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Exploring *Living Room*:

Using Complexity Theory to discuss dance set in 3D digital scenography

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Keywords

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Abstract

Living Room*, is a performance that metaphorically and practically explores: what it means to live or be 'immersed' in a digital world. Through this work, and others, we have been researching the interplay of live dance and 3D scenographic real-time animated virtual-environments (RAVEs). These RAVEs are projected over an entire white stage-space, and use an off-stage dancer to control their movement. This paper uses Complexity Theory and Deleuzian perspectives to reflect upon our work. We discuss how both* Living Room *and our developmental process can be considered 'complex systems', from which we believe new properties are 'emerging'. Using our work as an analogy, we conclude that use of digital media in contemporary life may not necessarily lead to a loss of sensation, becoming subsumed into the digital world, but could lead to a new intensity of sensation and emergence of new possibilities through the fusing of physicality and virtuality.*

Introduction

> When critics charge journalists for not leaving
> their computers, you can see the journalists' point.
> There is a world on the internet: why go out in the

> cold to seek only a little piece of it? (Lloyd, 2006: 10)

This paper discusses the application of Complexity Theory and a Deleuzian perspective to our current creative research and specifically our recent performance work *Living Room* in order to comment on: what it means to live or be 'immersed' in a digital world; which is increasingly relevant to our contemporary selves, as exemplified by the quote from Lloyd (2006: 10). The *Living Room* is an evolving intermedia theatre piece inspired by recently completed MA research at the University of Chichester. *Living Room* is evolving in that its compositional elements are continuously morphing over time. It combines live dance in a theatrical setting with digital 3D models projected over the whole of a white stage space. To the audience the onstage performer may appear as a character in a computer game. (see figure 1) We call this form of scenography, a Real-time Animated Virtual Environment (RAVE). *Living Room* reflects the current state of our research into fusing art and science, a process involving creating intermedia performance work that we started in 2000. Prior to this time each of us have worked as both dance-artists and in the field of science (computer system engineer or academic scientist).

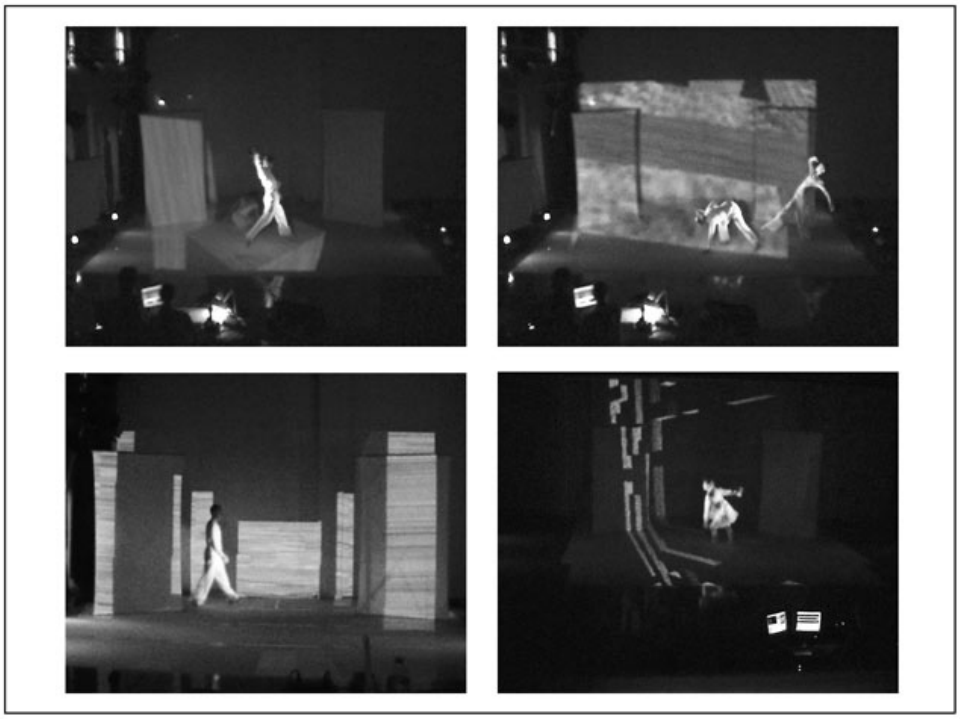

Figure 1 – Stills showing dancers onstage surrounded by RAVE

We believe that our RAVEs complement the metaphoric and abstract nature of the contemporary dance idiom, and that juxtaposing the virtual with the live physical performers comments on the contemporary human body in a digital technological paradigm. The process of developing this theatrical artwork has stimulated our reflection upon what it means to create in the virtual and the live-physical simultaneously. In this process the design and engineering paradigm of science and the intuitive sensibilities of art are fused, infusing a visceral perspective to the developments of the technology employed (Stuart, 2005) while expanding the creative possibilities of the art to comment on contemporary life.

This fusion of computer science and dance-art is being readily embraced by a rapidly escalating number of groups such as Carol Brown Dances (e.g. *Sea unSea*, 2006), Company in Space (e.g. *CO3*, 2002), Cunningham (e.g. *Biped* 2000), Igloo (*Winterspace*, 2003), Klaus Obermeier with Chris Haring (*D.A.V.E.,* 2000), and Troika Ranch (e.g. *16 (R)evolutions,* 2006), to name but a few. Al'Ka-mie's virtual imagery (see figure 2) usually depicts fully rendered found objects, rather than solely body orientated, wire framed models or abstract visual patterns, and consequently more closely resembles that of Reaney's (1999) realistic digital scenography for theatre performances (resembling conventional theatre sets) (see also Lloyd Weber's production (2005): *The Woman in White*,). Reaney's scenography also tended to be static. In contrast, our scenography is not only less realistic with more metaphoric found objects, but also our 3D models are moved in a manner similar to a 3D computer game. Inspiration for our scenography has come from Dali, Escher and Geiger amongst others.

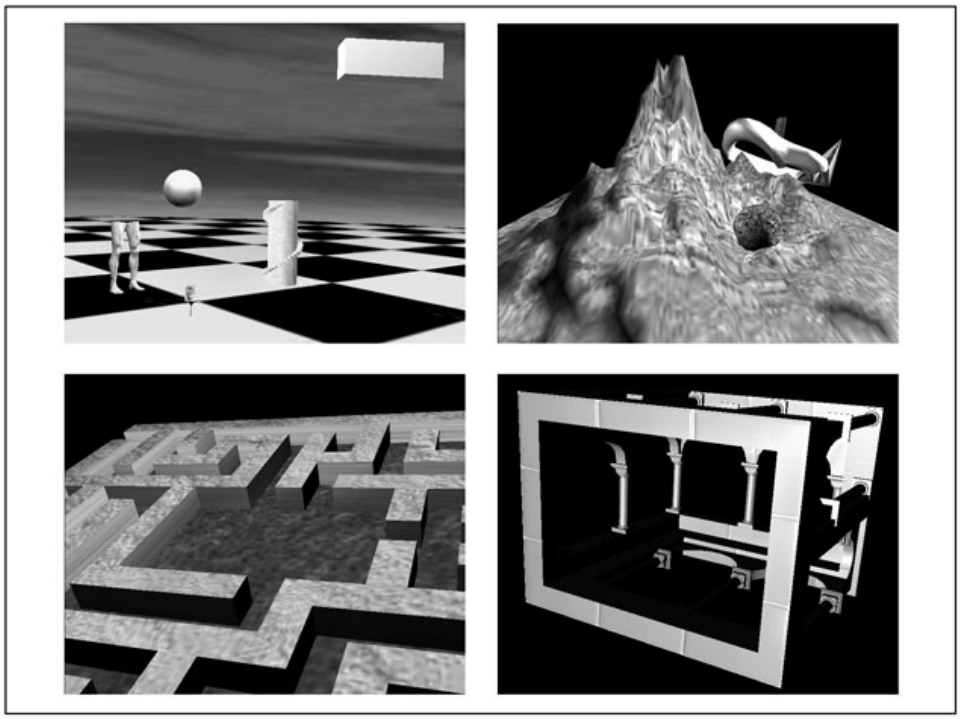

Figure 1 – Examples of projections showing some of the models used in the RAVEs

Our RAVEs fill the entire stage and are ‘live’ in that they are controlled and rendered in real-time. They can convey to the viewer a potential sense of ‘immersion’ within and travelling through virtual space. Furthermore, the fact that the virtual world extends beyond the rendered image of the projection can create an illusion that the stage environment itself is part of a bigger world in which the characters of the performance inhabit. In film theory this is called a diegetic world (Bordwell, 1985:16).

> The concept of immersion is central to both the art of the theatre and the new computer field of virtual reality or VR. It is a concept that unites the two areas, making VR a powerful new tool in scenography. (Reaney, 1999: 183)

The evolution of al'Ka-mie's research

Our current research involves applying hypotheses and developing methodologies, practice and software in combining, within a theatrical setting, the digital scenography with live dance and music or soundscapes. *Living Room* is our 7th performance piece 'experiment' with RAVEs. It comprises one solo onstage performer (Stuart), one offstage 'performer' controlling the RAVEs' movement (Curson) and either recorded music or improvising live musicians. (In earlier work the movement of the virtual environment was much less controllable and in initial works the movement was pre-rendered and set).

I believe there is a common understanding among artists propounded by Plato (2004) that once begun, an artwork takes on a growing 'identity of its own (Kaiser, 2002). The artwork starts to inform the artist of what is needed to help it grow to maturity (Troika

Ranch express this belief *pers. comm*. 2005). Some artists refer to this as divine intervention, where the growth of the artwork seems to be channelled from a higher entity, and is no longer simply a product of their own inspiration and creativity (e.g. Blake (Murray, 2000, Ross, 2000), Ficino (1457), Folk Art (Osinski, 2005), Marie, (2000)). We feel that this phenomenon was present with the development of *Living Room* and other of our works, particularly in more recent works where the movement of the virtual environment was highly responsive. *Living Room's* development and evolution has taken a pathway beyond our initial vision or seeming control.

We use the independent off-stage dancer (Curson) and a software and hardware system developed by Curson (in response to our practical research), to control the movement of the RAVEs. We aim to make the movement of the RAVEs, or virtual choreography, an equal, intelligent and creative dance-partner to the live onstage performer(s). The combination of the offstage dancer and the technological system creates in effect a 'technological dancing entity', which both responds to, and creates onstage events, in a manner that promotes a dancing dialogue between itself and the onstage performer. Complex patterns of relationship emerge from this partnership, which would be difficult to predict from the separate elements. Often the patterns that emerge from this dancing dialogue emerge with very little pre-determination (through improvisation). Stuart (2005) argues that the artworks we are creating in this

manner could be considered ‘living complex systems’. Just as living organisms grow, we view our artwork, (including the compositional process, the rehearsal process and the iteration of the performances) as ‘growing’.

Complexity Theory (Lucas, 2006) not only describes behaviour of living complex systems (such as *Living Room*), but also describes how development or growth and evolution of such systems occur. According to Kauffman (2000,) complex systems appear to expand rapidly into new variations of that which is in current existence, by using recombination and mutation of existing elements. This is known as expanding into ‘the adjacent possible’. Kauffman suggests:

> The adjacent possible will emerge as an important concept. The species diversity of the biosphere has increased as well as the molecular diversity. The diversity of goods and services in our economy is huge compared to the diversity of goods achievable by Palaeolithic humans 2000,000 years ago. In short the past four billion years has seen persistent flow of the biosphere into the adjacent possible. … Indeed I will be so bold as to suggest that this nonequilibrium flow into a persistent adjacent

> possible may be the proper arrow of time, rather than the more familiar appeal to the second law of thermodynamics in closed thermodynamic systems. (Kauffman, 2000 : 47-48)

Whether a higher entity is involved or not, the self-defining growth of an artwork could be perceived as a product of a 'living complex system' as it expands into the adjacent possible (see also Stuart 2005). We believe that Complexity Theory (see Kirschbaum, 2002, & Lucas, 2006), appeared an appropriate framework within which to generally interrogate our work and *Living Room*

Complexity theory applied to al'Ka-mie's research

Complexity Theory is a branch of Mathematics that investigates complex systems, i.e. those systems with the following properties:

- Emergence
- Self-organization
- Non-linearity
- A dynamic relationship between order and randomness

Lucas defines 'emergence' as:

> System properties that are not evident from those of the parts. A higher-level phenomena, that cannot be reduced to that of the simpler constituents and needs new concepts to be introduced. This property is neither simply an aggregate one, nor epiphenomenal, but often exhibits 'downward causation'. (Lucas, 2004)

That is, there are loops of causality within the system, and the parts that constitute the system can be affected by the dynamics of the whole system. An example of an emergent property is a book. All the constituent elements of the book do not alone make it what it is and tell the narrative. It is also vitally, the manner in which the elements are put together, that gives the book its nature.

The individual elements of *Living Room*: live dance and performers, music, props, computing technology, moving RAVEs, RAVE designer and ‘dance’ operator, etc. and the particular manners in which we combine them (or they combine themselves) form a complex whole, from which we believe new creative products to be emerging.

Emergence: of the new

Initially we worked with the virtual as a literal extension of the physical space, as though the virtual scenery was a substitute for real theatrical scenery. In this paradigm the orientation of the virtual closely following the orientation of the performer and her movement in space, as though she was moving in a real physical space. However through much experimentation involving the whole set-up of projection, white stage space, onstage dancer and offstage dancer we started to discover other more tangential relationships. We discovered, for instance, that if the virtual followed the orientation of the performer but exaggerated their translation in space they could appear to travel great distances without physically travelling far at all. We found that when the performer was standing the viewer had a greater perception of gravity compared to when the performer did ‘floorwork’ (as referred to in Dance e.g. rolling on the floor). Thus a standing dancer could appear to sink below the virtual world’s surface, if the apparent ground level of the RAVE appeared to rise. While a performer doing floorwork might appear to a viewer to be ‘flying’ in a 3D space if the RAVE flew in a 3D pathway. As a final example, we can play with scale and axis of the virtual: The dancer may appear to be moving in an undulating landscape which as the virtual zooms out reveals that the landscape is contours of a face, or stairs may be tilted to become a row of pillars or a cage.

In this manner the live performer can appear to move in an otherwise impossible manner and the semiotics of the work becomes highly fluid, mutating from one meaning to another and allowing oblique and fast moving narratives. These and many other relationships emerged from working with the complete system rather than trying to extrapolate them from the individual elements and as such are examples of emergent phenomena.

The combination of the live performer and the RAVE creates an artistic media entity that is more than the two simply combined. Through a symbiosis of human performance and Virtual Reality a third element or 'dimension' emerges, just as Virtual Reality philosopher Michael Heim (1993: 78) has suggested.

Self-Organization: The interaction between software development and choreographic development

> Typically one thinks of collaboration as being between human beings. But I believe that in a slightly different sense you also collaborate with your materials, onto which you do not simply impose your vision, but rather discover it there. To take a stock example, Michelangelo felt he found

> his forms in his stone, then set them free in his sculptures. (Kaiser, 2002)

Kaiser, too was working with technology.

Curson is developing the technology that we use. This technological evolution is symbiotic with our creative path and is part of *Living Room* as complex living system. Our practical research significantly effects the direction in which we develop the technology and in turn, the potential and limitations of the technology (the choreographic possibilities of the RAVE) are moulding the direction of the physical choreographic research. The physical choreography Stuart is evolving, is part of this cyclic process. The physical choreography is radically affected by the RAVE choreography and vice versa, as the final theatrical work appears not as two separate elements in space and time, but rather as a whole. The resulting effect is that the whole theatrical work dynamically reflects back upon the development of the individual components, whether choreographic or technological. This is the system self-organising itself, on many levels (as per living complex systems, Lucas, 2000).

This dynamic self-organisation is leading Curson to create a rhizomatically networked software system akin to the beginnings of an elementary dancing brain. This system together with Curson's

input mediating the onstage events during performance allows the RAVE to function more like an improvising dancer. Through applying software design to an artistic purpose and artistic sensibilities to an engineering problem, Curson is in the process of discovering insights into how a machine may become artistic and create for itself. Intelligence becomes a creative playful process. Curson's development of the software is unfolding in a manner otherwise not possible without the symbiotic human artistic creative process. From this process of self-organization of VR with a human interface yet another 3rd dimension of possibility is emerging as suggested by Heim (1993: 78).

Emergence may give rise to attractors: centres of stability

'All technologies display ambiguous, multistable possibilities. Contrarily, in both structure and history, technologies simply can't be reduced to designed functions' (Idhe, 2002: 106).

Returning to the example of the book as complex system, within all the possible combinations of its elements there are a few which would find a stable form as a functional book. This stable form may be called an attractor in complexity theory. But the book now defined as a stable form may develop more than the one function it was

conceived for. It may, for instance, become a paperweight, a doorstop, a pedestal to get a better view over a crowd etc.

According to Idhe (2002: 106) technologies in particular, have multistable possibilities of use that usually exceed or lie at a tangent from the intended design use. We observe this same characteristic with the technology we are developing. Our practical research has allowed us to gain insights into the possibility of using this technology not just in dance-performance, but also in nightclubs, as part of a VJ setup, or for music concerts. There are probably many more tangential uses than we have yet conceived.

Living Room: Non-linearity & a dynamic between Randomness and Order

According to Curson the software becomes just a freeze frame of our ideas at any one time, while its development is perhaps a movie, the dance of ideas, or a hypertext. Non-linearity and a dynamic between order and randomness are the third and fourth properties of complex systems. The development of our work has often followed a non-linear and seemingly chaotic path and yet, our vision, although not fully realised, provides an over arching direction and sense of order within which our creative path meanders.

For instance, by pushing the limits of the current software design we have accidentally stumbled on new creative possibilities with the physical choreography, while physical experimentation with movement may suggest new functionality that could be added to the software or virtual choreographic patterns. Further more, outside influences such as work from other researchers or artists may suggest new paths of enquiry altogether. These and other factors may lead us to further develop existing concepts while at others times push us to jump into new pools of possibility or encourage us to re-work existing ideas. Hence the resulting developmental path is non-linear, chaotic and complex. This is also known as a hypertextual path, and is emulated by the narrative of our most recent creation *Living Room*.

- The vignettes, which constitute the *Living Room* can be played in various orders, omitted or repeated,

- Within each vignette both the virtual and real physical performances are part choreographed and part improvised.

- The piece has been performed with both recorded and improvised music.

- The length of the piece can shrink or grow.

Living Room is composed of individual scenic vignettes. *Living Room* can itself be viewed as a complex system, not just through the process of its development, as we have already discussed, but also in the nature of its performance structure. It is non-linear and has chaotic elements embedded within a structure. The vignettes of the *Living Room* can be combined variously in time, omitted or repeated imbuing individual performances with unique narrative resonances. Through the recombination of the vignettes, the *Living Room* becomes a hypertext performance (see diagram 1).

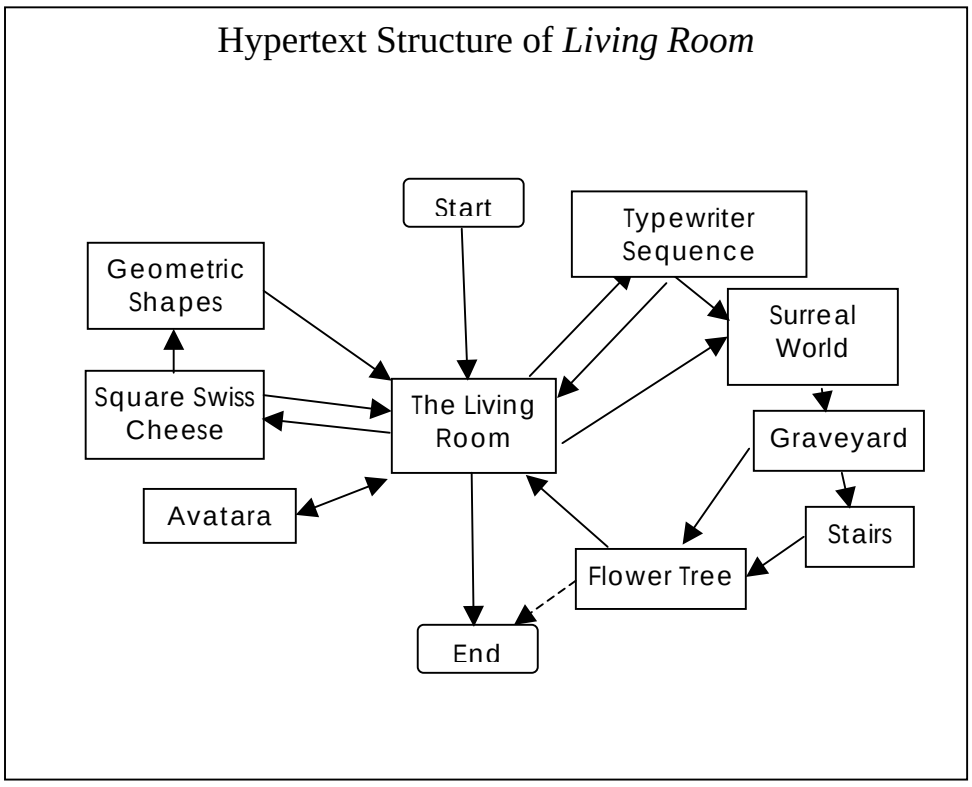

Diagram 1. Hypertext Structure of the *Living Room*

In the *Living Room*, the onstage dancer is free to react to the movement of the RAVE within her structured improvisational score, and the offstage dancer is free to manipulate the onstage virtual imagery within his improvisational score. Further, imprecise and random elements within the technology are retained so as to allow the possibility of the unexpected, of creation to appear in the virtual. The apparent contradiction of imprecise structure is a crucial element in allowing the physical choreography of the onstage dancer and the virtual choreography of the RAVE to be drawn into an intimate dialogue that becomes unique with each performance and promotes the discovery of new possibilities.

Living Room has been performed with both recorded and live improvised music, adding a further degree of variability. If recorded music is played, then during any one vignette the music does not necessarily provide an invariable timeline. Overall, the piece is dynamic, stretching and shrinking in time from one performance to another. It is a performance hypertext. According to Bernstein (1998), ‘today's Web designers are taught to avoid irregularity, but in a hypertext, as in a garden, it is the artful combination of regularity and irregularity that awakens interest and maintains attention’.

Living room’s central theme is that of a woman inhabiting a domestic living room, through which she and through her, we, access obscure realities, initially through framed portals (see figure 3). As the piece

progresses, the realities start to slide one into another. Iconic references are made to time (clock in the living room ticking at half speed), death (graveyard), ascendance (stairs), nature and life (Tree and flower).

Figure 3 – Video stills of *Living Room*

The hypertext structure of Living Room and the abstract nature of the media of performance allow audiences to read a wide range of scenarios into the piece. The viewers' 'reading' of her tumble

through these states, will vary according to the particular path taken during the viewing and according to the individual viewer.

Possible narratives read into the work by a viewer might be:

- The woman is in an Alice-like dream
- She is psychotic
- She is caught in computer virtual reality
- She is on drugs
- She is waiting for life to ‘start’ and experiences various dream realities.

Whatever the narrative read into the piece, there is a lack of stability in the woman’s world. She is seen to ‘jump’ through different realities (multistable points, attractors?) without a clear sense of progression. She exists in an unstable visual environment, in a virtual world where both her movement and the virtual world’s movement enhances the viewer’s feeling that she is not standing on solid ground. Her living room is no more substantial than her dream realities; and physically she can appear at times to fade into any of the real or dream worlds. At the end of the piece, her physical form becomes veiled/ blurred into her environment. She is both real and virtual, reflecting back her surroundings.

Living Room as Virtual Reality: presence and immersion

According to Virtual Reality (VR) philosophers like Hillis (1999, 15, 201), Idhe (2002: 39, 138) and Heim (1993) in our digital hypertextual world, the body lives in a heightened visual sense with the other senses being downplayed and further suggest that our contemporary western culture elevates vision among all our senses. They believe that in using the highly visual medium of VR we are attempting to live in a techno-fantasy of escaping the limitations of our bodies by immersing ourselves in VR and 'leaving' our bodies behind. But they suggest an addendum: that we are simply substituting one set of limitations of the real world for another of the virtual world without necessarily gaining freedom and instead losing bodily senses.

We have been assessing our work through questionnaires with regard to whether the viewer perceives the live performers as 'present' within the RAVEs, and whether they themselves feel 'immersed' enough in the RAVE to feel kinaesthetically moved in response to the moving RAVE.

When staging digital scenography for dramatic theatre, Reaney (1999) noted that when the scenography was more realistic, as compared to metaphorically expressive, actors were more easily perceived as present within the scenography. The more metaphorically expressive scenography appeared to immerse the viewer more. Reaney's work favoured realistic static scenography

and dramatic theatre, which contrasts with our use of live moving RAVEs and contemporary dance theatre.

Question Asked	**Number of Respondents**	
[How much of the time] did you see the dancers as belonging to or inhabiting the virtual world?	½ the time or more	Less than ½ the time
	28 (47%)	31 (53%)
Did You feel as if your body was physically moving (eg watching a roller-coaster in the cinema)?	Yes	No
	38 (65%)	20 (35%)

Table 1 – Response to questionnaire

Question Asked		Did You feel as if your body was physically moving (eg watching a roller-coaster in the cinema)?	
		No	Yes
[How much of the time] did you see the dancers as belonging to or inhabiting the virtual world?	½ or >	**16**	**21**
	< ½	**14**	**6**
Viewers who felt kinaesthetically moved tended (nonsignificantly) to be more likely to see the dancers as inhabiting the virtual world (CHITEST probability = 0.0535)			

Table 2 – Breakdown of viewers who felt their body moving against those who saw dancers as inhabiting the RAVEs

In our vignettes 65 per cent of viewers felt that the dancer was present or inhabited the virtual world and 47 per cent of our viewers felt themselves kinaesthetically moving (table 1.). These two appeared to be linked although not yet significantly (see table 2), as the numbers were small. It would appear that viewers who felt that the dancers were present within the virtual world, did not appear less likely to feel themselves kinaesthetically moved i.e. immersed enough in the virtual world to be bodily engrossed. These results seem to contrast with Reaney's findings.

To explain our survey results we used a Deleuzian perspective (Deleuze, 2003). Using such a perspective, Kennedy (2000) describes how the sense of vision and bodily sensation are closely intertwined as she elaborates on Deleuze's concept: that the temporal concept of sensation and its intensity, can replace the concepts of pleasure and desire as underlying the determination of the aesthetic. She (Kennedy, 2000, p28) writes: 'I argue that the visual engagement is but a pathway to other synaesthetic experiences such as tactility, or hapticity, and proprioceptivity, for example'. Thus, an intensity of sensation may effect viewers' perception of their enjoyment and engagement. We now believe by sympathetically relating the RAVE with the moving performer we engendered a heightened bodily experience in the audience, an increase in sensation in the viewer. This increase in sensation by feeling kinaesthetically moved may have enhanced many viewers' sense of immersion in our virtual theatre and also willingness to place the dancer as present within the RAVE.

As mentioned, VR philosophers (Idhe, 2002: 138; Hillis, 1999: 201) believe that rather than enhancing sensation, virtual reality work tends to involve diminished sensation resulting from promoting the visual sense while neglecting the other senses. We would suggest that the synthesis of virtual and physical, particularly when there is a high degree of coincidence between them, might deepen viewers'

sensation beyond the visual into the visceral, rather than diminish their sensation.

Conclusion

For us the *Living Room* is a practical and metaphoric research exploration of: what it means to live in a digital world. According to Hillis (1999) today ‘physicalness’ is being subsumed in the virtual; we increasingly ‘live through’ our computers, as exemplified by the quote by Lloyd (2006: 10) at the beginning of this paper.

We have mentioned already that when there is a high degree of coincidence between the movement of onstage performer and of the RAVE an extra dimension appears to be achieved. In this extra dimension there are several emerging new properties or perspectives. The live performer can appear to move in an otherwise impossible manner. The development path of the software is unfolding in a manner otherwise not possible without the human artistic creative process: self-organising along a human-digital technology interface. New unexpected functionalities of the technological system are emerging. A hyper textual story line allows greater dimensionality in the reading of the *Living Room* work. And specifically, from outside the viewer may experience a heightened kinaesthetic response.

Our research using *Living Room* and other similar works constitutes an exploration into possible human technological interactive paradigms, that is more generally, what it is to live in an increasingly digital technological world. By using Complexity Theory and a Deleuzian perspective as frameworks to help us find an external perspective we would suggest that: perhaps the virtual interaction of contemporary life is not about losing sensation, being subsumed into the digital world, but about fusing physicality and virtuality to evolve a new intensity of sensation, with lateral perspectives leading to the probable emergence of new properties, of new creative possibilities.

Works cited:

Bernstein, M. (1998) *Hypertext Gardens: Delightful Vistas. Beyond the navigation problem; The limits of Structure; The Virtue of Irregularity; 7gates / lessons.* Eastgate Systems, Inc. http://www.eastgate.com/garden/. Accessed on 21st April 2005.

Bordwell, D. (1985) *Narration in the Fiction Film,* London: Routledge.

Carol Brown Dances (2006) *Sea unSea,* Siobhan Davies Studios, London, UK.

Company in Space (2002) *CO3*, Contemporary Arts Museum, London, UK.

Cunningham Dance Company (2000) *Biped*, Greenwich Dance Agency, London, UK

Deleuze, G. (2003) *Francis Bacon: The Logic of Sensation,* translator: Smith, D. W., London: Continuum.

Ficino, M. (1457) 'On Divine Frenzy' letter, http://www.users.globalnet.co.uk/~alfar2/frenzy.htm. Accessed on 20th July 2005.

Heim, M. (1993) *The Metaphysics of Virtual Reality*, Oxford; Oxford University Press.

Hillis, K. (1999) *Digital Sensations: space identity, and embodiment in virtual reality,* Mineapolis: University of Minnesota Press

Igloo (2003) *Winterspace*, Chancellor Hall, Chelmsford, UK.

Ihde, D. (2002) 'Bodies in Technology', *Electronic Mediations*, 5, London; University of Minnesota Press.

Kaiser, P. (2002) 'On the Design of Creative Collaboration', position paper for *The Managing as Designing conference* at Cape Western University in Cleveland, http://www.kaiserworks.com/duoframe/duoideas.htm. Accessed on 23rd April 2005.

Kauffman, S. A. (2000) *Investigations,* Oxford: Oxford University Press.

Kennedy, B. M. (2000) *Deleuze and Cinema: the aesthetics of sensation,* Edinburgh: Edinburgh University Press.

Lloyd, J. (2006) 'The best – and worst- of times: just as the internet makes journalists jobs easier than ever it threatens them with redundancy' *FT Magazine*, April 1:2, p10.

Lloyd Webber, A. (2005) *The Woman in White*, Palace Theatre, London, UK.

Lucas, C. (2006) *Complexity and Artificial Life Research*, http://www.calresco.org. Accessed on 5th March 2005.

Lucas, C. (2004) 'Emergence and Evolution - Constraints on Form' *Complexity and Artificial Life Research*, http://www.calresco.org/emerge.htm#em. Accessed on 14th February 2005.

Lucas, C. (2000) 'Autopoiesis and Coevolution', *Complexity and Artificial Life Research*, http://www.calresco.org/lucas/auto.htm. Accessed 14th February 2005.

Kirschbaum, D. (2002) 'Introduction to Complex Systems', *Complexity and Artificial Life Research,* http://www.calresco.org/intro.htm. Accessed on 3rd March 2005.

Marie, T. (2000) 'Art & Soul Workshops', http://www.tianamarie.co.uk/chalicearts/t-workshops.html. Accessed on 20th July 2005.

Murray, G. (2000) 'William Blake Online', http://www.tate.org.uk/britain/exhibitions/blakeinteractive/. Accessed on 20th July 2005.

Obermaier, K. and Haring, C. (2002) *D.A.V.E. (Digital Amplified Video Engine)*, The Purcell Room, London, UK.

Osinski, B. (2005) 'Biblical Muse', *Atlanta Journal Constitution*, http://www.ajc.com/metro/content/metro/gwinnett/0405/30folkart.html. Accessed on 20th July 2005.

Plato (2004) *Ion*, translated by Jim Barcelona, http://www.well.com/~barce/Ion.pdf#search='Plato%20divine%20inspiration'. Accessed on 20th July 2005.

Reaney, M. (1999) 'Virtual Reality and the Theatre: immersion in virtual worlds'. *Digital Creativity*, 10(3): 183-188.

Ross, D. (2000) 'William Blake', Britain Express, http://www.britainexpress.com/History/bio/blake.htm. Accessed 20th July 2005.

Stuart, R. I. (2005) *Rhizomes: a complex system (an investigation into combining live dance with animated virtual scenography)*. MA (Collaborative Arts) Thesis; University of Chichester: Chichester, UK.

Troika Ranch (2006) *16 (R)evolutions*, University of Chichester, Chichester, UK.

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Robyn Stuart is a performance artist who has a strong scientific background having a Ph.D. and worked as a research fellow in the Department of Ecosystem Management at the University of New England, Australia. She has just completed an MA in Collaborative Arts from the University College Chichester, where she investigated compositional techniques for live dance in 'moving' digital scenography. She has worked as an independent dance artist/ choreographer in Sydney, Australia and the UK since 1993, and formed al'Ka-mie together with Mr Curson in 2000 in order to perform, choreograph, and develop live theatre, which incorporates digital scenography. Contact: al'Ka-mie Intermedia Theatre, c/o Blue

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Brian Curson studied science and engineering, and worked as a software analyst and engineer before switching to study martial arts and then dance at the Rambert School of Dance. He has worked internationally as an independent dance artist since 1996 collaborating with film-makers, sculptors, and composers, while simultaneously developing an interest in and working as a lighting designer. Mr Curson formed al'Ka-mie with Dr Stuart in 2000 and not only dances and choreographs, but is also responsible for the design and development of the computer systems and lighting used. Contact: al'Ka-mie Intermedia Theatre, c/o Blue Cottage, Lower Froyle, Alton, Hampshire, GU34 4LL. Email: brian@alkamie.co.uk