - 316.

Rimmer, Matthew. Digital Copyright and the Consumer Revolution: hands off my iPod. Cheltenham: Edward Elgar Publishing, 2007.

Roffe, Jon. "A Clamorous Encounter: Badiou's Deleuze and Deleuze's Plato". Global Arts, Local Knowledge: Cosmopolitical Planes of Expression. Eds. Colman, Frichot and Reynolds. Lexington: Lexington Press. Forthcoming.

Roof, Judith. "Depth Technologies." Technospaces: inside the new media. Ed. Sally R. Munt. New York: Routledge, 2001. 21 - 37.

Rose, Tricia. Black noise: rap music and black culture in contemporary America. Middletown: Wesleyan University Press, 1994.

Santos, Filipe, Benjamin? Fonseca, Paulo Martins and Leonel Morgado, "Negotiation of Spatial Configurations in Collaborative Virtual Environments." Current Developments in Technology-Assisted Education. Ed. A. Méndez-Vilas, A. Solano Martín, J.A. Mesa González and J. Mesa González. Spain: FORMATEX, 2006. 1472 – 1476.

Sardar, Siauddin. "alt.civilization.faq: cyberspace as the darker side of the west". Cyberfutures: culture and politics on the information superhighway. Eds. Siauddin Sardar and Jerome R. Ravetz. New York: New York University Press, 1996. 14 - 41.

Second Life. Computer software. Linden Research Inc. 2002.

Shaviro. Steven. Connected, or What It Means to Live in the Network Society. Minneapolis: University of Minnesota Press, 2003.

Soja, Edward W. Thirdspace: Journeys to Los Angeles and Other Real-and-imagined Places. Cambridge: Blackwell Publishing, 1996.

Southall, Nick. "Imperfect Sound Forever." Stylus Magazine. Online article. (2006). December 18. 2008  
<[http://www.stylusmagazine.com/articles/weekly\\_article/imperfect-sound-forever.htm](http://www.stylusmagazine.com/articles/weekly_article/imperfect-sound-forever.htm) >

Stephenson, Neal. Snow Crash. New York: Bantam Books, 1992.

Sutton, Damian and David Martin-Jones. Deleuze Reframed. London: I.B. Tauris, 2008.

Tal, Kali. The Unbearable Whiteness of Being.

<http://www.gse.buffalo.edu/FAS/Bromley/classes/socprac/readings/Kali-Tal-unbearable.htm>. 1996. December 2008.

Tal, Kali. Duppies in the Machine, or, "Anybody know where I can buy a copy of the UPNORTH-OUTWEST GEECHEE JIBARA QUIK MAGIC TRANCE MANUAL FOR TECHNOLOGICALLY STRESSED THIRD WORLD PEOPLE?". 1998. December 2008.

<<http://www.kalital.com/Text/Articles/Duppies.html> >

Tamiko Thiel. Beyond Mazanar. Manchester: Cornerhouse, 2003.

There.com. Computer software. Makena Technologies. 2003.

Toop, David. Haunted Weather: Music, Silence and Memory. London: Serpent's Tail, 2004.

Vega, Suzanne. Official Biography.

<http://www.suzannevega.com/suzanne/biography>. December 2008.

Virilio, Paul. Art and Fear. London: Continuum, 2000.

VNet. Open Source Software. 1998. Discontinued. See <http://tecfa.unige.ch/vrml/vnet/>

Wardrip-Fruin, Noah and Pat Harrigan, ed. First Person: New Media as Story, Performance and Game. Cambridge: MIT Press, 2004.

Wertheim, Margaret. The Pearly Gates of Cyberspace: A History of Space from Dante to the Internet. Sydney: Doubleday, 1999.

World of Warcraft. Computer software. Blizzard Entertainment. 2004.

Žižek, Slavoj. "From Virtual Reality to the Virtualisation of Reality".

Designing for a Digital World. Ed. Neil Leach. Chichester: John Wiley, 2002. 122 - 126.

Žižek, Slavoj. Enjoy Your Symptom!. New York: Routledge, 2008.