HOW DO DEVELOPMENTS IN HYBRID ART AFFECT THE PERCEPTION OF THE HUMAN–TECHNOLOGY RELATIONSHIP?

Alise Piebalga

Presented in Partial Fulfilment of the Requirements for the Degree of

Doctor of Philosophy

CARDIFF METROPOLITAN UNIVERSITY

January 2016
# TABLE OF CONTENTS

DECLARATION .............................................................................................................................. iv  
ACKNOWLEDGEMENTS ........................................................................................................... v  
LIST OF TABLES ..................................................................................................................... vii  
LIST OF FIGURES .................................................................................................................. viii  
ABSTRACT ............................................................................................................................. xi  

CHAPTER 1: BACKGROUND ................................................................................................. 1  
1.1 Introduction ....................................................................................................................... 1  
1.2 Context of the study .......................................................................................................... 2  
1.3 Research objectives ......................................................................................................... 6  
1.4 Thesis structure ............................................................................................................... 7  
1.5 Summary ......................................................................................................................... 9  

CHAPTER 2: METHODOLOGY ............................................................................................. 11  
2.1 Introduction .................................................................................................................... 11  
2.2 Literature review .......................................................................................................... 12  
2.3 Developing practice ....................................................................................................... 13  
2.4 Gathering and evaluating audience feedback data ....................................................... 15  
2.5 Summary ....................................................................................................................... 22  

CHAPTER 3: LITERATURE REVIEW ................................................................................ 24  
3.1 Introduction .................................................................................................................... 24  
3.2 Debates reveal a crisis in the perception of the human–technology relationship ............ 24  
3.3 The hybrid art discipline ............................................................................................... 29  
  3.3.1 Hybrid art and Ars Electronica ............................................................................... 29  
  3.3.2 Transdisciplinarity in hybrid art ............................................................................ 32  
  3.3.3 Serres’s ‘third space’ of innovation through transdisciplinarity ......................... 34  
  3.3.4 Hybrid art becomes a prize category at Ars Electronica 2007 ............................ 36
3.4 Hybrid art and the debates on the human–technology relationship .......... 40
  3.4.1 Hybrid art and the debates on technologically augmenting the human body ................................................................. 40
  3.4.2 Hybrid art and the debates on replicating human characteristics in artificial systems ....................................................... 45

3.5 Blurring of the experience of the virtual and the real in hybrid art ............ 50
  3.5.1 Blurring virtual/real boundaries in digital performance practices ........ 52

3.6 Summary ........................................................................................................ 58

CHAPTER 4: DEVELOPMENT AND EVALUATION OF PRACTICE ............... 60

4.1 Introduction ...................................................................................................... 60
4.2 Development of practice .................................................................................. 61
  4.2.1 Labyrinths ................................................................................................. 61
  4.2.2 Forking Paths .............................................................................................. 68
  4.2.3 Immortal .................................................................................................... 72
  4.2.4 I Know What It is When I Find It ................................................................. 76
  4.2.5 Skin Side Up ............................................................................................... 81
  4.2.6 Enclave and Enclave 2 ................................................................................. 83

4.3 Card-sort event ................................................................................................ 91
4.4 Individual card-sort results ............................................................................. 93
4.5 Evaluation of the card-sort results ................................................................ 109
4.6 Summary ......................................................................................................... 113

CHAPTER 5: SUMMARY AND CONCLUSIONS .......................................... 115

5.1 Introduction ..................................................................................................... 115
5.2 Summary of research methodology ............................................................... 116
5.3 Summary of research findings ....................................................................... 117
  5.3.1 Literature review ...................................................................................... 117
  5.3.2 Findings from the development of practice ............................................. 121
  5.3.3 Findings from the card-sort event ........................................................... 123

5.4 Evaluation of findings ................................................................................. 126
  5.4.1 Evaluation of literature review findings .................................................. 126
  5.4.2 Evaluation of practical work ................................................................. 127
DECLARATION

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed .......................................................... (candidate) Date

STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. Where correction services have been used, the extent and nature of the correction is clearly marked in a footnote(s).

Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

Signed .......................................................... (candidate) Date

STATEMENT 2

I hereby give consent for my thesis, if accepted, to be available for photocopying and for inter-library loan, and for the title and summary to be made available to outside organisations.

Signed .......................................................... (candidate) Date
ACKNOWLEDGEMENTS

It feels like a different person began this research project. She wrote differently, thought differently and aimed to achieve goals that now seem much less significant. I think the main difference is that writing a PhD thesis in the early days was about achieving objectives: holding a book in my hands, getting a better job and being able to produce art while working in academia. However now it feels like the value of having written a PhD thesis is in having changed through the process as an artist, researcher, academic and a person. Like all journeys, this has been thanks to people who supported me along the way.

First and foremost I would like to thank my amazing supervisory team. I believe that I have been very lucky to be able to call on the expertise of Professor Robert Pepperell, Professor Clive Cazeaux and Dr Steve Thompson. They contributed to my work with their extensive knowledge and shaped the way I write and think.

Even during my undergraduate studies, I have been a fan of Robert’s art and writing. He has a fantastic ability to really see the world and I feel very grateful to have had the benefit of his eye and advice on my art and research.

I would like to thank Clive for his attention to detail and true investment in this process. His notes and comments have been invaluable and his insistence on accountability in research, helped to shape the methods I developed.

I wish I had kept all the diagrams and sketches that Steve has drawn for me over the years. I would like to thank him for showing me that a thought expressed simply is best.

Art is never created in isolation and I would like to thank all my peers and audiences for offering me their advice and insights. Particularly I am indebted to my collaborator Alistair Burleigh who has an enviable ability to create environments that seduce and inspire.

Despite my previous misconceptions, I now understand that neither is writing done in isolation. For their generous help in editing and helping to format my work, I would like to thank Dr Edward Crooks and Dr Michael Pengelly.

I would like to take this opportunity to express my gratitude to my family: Anda Piebalga, Andris Piebalgs, Anete Piebalga and Andris Piebalgs. Each one is an endless source of inspiration. Their achievements and ability to take on challenges is incredible. I remember my father bringing home a puzzle game in English when I
was very young. I could not understand why should I play in English, rather than in Latvian. He promised that learning English early would help me in life; and so it has. Finally I would like to thank my partner David Holdsworth. His pride in everything I do has sustained me through many doubtful times. When I felt like giving up, he was there to show me what is important. When I needed help installing my work, he was there with a paintbrush and a saw. When I needed advice, he was there to talk to. In fact one of these conversations resulted in a major breakthrough in my research for which I am endlessly indebted.

This PhD submission was only possible because I have had these people in my life. Each one of them is brilliant and I feel grateful that their knowledge, experience, intuition and kindness have changed me along the way.
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Box plot 1 and Box plot 2 for the card ‘Mechanical’</td>
<td>94</td>
</tr>
<tr>
<td>4.2</td>
<td>Box plot 3 and Box plot 4 for the card ‘Slow motion’</td>
<td>95</td>
</tr>
<tr>
<td>4.3</td>
<td>Box plot 5 and Box plot 6 for the card ‘Dance’</td>
<td>96</td>
</tr>
<tr>
<td>4.4</td>
<td>Box plot 7 and Box plot 8 for the card ‘Partner’</td>
<td>97</td>
</tr>
<tr>
<td>4.5</td>
<td>Box plot 9 and Box plot 10 for the card ‘Effect’</td>
<td>98</td>
</tr>
<tr>
<td>4.6</td>
<td>Box plot 11 and Box plot 12 for the card ‘Pattern’</td>
<td>99</td>
</tr>
<tr>
<td>4.7</td>
<td>Box plot 13 and Box plot 14 for the card ‘Body’</td>
<td>100</td>
</tr>
<tr>
<td>4.8</td>
<td>Box plot 15 and Box plot 16 for the card ‘Observed’</td>
<td>101</td>
</tr>
<tr>
<td>4.9</td>
<td>Box plot 17 and Box plot 18 for the card ‘Observer’</td>
<td>102</td>
</tr>
<tr>
<td>4.10</td>
<td>Box plot 19 and Box plot 20 for the card ‘Performer’</td>
<td>103</td>
</tr>
<tr>
<td>4.11</td>
<td>Box plot 21 and Box plot 22 for the card ‘Performance’</td>
<td>104</td>
</tr>
<tr>
<td>4.12</td>
<td>Box plot 23 and Box plot 24 for the card ‘Sensation’</td>
<td>105</td>
</tr>
<tr>
<td>4.13</td>
<td>Box plot 25 and Box plot 26 for the card ‘Organic’</td>
<td>106</td>
</tr>
<tr>
<td>4.14</td>
<td>Box plot 27 and Box plot 28 for the card ‘Rhythm’</td>
<td>107</td>
</tr>
<tr>
<td>4.15</td>
<td>Box plot 29 and Box plot 30 for the card ‘Movement’</td>
<td>108</td>
</tr>
<tr>
<td>4.16</td>
<td>Box plot 31 and Box plot 32 for the card ‘Speed’</td>
<td>109</td>
</tr>
<tr>
<td>4.17</td>
<td>Table comparing results for all cards</td>
<td>110</td>
</tr>
<tr>
<td>4.18</td>
<td>Surface graphs for all cards</td>
<td>111</td>
</tr>
<tr>
<td>4.19</td>
<td>Table of changes</td>
<td>112</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

Figure 1.1. Alise Piebalga swinging trapeze ................................................................. 1
Figure 2.1. Card sort envelopes ................................................................................. 17
Figure 2.2. Human–technology scale on the reverse of cards ................................. 19
Figure 2.3. Box and Whisker diagram example. Reproduced from BBC Bitesize, http://www.bbc.co.uk/schools/gcsebitesize/maths/statistics/representingdata3hirev6.shtml (accessed 08 April 2014) .............................................................. 21
Figure 3.1. Marc Downie, Shelley Eshkar and Paul Kaiser. how long does the subject linger on the edge of the volume... (2005). Multimedia installation and performance. Reproduced from http://www.trishabrowncompany.org/?page=view&nr=102 (accessed 30 September 2013) ........................................................................................ 31


Figure 4.1. Alise Piebalga and Wrap3. *Labyrinths* (2009). Mixed media ..... 62

Figure 4.2. Alise Piebalga and Wrap3. *Labyrinths* (2009). Mixed media ..... 62

Figure 4.3. Alise Piebalga and Wrap3. *Labyrinths* (2009). Mixed media ..... 63

Figure 4.4. Alise Piebalga and Wrap3. *Labyrinths* (2009). Mixed media ..... 64

Figure 4.5. Alise Piebalga and Wrap3. *Labyrinths* (2009). Mixed media ..... 64

Figure 4.6. Alise Piebalga and Wrap3. *Forking Paths* (2009). Mixed media ..... 68

Figure 4.7. Alise Piebalga and Wrap3. *Forking Paths* (2009). Mixed media ..... 69

Figure 4.8. Alise Piebalga and Wrap3. *Forking Paths* (2009). Mixed media ..... 69

Figure 4.9. Alise Piebalga and Wrap3. *Forking Paths* (2009). Mixed media. ..... 70

Figure 4.10. Alise Piebalga and Wrap3. *Forking Paths* (2009). Mixed media ..... 70

Figure 4.11. Alise Piebalga and Wrap3. *Immortal* (2009). Mixed media ..... 73

Figure 4.12. Alise Piebalga and Wrap3. *Immortal* (2009). Mixed media ..... 73

Figure 4.13. Alise Piebalga and Wrap3. *Immortal* (2009). Mixed media ..... 74


Figure 4.16. Alise Piebalga. *I Know What It is When I Find it* (2009/2010). Mixed media .................................................. 78

Figure 4.17. Alise Piebalga. *I Know What It is When I Find it* (2009/2010). Mixed media .................................................. 79

Figure 4.18. Alise Piebalga. *I Know What It is When I Find it* (2009/2010). Stills from video footage .................................................. 77, 78

Figure 4.19. Alise Piebalga. *I Know What It is When I Find it* (2009/2010). Mixed media .................................................. 79

Figure 4.20. Alise Piebalga. *Skin Side Up* (2009/2010). Mixed media .................................................. 81

Figure 4.21. Alise Piebalga. *Skin Side Up* (2009/2010). Mixed media .................................................. 82
Figure 4.22. Alise Piebalga. *Enclave* (2011). Video still ........................................... 84
Figure 4.23. Alise Piebalga. *Enclave* (2011). Video still ........................................... 84
Figure 4.25. Alise Piebalga. *Enclave* (2012). Image from the proposal for the show 85
Figure 4.26. Alise Piebalga. *Enclave* (2012). Experiments, stage one .................. 85
Figure 4.27. Alise Piebalga. *Enclave* (2012). Experiments, stage two, at the Archipelago show ................................................................. 86
Figure 4.28. Alise Piebalga. *Enclave 2* (2012). Video still ................................ 87
Figure 4.29. Alise Piebalga. *Enclave 2* (2012). Video still ................................ 87
Figure 4.30. Alise Piebalga. *Enclave 2* (2012). Video still ................................ 87
Figure 4.31. Alise Piebalga. *Enclave 2* (2012). Video still ................................ 88
Figure 4.32. Alise Piebalga. *Enclave 2* (2012). Mixed media ......................... 88
Figure 4.33. Alise Piebalga. *Enclave 2* (2012). Mixed media ......................... 89
Figure 4.34. Alise Piebalga. *Enclave 2* (2012). Mixed media ......................... 90
Figure 4.35. Alise Piebalga. *Enclave 2* (2012). Mixed media ......................... 90
Figure 4.36. Alise Piebalga. *Enclave 2* (2012). Mixed media ......................... 91
ABSTRACT

Debates in science and technology studies suggest that our understanding of the human–technology relationship is in crisis. There are those who argue that developments in prosthetics and human augmentation will benefit humanity. While others argue that such developments will lead us into technological oblivion.

These discussions are not confined to the fields of science and technology. Artists make works that address the human–technology relationship, claiming that their artworks affect how audiences perceive it. But little research has been conducted into how such artworks affect the audience’s perceptions of the human–technology relationship.

This research project focuses on ‘hybrid art’, which is defined by its transdisciplinary approach to making art that addresses the human–technology relationship. It surveys several notable hybrid artworks and describes the reported impact they have had on their audiences’ perceptions of the human–technology relationship. Many of these reports suggest that the audiences of these works experienced a blurring of the perceived boundary between the virtual and the real.

This phenomenon has been further investigated in this research by studying audience responses to hybrid artworks created by the author. These artworks provided a case study for gathering and evaluating empirical data to test the hypothesis that hybrid artworks affect audience’s perceptions of the human–technology relationship. The data was gathered using a technique, which takes snapshots of an audience’s perceptions of the human–technology relationship before and after viewing a hybrid art installation. The study showed that in an overwhelming number of cases the artworks had affected the audience’s perceptions of the human–technology relationship.

By revealing that hybrid artworks affect viewers’ perceptions of the human–technology relationship, the research suggests that artworks can play a significant role in shaping our understanding of the human–technology relationship, and perhaps what it means to be human.
CHAPTER 1

BACKGROUND

1.1 Introduction

I am a performer, trained in dance, circus and interactive art. As a performer, who relies on safety equipment (Figure 1.1), I have developed a relationship with my safety lines, the trapeze bar, the ropes and the ceiling rig that relies on how I feel them. I feel the effects of a badly placed pulley as a rumble in my stomach or the movement in the metal of the ceiling rig as vibrations in my bones. My weight adjusts constantly from weightless to about 500 kilograms throughout the swing, depending on what the trapeze bar does. If I fall, I sometimes lose all awareness of my body, until the safety belt squeezes me, reminding me where my waist is. If all goes well I feel like a performing human–technology system, but when things go wrong I feel separate and caught in the melee of bits.

Figure 1.1 Alise Piebalga swinging trapeze.
The crucial role that the safety equipment plays in my life has made me more aware of how I experience it. This type of investigation into the perception of the relationship I have with technology became the subject for my work as an artist working in hybrid art discipline. I aim to reflect on this experience and create works that communicate it to the audience. My intention as an artist is to affect the audiences’ perception of their relationship with technology.

This intention is within a larger context of a multi disciplinary debate on the crisis that affects the perception of the nature of the human–technology relationship. The crisis pivots around opposing positions on how new technologies will affect the understanding of what it means to be human. Artists addressing the human–technology relationship aim to question, stimulate and participate in the dynamic that changes human futures (e.g., Catts & Zurr, 2002; Catts, 2004; Catts & Sillars, 2008; Corby, 2008; Corby & Baily, 2006; Kac, 1998, 2005a, 2005b). This research project asks how such artworks affect the audience’s perception of the human–technology relationship.

Through both theory and practice, this thesis examines contemporary developments in a relatively unexplored area of art practice, hybrid art, which explores the human–technology relationship using a transdisciplinary method. According to Michel Serres (1980/2007, 1982/1995, 1991/1997b), this transdisciplinarity through a common discourse that combines debates usually confined to specific disciplines, fosters innovation and communication across research fields, providing new insights and sensitivities. This thesis proposes, tests and demonstrates the theory that hybrid artworks affect viewers’ perceptions of the relationship between human beings and technology by blurring the apparent boundary between the virtual and the real. Through this function hybrid art has the potential to affect the shaping of future technology and the understanding of being human.

1.2 Context of the study

Recent debates in the fields of human augmentation and technology design (e.g., Bostrom, 2008; Fukuyama, 2002; Kass, 2007; Kemp, 2008; Miah, 2008c; Reichle, 2005/2009; Turkle, 2007, 2011) indicate that perceptions of the human–technology
relationship are polarised between progressive support for and conservative resistance to new technologies that aim to augment the human body and experience. This polarisation creates a crisis that affects the development of future technologies and influences ‘our ways of thinking about ourselves, our relationships, our sense of being human’ (Turkle 2011: 2).

However, these debates are not limited to the fields of science and technology design. Using the transdisciplinary approach of engaging with a diverse range of disciplines, artists explore the relationship between human beings and technology and claim that their works affect how viewers perceive that relationship. The effect art has upon the viewer potentially affects debates on the future direction of technological development (e.g., Catts, 2004; Catts & Sillars, 2008; Kac, 1998, 2005a, 2005b) and, ultimately, on the understanding of the experience of being human.

While some research claims that art addressing the nature of the relationship between human beings and technology has the potential to affect the viewer’s perception of that relationship (Anker, 2010; Ascott, 1990, 2003, 2006a, 2006b, 2008; Broadhurst, 2007; Broadhurst & Machon, 2006; Castellanos & Gromala, 2009, 2010; Corby, 2008; Corby & Baily, 2006), there is a lack of material that identifies and demonstrates how this process occurs in hybrid art practices.

Consider the example of Blast Theory’s hybrid artwork *Day of the Figurines* (Figures 3.3 and 3.4), which crosses theatre, mobile technology design, performance and public activism disciplines to involve the public in a large roll-playing game. Giannachi and Benford (2008: 64) report that the work offers an experience of a ‘more flexible, hybrid way of being’, blurring real/virtual boundaries, ‘allowing the players to experience the presence in both dimensions at once’ (Karelina, 2012). While the authors report experiencing the blurring of the perceived boundaries between the virtual and the real, there is a lack of research exploring how such works affect the viewer, thereby suggesting an evident gap in the knowledge.
This thesis will adopt the *Oxford English Dictionary*’s definition of virtual as a ‘computerized or digital simulation of something… established or conducted using computer technology.’ However, unlike in the *Oxford English Dictionary*’s definition of the term *virtual reality*, here *virtual* will not be used to mean a ‘simulation of a lifelike environment’, as the artworks discussed in this thesis do not attempt to recreate or mimic life-like environments. The term *real* will be used to refer to environments/things that are not generated through computer technology, ‘having an objective existence; actually existing physically as a thing.’ For example, when discussing real and virtual performers in Chapter 4, *real* refers to the human
dancer performing in a non-computer-generated environment and virtual refers to the video or an animation of that performer placed in a computer-generated environment.

Both terms, real and virtual, are widely used and have different meanings in various research fields; when discussing hybrid artworks, the perceived boundary between the two terms is blurred and it becomes harder to discuss each term separately. These terms are used in this thesis because the authors reflecting on hybrid art experiences use them.

For example, in Blast Theory’s Day of the Figurines, real refers to the people and the lives of the people involved in the role-playing game, while virtual describes the personalities and the activities taken by the fictional characters assigned to each player through mobile phone technology. As Giannachi and Benford (2008) remark, Day of the Figurines blurs the perceived boundaries between the real and the virtual as people start acting out and developing an emotional connection to their own assigned lives and to other virtual lives. They take actions in a real environment on the basis of virtual experiences presented to them, and virtual actions on the basis of their real locations within the city.

This thesis identifies hybrid art as an art practice that explores the human–technology relationship using a transdisciplinary approach. Nevertheless, this is not the only art discipline that could be defined this way: bioart, net art, network art and scientific art use transdisciplinary methods to examine the human–technology relationship. In these disciplines also there is research that aims to understand how these works affect the audience and the audience’s perception of the human–technology relationship. However, since the term is relatively new, having been introduced with the creation of the Hybrid Art category to the prestigious Ars Electronica festival prize in 2007, hybrid art is a subject that has not been and needs to be explored.

Additionally, I looked for a term that could describe my practice, which developed on an undergraduate interactive arts course. My practice is based in my experience as a dancer and performer who wants to explore the relationship between human beings and technology using movement both real and virtual, presenting installations as opposed to shows or live performances. The definition of hybrid art – founded in Ars Electronica’s Hybrid Art category call for media art projects that cross disciplines and genres, blurring the boundary between art and research – enabled me to do this.
1.3 Research objectives

This research was substantially practice driven, and involved developing hybrid artworks that were exhibited publicly. Each work was experimental both because it created a new form of hybrid art that explored the relationship between human beings and technology and because it observed the affect on viewers’ perceptions of this relationship.

To determine whether viewers’ perceptions of the human–technology relationship had been affected, a method was devised for capturing data based on a closed card-sort technique. Originally developed for constructing information architectures (Spencer, 2009), and until now unused for evaluating the effect artworks have on the viewer, the method provides a means of measuring audiences’ understanding of key terms before and after viewing a work. This enables qualitative and quantitative data to be gathered that make it possible to see whether there has been a change in the viewer’s perception of the human–technology relationship in response to the artwork and what the nature of this change is.

The research programme as a whole consists of my work – making and exhibiting art and gathering audience evaluation data – combined with a review of the relevant literature in the emerging field of hybrid art, in terms of both practice and theory. The developed methodology enables me to identify, examine and, most importantly, test the theory that contemporary developments in hybrid art affect the way viewers perceive the relationship between human beings and technology by blurring the experience of the perceived boundary between the virtual and the real.

This project aims to inform researchers and practitioners in several fields:

(1) It provides an overview of a relatively unexplored hybrid art practice, contributing to the fields of art history and theory.
(2) It explores the debates on the human–technology relationship, highlighting the importance of other voices within it.
(3) It produces new works of art in the field of hybrid art.
(4) It contributes to the debates on the blurring of the perceived boundary between virtual and the real in the field of digital performance.
(5) Through the card sort method it develops a way of gathering quantitative and qualitative data based on the audiences’ experience of a work of art. This contributes research in the field of practice-based research in art.

1.4 Thesis structure

The thesis is presented in five chapters: Chapter 1 – Background; Chapter 2 – Methodology; Chapter 3 – Literature review; Chapter 4 – Development and evaluation of practice; Chapter 5 – Summary and conclusions. Chapter 2 sets out the project’s methodology by surveying the three central methods employed:

- Theoretical and historical enquiry
- Development of hybrid art practice
- Gathering and evaluating audience feedback data

The chapter explains why using methodologies employed by Carlos Castellanos and Diane Gromala (2010), Susan Broadhurst (1999, 2007) and Susan Kozel (2007) for creating art, reflecting on the experience of the work and observing audience feedback is integral to the process of answering the research question. Finally, it details the data evaluation method developed to determine whether the audience’s perception of the relationship between human beings and technology has been affected in response to the work.

Chapter 3 forms the literature review of this document and is divided into three sections: Section 3.2 presents the debates in the fields of science and technology design that highlight a crisis in the contemporary perception of the relationship between human beings and technology. This sets the background for the more detailed examination of hybrid art practice in section 3.3. While there are online sources that refer to hybrid art, only a small amount of academic material explores the practice and no results for ‘hybrid art’ are found in the Oxford English Dictionary online (accessed 3 July 2014). This section identifies Ars Electronica’s 2005 event ‘Hybrid: Living in Paradox’ and the Leonardo/CAA Special Session named ‘Hybridity: Arts, Sciences and Cultural Effects’ at the 2005 College Art Association Conference in Atlanta as the two events that provided the framework for academic references to hybrid art practice. It follows the development of hybrid art and defines
it as an art practice that addresses the relationship between human beings and technology using a transdisciplinary approach. This approach, discussed in more detail in subsection 3.3.3, according to Serres (1982/1995, 1991/1997b, 1980/2007) is imperative in fostering innovation and increasing communication with other disciplines.

Section 3.4 brings together hybrid art and the debates on the relationship between human and technology, showing that the exploration of this relationship is at the heart of hybrid art practices. The section is itself divided into two subsections: subsection 3.4.1 examines hybrid artworks that explore the issues raised by the development of technologies that promise to augment the human body. Subsection 3.4.2 looks at hybrid artists who engage with the notion of replicating human characteristics in artificial agents.

Section 3.5 focuses on exploring the experience of hybrid art. It draws parallels between reports on experiencing the blurring of the perceived boundary between the virtual and the real in hybrid artworks (Giannachi & Benford, 2008; Hallensleben, 2009; Buci-Glucksmann, 2010; Guertin, 2005) and research by Susan Broadhurst (1999, 2007), Broadhurst and Josephine Machon (2006, 2009), Susan Kozel (2007), Sita Popat (2006) and Steve Dixon (2007) on digital performance practices that claim a connection between this blurring of the perceived boundary between the virtual and the real and the viewer’s perception of the human–technology relationship.

Chapter 4 describes the development of my hybrid art practice. Drawing on research in the previous chapter that suggests that the blurring of the virtual and the real has the potential to affect the viewer’s perception of the human–technology relationship, I created artworks as a way of testing whether the blurring of the experience of the virtual and the real in hybrid art affects the hybrid art viewer’s perception of the relationship between human beings and technology.

Section 4.2 describes the practical work that I conducted throughout the research process. I undertook six projects between 2009 and 2013, which were exhibited eight times in public venues. Each exhibited work fed into the development of the next, through reflections, audience observation, debates, presentations and informal conversations. This feedback affected the process in three stages: (1) performance for
the digital environment, (2) filming and editing and (3) creating installations. This section looks at each project and the audience feedback gathered.

Section 4.3 examines the card-sort data drawn from audience feedback to one of my hybrid art installations. Viewers were invited to respond to key terms before and after viewing the work by recording their perception of where each term falls on a scale running from human to technology. This section applies the data analysis technique of box and whisker diagrams – which provide a useful and visual way of understanding changes in pre- and post-viewing responses – as well as surface graphs and tables that examine general trends. The chapter concludes by drawing conclusions on the basis of the results of the card-sort data analysis.

Chapter five reviews the research conducted for this project and presents conclusions on how recent developments in hybrid art affect perceptions of the relationship between human and technology. It will highlight the impact of the study and present recommendations for the future.

1.5 Summary

This thesis proposes that hybrid art affects viewers’ perception of the relationship between human beings and technology by blurring the perceived boundary between the virtual and the real. It investigates this theory by developing hybrid artworks created to entangle real/virtual experiences. It tests the theory by evaluating audience feedback data gathered during public exhibitions. Finally, it presents the outcomes, showing how hybrid artworks affect the perception of the human–technology relationship.

In order to answer this question, the thesis surveys literature on hybrid art practices, the debates on the human–technology relationship, transdisciplinarity and the connection between the blurring of the perceived boundary between the virtual and the real and the audience’s perception of the human–technology relationship.

The project offers four original contributions: (1) it surveys and defines a relatively unexplored area of art practice called hybrid art; (2) it fosters the production of new forms of hybrid art that explore the relationship between human and technology; (3)
it proposes that hybrid art affects viewers’ perceptions of the human–technology relationship by blurring the perceived boundary between the real and the virtual; (4) it develops a method for gathering feedback data that helps us understand how hybrid artworks affect the audience.

The artworks developed for this project are an attempt to understand and carve out an arts practice that builds on the strengths of my experience as a dancer, circus performer, and installation and new media artist who wants to explore the human–technology relationship and to understand whether the works I develop affect audiences’ perception of the relationship between human beings and technology.

By demonstrating that hybrid art affects perceptions of the human–technology relationship, this thesis contributes to larger debates on the role art plays in constructing human futures. Considering that the polarity in the debates on the relationship between human beings and technology creates a crisis that may affect how technology is designed, art offers a voice that can influence future technological development and the understanding of the experience of being human.
CHAPTER 2

METHODOLOGY

2.1 Introduction

This chapter will describe and analyse the methodology devised in order to answer the question of how contemporary developments in hybrid art affect perceptions of the human–technology relationship.

Hybrid art has a short history and there are limited sources that examine the practice. There is even less information on how these works may affect the viewer; however, there are reports by Adams (2012), Giannachi and Benford (2008), Hallensleben (2009), Karelina (2012) and Paterson (2011) on experiencing the blurring of the perceived boundary between the virtual and the real in hybrid art installations. As there has been a limited amount of reliable academic attention dedicated to hybrid art practices, this has not been pursued any further. On the other hand, there is research in digital performance practices (Popat, 2006; Broadhurst, 2007; Kozel, 2007; Dixon, 2007) that explores the connection between works that blur the experience of the virtual and the real and the effect it may have on the viewer’s perception of the human–technology relationship.

The work I developed during this project offered a way to connect this research in digital performance with hybrid art practice. This was done by creating environments and situations for testing whether hybrid artworks that blur the perceived boundary between the virtual and the real affect the viewer’s perception of the human–technology relationship. It offered a way to reflect on personal responses to the work (Piebalga, 2010), observe and engage with audience feedback and gather evaluation data based on that feedback. My research programme as a whole involves a combination of the exhibition of hybrid art and the evaluation of audience feedback data with a review of the relevant literature in hybrid art practices and the debates on the relationship between human and technology. Sections 2.2, 2.3 and 2.4 of this chapter will examine each research method in detail.
2.2 Literature review

The literature review in this research project has several functions:

- To identify, define and review the existing state of a relatively unexplored area of art practice called hybrid art
- To examine literature that explores the debates on the relationship between human and technology
- To understand the connection the discipline has to debates on the relationship between human and technology
- To identify a possible model for understanding how hybrid art affects the viewer’s perception of the human–technology relationship

The first function explores literature on hybrid art. While there are online resources (Wikipedia, Walker Art Center, Yahoo Answers) that refer to or define hybrid art as a discipline, there are few academic resources that do this. Because of this lack of reliable material, this literature review uses information on the annual Ars Electronica Hybrid Art prize category and surveys the prize submissions. This approach identifies hybrid art as a distinct art discipline, thereby generating an account of history and theory.

The second function explores the debates on the human–technology relationship. It identifies a polarity in the perception of the human–technology relationship by surveying developments in technology design, robotics, artificial consciousness and biotechnology. Because hybrid artists and authors who review hybrid artworks consider these artworks to be within the framework of contemporary technological developments and the debates on the human–technology relationship, the third function of the literature review examines hybrid art in the context of these debates.

The final function of the literature review is to look at contemporary research claiming that art that engages with the relationship between human beings and technology affects the viewer’s perception of that relationship. It investigates observations made by some viewers and authors that the affecting factor in hybrid art is the blurring of the perceived boundary between the experience of the real and the virtual. While there is limited literature examining hybrid art in this context, there is research in the field of digital performance. That research explores the tensions
created in installation environments where the virtual and the real meet. As my hybrid art practice draws on my background in dance, performance and video, I adopt the digital performance approach to creating a blurred experience between the virtual and the real in my hybrid art practice.

2.3 Developing practice

The practical work within this project offered environments for testing the theory that hybrid art affects the viewer’s perception of the relationship between human beings and technology by blurring the perceived boundary between the virtual and the real. It tests the theory by drawing on personal reflections, observations of viewer responses and assessment of viewer feedback data.

Drawing on Cahnmann-Taylor and Siegesmund’s (2008) research and Estelle Barrett’s suggestion in Practice as Research: Approaches to Creative Arts Enquiry (Barrett & Bolt, 2007/2010), the project aimed to see practical outcomes and studio enquiry as part of an investigative process, relocating ‘the critical focus away from the evaluation of the work as product, to an understanding of both studio enquiry and its outcomes as process’ (Barrett 2007/2010: 135). This approach acknowledges the importance of reflecting during the experimental stages and of allowing the thought process to flow from one project to the next.

In their investigations into how interactive art or digital performances affect viewers’ perceptions of the relationship between human and technology, Castellanos and Gromala (2010), Broadhurst (1999, 2007), Broadhurst and Machon (2006, 2009) and Kozel (2007) have used their practices as experiments. The works provide the setting in which the artists are able to observe their own as well as the audience’s response to the work. The artists reflect that there are two ways of doing this: (1) experiencing and observing audience feedback on the work of other artists; or (2) creating works of art, experiencing them, observing the audience, feeding the reflections back into research and providing information for the next work. The second process offers opportunities to create situations allowing highly detailed reflections and custom-made environments for observing audience feedback; it also allows these effects to be demonstrated.
Tom Corby and Gavin Bailey (2006) remark on the benefit of studio enquiry and of developing an open conversation between themselves, the work, the audience and different disciplines during the developmental stages of their creative process. During their ICA residency, the artists invited the public to view the work as it was being developed. They explain that:

Work emerges discursively; both in a literal sense as an ongoing making and reflective activity and through contact with other disciplines, ideas, the public and curators, etc… These components jostle and interact to drive development forward; the final project is always different from its initial aims. (Corby & Bailey 2006: 119)

Similarly, I invited the public, through observation and debate, to contribute to the shaping of the development of my practice. For example, during the Kinetica 2009 exhibition my collaborator and I observed and noted the audience responding to the shadows they created on the installation. Their movement in the real environment affected the projected virtual environment, which created a playful interaction between the virtual environment and the real exhibition space. We took this observation further in the next project and created virtual shadows that broke up the projection intermittently. This resulted in the viewer looking for the source of that shadow in the real exhibition space, blurring further the perceived division between the virtual and the real environment.

The emphasis on process is helpful because it offers an opportunity to develop a closer relationship between theoretical enquiry and practice. For example, during one of my first performances for a project called *Labyrinths*, I noticed confusion in my understanding of the environment in which I was performing. I was performing in a real space but for a virtual environment, trying to move as if not restricted by gravity and the physical dimensions of the space, while becoming more acutely aware of how they affect my movement. This observation, made during a very early stage of my practical investigations, guided the theoretical investigations into the blurring of the experience of the virtual and the real. Out of this observation came the framework for the process of choosing the words used during the data gathering method described in section 2.4.
Chapter 4 of this thesis examines my hybrid art practice following this recommendation. It notes reflections made during the performance stages, the filming and editing and the installation processes. Finally it reflects on what was learned, what was successful and not so effective in relation to blurring the experience of the virtual and the real.

From 2009 to 2012, I had eight public exhibitions of six hybrid art installations, which were created as part of the research process. Each exhibition provided a different environment for reflecting on how the audience and I react to the work. Some venues, such as the Ffloc Gallery at the University of Wales, Newport, were intimate and formed the environment for a detailed discussion (Piebalga, 2010). Others, such as the Kinetica 2009 event in London, were large, busy spaces where the reflections were based on how the audience engaged with the work in environments in which there are distractions. Reflections, observations and feedback from each installation, noted in self-reflective journals, a personal development plan and an online blog formed the platform for experiments for the next stages of this research project.

2.4 Gathering and evaluating audience feedback data

Providing evidence of how audiences’ perception of the human–technology relationship has been affected through a work of art is not an easy task. The relationship between the viewer and the work of art is intimate and the affect is potentially very subtle and difficult to measure. In addition to reflecting on my hybrid art experience and observing how the audience engages with the work, I developed an evaluation method to acquire a deeper insight and collect qualitative and quantitative research data on how one of my installations affects the viewer’s perception of the relationship between human beings and technology.

The process of selecting an evaluation method was based on considering the type of data I wanted to gather. My ambition was to understand if and how the work of art has affected the viewers’ perceptions of the human-technology relationship. To achieve that I wanted:
To gather both qualitative and quantitative audience feedback data in order to see if and how the audience’s perceptions of the human-technology relationship have been affected

To gather that data before and after the audience experienced the hybrid artwork

To gather data that is statistically significant

To be able to see if and how the work has affected an individual viewer, as well as the group together

Not to alert the audience to the subject of the study

To gather the data comparatively quickly without inconveniencing the viewer too much

After considering other methods, such as questionnaires and interviews, I came to a conclusion that none fit all the points above. I talked to a statistician Dr. Jess Spate from Thoughtful Media (http://thoughtfulseo.com/), who eventually did the statistical significance testing on my results using Mood’s median test. She suggested looking at card-sorting techniques.

Existing card-sorts for constructing information architectures for effective websites did not suit the subject, so I adapted a method based on a closed card-sorting technique. According to Donna Spencer (2009: 16), it enables the researcher to ‘learn how other people think of groups, concepts and categories’, thereby developing an overview of thought patterns. Widely used in constructing information architectures, the method originated in George Kelly’s (1963) A Theory of Personality: The Psychology of Personal Constructs. Kelly’s theory identifies that there are enough similarities in the way people respond to a card-sort task to establish an overview of thought patterns, while retaining a detailed view of individual responses. The method allows the researcher to understand the data provided by an individual as well as by a group.

Another benefit of using the card-sort method is that it allows reliable data to be gathered without sensitising participants ‘to the precise research focus to prevent contamination of findings’ (Saunders and Thornhill 2011: 334). Saunders and Thornhill (ibid.) explain that an awareness of the particular research focus may introduce an unhelpful bias and affect the development of new insights on the topic.
The strategy was to establish the pattern of the audience’s perception of the relationship between human beings and technology before they view the work, and then to get another snapshot of the pattern after the viewing. By overlaying the two patterns it would become clear whether there had been a shift in the perception of the relationship between human and technology.

Thirty-two cards were made for each participant; of these, sixteen were viewed by the participant before seeing the work and sixteen after (Figure 2.1). The number of cards was chosen to avoid overloading the task, while simultaneously making it difficult for participants to recall their responses to the pre-viewing task. Donna Spencer in Card Sorting (2009) also suggests that the task is manageable and informative when it involves between thirty and one hundred cards.

![Figure 2.1. Card sort envelopes.](image)

Each card within the set contained a word that had a close relationship to the installation and invited a reflection on the human–technology relationship. As the cards were produced before the installation was complete, the method provided the initial challenge of coming up with the words before completing the work.

A solution was found in word association games used in dance and performance practices. Word association is widely used in dance to engage with the dancers’ feedback during rehearsals. This allows the performers to examine how different movements develop and feel. For example a dancer might respond with movement to a single word, like the ‘moon’ (Pina, 2011). However they also can consider
words that reflect movement that was created through improvisation in order to communicate that feeling to other dancers or the choreographer (Learn Sia’s Chandelier Dance with Ryan Heffington, 2014).

Using the second option the performers and I reflected on our relationship with the cameras when performing for the hybrid art installation environment. The first stage in this process was to write down words that came to mind after performing with the cameras. The cameras used were small, portable and easily manipulated through movement. We mounted them on our heads and chests and held them in our hands. I did not provide guidance regarding the type of words: any deriving from the experience were accepted.

Stage two of the word selection was to consider how those words should be grouped and evaluate whether they reflected the performer/camera dance experience. If they did, then the words were accepted for the card sort.

The words partner, performer, observer and observed reflected the relationship we felt to the cameras. For example, when moving while holding the camera in our hands, we noticed that we treated it as a dance partner or even a performer. We considered movement in relationship to the camera eye, as well as camera movement in relationship to the body. For this reason, the words observer and observed were used too – the camera was observing the movement but we were observing the camera movement and manipulating it.

The other terms were loosely based on three other areas of reflection:

- **Movement, speed, slow motion, organic and mechanical** were the terms associated with movement in relation to the small, portable cameras used during the performance; for example, how the hand holding the camera moved, or how the other hand, which was not holding the camera moved in relationship to the camera in the opposite hand. In some cases we would keep the body parts holding the camera as still or as slow moving as was possible and create faster movements with other body parts.
- **Effect, body, rhythm, pattern and sensation** were the words associated with how the performer experienced the movement itself. These words reflect the sensation of the performance when various movements are performed together – the repetition of the pattern that is created by the slow movement
of the camera body parts and the faster movement of the others; or how aware we were of our bodies when getting into an awkward movement because we were focused on what the camera sees.

- *Performance* and *dance* were the two words that described the process of performing with the cameras. *Performance* is something that we felt was observed by the camera, while *dance* is the choreography created through the various movement patterns.

The simultaneous process of filming and being filmed, partnering another dancer and the camera and performing in a real space and for a virtual environment produced some diametric word choices, such as *observer, observed, organic* and *mechanical*. This offered interesting response data, further discussed in Chapter 4.

On the back of each card displaying one of the words discussed above was a numberless scale, one end of which indicated *human* and the other end *technology*. The participants were asked to mark on the back of the card where in the scale the concept sat according to their perception, with the middle of the scale indicating both *human* and *technology* (Figure 2.2). It was made clear to all participants that the scale did not suggest any positive or negative values, such as would be the case if the middle were described as 0. In this respect, the method used in this project differed from a traditional card sort, where the participant would sort a card into either supplied or self-assigned categories. While I provided the viewers with two categories, one being *human* and the other *technology*, they were able to place the card anywhere on a scale between the two. This provides not only quantitative data indicating a change but also qualitative data for analysis, showing how the responses have changed.
After completing the task, viewers were asked to submit their cards, indicating the time, their gender, the first letter of their name and the last four letters of their family name. They were then invited to experience the work, completing the other set of cards afterward.

The audience for the card-sort was not pre-selected. These were people invited to participate as they were walking past the gallery where the card-sort was taking place. There was a table set up outside the gallery and the doors to the artwork were closed. I approached people walking past and asked them if they would like to participate in a research project. I gave no further indication on the nature of the project, however, if asked, said that it would be a short task. I would then guide them to one of the seats outside the gallery and ask them to complete the first set of cards. Once these cards were filled out, I invited the participants to go into the gallery to view the work, completing the second set of cards afterwards.

The venue for the event was a gallery/performance studio at Nottingham Trent University. I was aware that there are limitations to the audience selection process, as the location within the art, design and photography wing of the university would dictate that students and lecturers who are informed on art and design practices and debates would be the likely people passing the gallery. In response to this, I selected a date for the card-sort that coincided with the university’s open day and was prior to the students returning from their holidays. This increased the amount of people passing the gallery and diversified the audience, including parents, grandparents and pre-university students. As a result, the age rage of people participating was between 18 and 55.

While this tactic addressed some of the limitations to the audience selection process, it did not eliminate them altogether. People participating in the event would have been already motivated to engage positively with the project, having come to Art, Design and Photography department for an open day. Future research discussed in section 5.5.3 aims to address this further and explore other venues, spaces and contexts for this type of card-sort events.

While Spencer (2009) refrains from quoting the ideal number of participants for a card study, Tom Tullis and Larry Wood, the authors of ‘How many users are enough
for a card-sorting study?’ (2004), suggest that twenty to thirty participants would provide a good pattern indication. For this research I tested twenty-five participants; the data gathered and the pattern information is given and discussed in Chapter 4.

In order to examine the research data, the answers were given a numerical value and analysed using box and whisker diagrams. The Standards and Testing Agency of the Department for Education (UK) (2013) defines a box and whisker diagram as one that ‘illustrates the spread of a set of data. It also displays the upper quartile, lower quartile and inter-quartile range of the data set’. Furthermore, it provides a median, which shows the middle value (Figure 2.3).

Figure 2.3. Box and Whisker diagram example. Reproduced from BBC Bitesize, http://www.bbc.co.uk/schools/gcsebitesize/maths/statistics/representingdata3hirev6.shtml (accessed 08 April 2014).

Box and whisker diagrams are a visually efficient way to analyse changes in given data sets, providing a simple way to overlay pre- and post-viewing results and information on any changes in perception patterns. Section 4.4 of this thesis discusses changes in perception patterns for each of the terms on the cards. This method provided a way of gathering both qualitative and quantitative research data, tracking changes in personal responses and seeing the overall pattern the data created.

However there are limitations to the card-sort method developed and the results have to be seen in the light of these limitations:
• The method is manageable and efficient when used to survey the thought patterns of a relatively small group of people. It would be possible to explore the method with a larger number of participants, however the review of the data would have to be changed from looking at each response personally to using/building computer software to do this. It is a slow process.
• While I selected the date for the card-sort in order to diversify the audience, the venue location impacts on the results. Ideally the card-sort would be repeated in different locations, diversifying the audience even further.
• The selection of the words that appeared on the cards was based on a card association game used in dance and performance. It would be beneficial to see how and if that word selection affects the task

While the results of the card-sort need to be seen in the light of these limitations, there are a great amount of positives it offered:

• The method can be replicated with that particular or another work of art
• It can be replicated in a different venue
• It has provided both qualitative and quantitative data for the research project
• The results are statistically significant
• It allows us to explore the intimate relationship between the viewer and a work of art.
• It provides an opportunity to measure if the work of art has affected the viewer in a particular way
• It provides an opportunity to measure how a work of art has affected a group of people.

2.5 Summary

This thesis aims to understand the effect hybrid artworks may have on the perception of the relationship between human and technology. The research programme providing evidence used in this investigation is based on three research methods:

1) Theoretical and historical enquiry through a literature survey of hybrid art practices and the debates on the relationship between human and technology
2) Creating and exhibiting hybrid art installations that form experiments in new forms of hybrid art, providing settings for testing whether the works have had an effect on the audience’s perceptions.

3) Developing an evaluation method based on a closed card-sorting technique that provides audience feedback data that can be analysed to reveal patterns of viewers’ perceptions of the relationship between human beings and technology before and after viewing one of my hybrid art installations.

The three methods identify, investigate, test and demonstrate how hybrid art affects perceptions of the relationship between human and technology. The results are discussed in Chapters 4 and 5.
CHAPTER 3

LITERATURE REVIEW

3.1 Introduction

This chapter reviews the literature that identifies hybrid art as a relatively unexplored area of art practice that uses a transdisciplinary approach to engage with the issues raised by the crisis in contemporary debates on the relationship between human and technology. It will examine hybrid artworks in relation to these debates and identify the blurring of the experience of the virtual and the real, which is investigated in digital performance practices as a potential method for understanding how hybrid artworks affect the viewer’s perception of the human–technology relationship.

The debates that detail the crisis in the contemporary perception of the relationship between human beings and technology will be discussed in section 3.2. It will form the background for section 3.3, which explores hybrid art practice. The following section, 3.4, will discuss the relationship between hybrid art and the debates on the human–technology relationship, with two subsections, 3.2.2 and 3.2.3, which will examine hybrid artworks in connection to the debates on technologically augmenting the human body and on replicating human attributes in artificial agents, respectively.

The final section, 3.5, draws parallels between reports on experiencing virtual/real blurring in hybrid art installations and research in digital performance practices that suggests that this affects viewers’ perceptions of the human–technology relationship. This sets up a platform for my practical investigations, which examine whether hybrid art installations created to blur the perceived boundary between the real and the virtual affect the viewer’s perception of the relationship between human and technology.

3.2 Debates reveal a crisis in the perception of the human–technology relationship
Recent debates in the fields of human augmentation and technology design indicate that the contemporary perception of the relationship between human beings and technology is polarised. On the one hand there is progressive support for new technologies that promise to significantly augment the human body and experience (e.g., Bostrom, 2003, 2005a, 2005b, 2008; Stock, 2003; Vita-Moore, 2012), on the other hand there is conservative opposition that calls for strict regulations to be placed on these technologies (e.g., Fukuyama, 2002; Kass 2004–5, 2007). This discord creates a crisis that influences the future directions of technological development and affects ‘our ways of thinking about ourselves, our relationships, our sense of being human’ (Turkle 2011: 2).

Sandra Kemp in ‘Shaping the human: The new aesthetic’ (2008: 86) identifies that public opinion is split between ‘fear at the prospect of the body’s invasion by technology and excitement about the possibility of an augmented human body and mind.’ She highlights that the fear is accompanied by concerns that this technology may change ‘our perception of what it means to be human’ (Kemp 2008: 87).

Ingeborg Reichle (2005/2009) elaborates on these ideas in relation to the development of genetic engineering, artificial life and robotics, and as part of the larger contemporary shift from science into technoscience: ‘voices began to be heard that postulated the disappearance of nature, and/or the implosion of nature and culture’ (Reichle 2005/2009: 7).

Francis Fukuyama (2002) and Leon Richard Kass (2004–5, 2007) see the dangers of developing new transformative technologies in parallel to an interpretation of Aldous Huxley’s novel *Brave New World*. For them, the future world is one where qualities inherent to human nature are compromised by technology that augments human behaviour, reproduction and life expectancy. Fukuyama in *Our Posthuman Future: Consequences of the Biotechnology Revolution* (2002: 7) defines human nature as ‘a source of values’ that ‘has provided a stable continuity to our experience as a species.’ He explains that these new technologies will create inequalities (also in Rifkin 1998a, 1998b) that will have a devastating effect on human nature, source values and the continuity of the human species.

In contrast to these views, there is excitement that new technologies could improve and enhance the human experience (Bostrom & Sandberg, 2009). Nick Bostrom
(2005a, 2005b) proposes that death is a large but resolvable problem facing humans and that augmentation could prolong the experience of fulfilment and happiness. In his ‘Letter from Utopia’ (2008) he describes a potential scenario where new technologies generate new possibilities and new levels of happiness. He explains that this can be attained by (1) augmenting the human body to eradicate illness and death, (2) enhancing cognitive abilities and (3) altering emotional experience. While acknowledging the difficulties of achieving an enhanced human experience, Bostrom expresses optimism toward the possibility.

Bostrom’s writings resonate with Gregory Stock’s thoughts in Redesigning Humans: Our inevitable Genetic Future (2003). He explains that engagement with technological augmentation is an essentially human quality. He asks why technological augmentation of the human body is so controversial, concluding that ‘Perhaps the notion that we will control our evolutionary future seems too audacious. Perhaps the idea that humans might one day differ from us in fundamental ways is too disorienting’ (Stock 2003: 3).

A similar polarity can be observed in the debates exploring the replication of human attributes in artificial systems. W.J.T. Mitchell in ‘The work of art in the age of biocybernetic reproduction’ (2003) explains that fantasies about human/machine hybrids and the re-creation of human abilities in artificial systems have long occurred. However, in the age of cybernetic reproduction, the building blocks are biological and computational. Mitchell uses the term cybernetic reproduction to describe the current condition of balancing anticipation with anxiety when considering the changes contemporary biological and computer technologies may bring to the human environment. He concludes that:

The epithet for our times, then, is not the modernist saying ‘things fall apart’, but the even more ominous slogan ‘things come alive’. Artists, technicians, and scientists have always been united in the imitation of life, the production of images and mechanisms that have, as we say, ‘lives (and desires) of their own.’ Perhaps this moment of accelerated stasis in history, when we feel caught between the utopian fantasies of biocybernetics and the dystopian realities of biopolitics, between the rhetoric of the post-human and the real urgency of universal human rights, is a moment given to us rethinking what our lives, and our arts, are for. (Mitchell 2003: 498)
Campbell (2009) discusses the notion of technology coming alive in the field of Artificial Intelligence. He highlights the fears over the potential loss of control over such artificially intelligent systems. However in ‘The revolution will not be roboticised’, robotics expert Noel Sharkey (2009) dispels any fears over ‘robots taking over the world’. Sharkey (2009: 28) suggests that the development of artificial intelligence is plagued by erroneous assumptions regarding human intelligence and the relationship between human and technology. However, he warns against the use of technologies that perform emotionally complicated tasks. He expresses fears over the use of robot nurses in Japan, claiming that this might lead to a decrease in human interaction.

Sherry Turkle (1999, 2003, 2007, 2011) remarks that the development of such technologies necessitates a debate that goes beyond seeing technology as a tool. The debates need to examine the way humans develop relationships with that technology. Reflecting Andy Miah’s (2008c, 2009, 2011) and Gregory Stock’s (2003) thought that to change with and through technology is human, Turkle asks not whether the development of technologies that would successfully mimic human abilities and emotions would be possible, but what human qualities are reflected in and through the development of these technologies. Turkle developed the term evocative objects to refer to technologies that ‘help us make our minds, reaching out to us to form active partnerships’ (Turkle 2007: 308). She explains that ‘what we need to ask is not whether robots will be able to love us but rather why we might love robots’ (Turkle 2003: 45).

Turkle (2011) broadly traces the development of computers and highlights that these changes run in parallel with transformations in how humans perceive that they differ from technology. During the early development of computers, according to Turkle (2003, 2011), humans distinguished themselves from technology through intelligence. This is reflected in the documentary Game Over: Kasparov and the Machine (2003), which explains the challenge IBM’s chess-playing computer Deep Blue presented to Garry Kasparov in two matches in 1996 and 1997:

There is one area in which we have been supreme for millions of years and that is intelligence. Nothing has challenged us. Now for the first time in the history of our race something comes and says ‘Hey I might be smarter than you’ and it is a machine.
With the rapid progress in computer intelligence, the differentiating factor became emotional authenticity. Turkle illustrates this with the example of Kasparov, who won the first match in 1996, but lost the second in 1997. She suggests that Kasparov’s reference to having an emotional response to losing indicates that emotional authenticity was viewed as a characteristic that separates humans from technology. Nevertheless, with the development of technology that gives an impression of an emotional experience, biology has become the distinguishing human quality. ‘In the language of children, the robot is smart and can be a friend but doesn’t have “a real heart or blood”’ (Turkle 2003: 48). However, Turkle continues, contemporary developments in prosthetic technology, such as reported by Bains (2009), Connor (2013), Fildes (2009), Fischman (2010) and Yoo et al. (2013) question this perceived distinction of an authentic human quality.

Turkle reflects on technologies that might be tasked to perform complex and emotionally delicate human tasks – such as the use of robot nurses in Japan to look after the elderly. While mirroring some concerns raised by Sharkey (2009), she suggests that if the principle of authenticity in the relationship between human beings and technology is observed – if it is based on how it extends human relationships between one another and their environment – then the development of such technologies will be considerate. She gives an example of the use of robotic arms to lift and turn ill patients in hospitals, and reflects on a comment made by the daughter of a patient who wished that she could have this technology to care for her mother. Turkle (2003: 50) concludes that ‘relatively small changes in how we imagine our technologies can have very large consequence on our experiences with them. Are the robot arms industrial “flippers” or extensions of a daughter’s touch?’

Riccardo Manzotti and Robert Pepperell (2012) support Turkle’s position. In ‘The new mind: Thinking beyond the head’ the authors explain that the contemporary theory for understanding the mind extended beyond the brain does not permit seeing technology as separate from or in antagonistic relationship with humans. They recommend seeing the mental processes involved in creating and using technology as akin to the artist’s mental processes involved in giving an aesthetic value to a work of art. Manzotti and Pepperell use a pencil to describe their point further. They explain that the pencil can be seen as part of an extended human mind from two perspectives: (1) the pencil contains within it the skill, the experience and the intellectual properties of its designers, manufacturers and users; as such, it is an
expression of the human mind; (2) when considering that pencil it becomes a part of
the considering mind. This model of seeing the mind means that:

we can no longer think of technology as a distinct realm from which we are
separated, or even as something [to] which we have an antagonistic
relationship… Rather, technological artefacts become aspects of the human
mental condition that are spread out through the world, embodied in
mechanical systems or objects as well as in organisms. (Manzotti & Pepperell
2012: 163)

It is within these debates in how the relationship between human beings and
technology is perceived that artists claim to create an intervention (Bezzant, 2008).
The following section, 3.3, will explore this further.

3.3 The hybrid art discipline

3.3.1 Hybrid art and Ars Electronica

In 2007 Ars Electronica, an organisation that aims to promote developments in
contemporary media art, introduced a new Hybrid Art category to their prize
competition. This signalled an important development in recognising hybrid art as an
art discipline. While there are online sources that refer to hybrid art, there is little
academic material on the subject. For example, at the time of writing, the Oxford
English Dictionary does not provide a definition of hybrid art. Nevertheless, there
are academic sources that allow a definition of the discipline and its characteristics to
be distilled. These materials can be traced back to two events in 2005: (1) Ars
Electronica’s ‘Hybrid: Living in Paradox’ and (2) Leonardo/CAA’s ‘Hybridity: Arts,
Sciences and Cultural Effects’.

‘Hybrid: Living in Paradox’, was the theme for the 2005 annual media arts festival
run by Ars Electronica. Organisers Gerfried Stocker and Christine Schöpf (2005)
explain that for the festival the term hybridity represented the perception of a period
when developments in technology promised to blur perceived cultural, social,
political and physical boundaries. In their introduction to the event they highlight
that:
No other term provides such a consummately appropriate and comprehensive description of the highly paradoxical current state of our world, one that is characterized by interrelationships that, among other things, are extraordinarily contradictory while at the same time displaying superb operative effectiveness. (Stocker & Schöpf 2005: 10)

The authors elaborate that hybridity is witnessed in (1) collaborative projects between art and science, (2) the widespread mixing of cultures, (3) technological human augmentation, (4) the resistance to augmentation and (5) the transdisciplinary mixing and remixing of creative expressions.

In a text supporting the event, Derrick de Kerckhove (2005: 14) suggests that the creation of hybrids and the state of hybridity is a human characteristic. However, with the development of new technologies an accelerated hybridisation has become the subject that inspires debates. Kerckhove explains that hybridity evolves through the process of ‘fragmentation and recombination’ with smaller, flexible units in a more favourable position for reconfiguration. Seeing digital process with the smallest units of 1 and 0 at the core of the accelerated process of hybridisation, the author suggests that sampling or mixing cultures, creative processes, bodies and technology becomes irresistible.

Ars Electronica’s award of distinction was presented to the submission how long does the subject linger on the edge of the volume… (Figure 3.1) by Marc Downie, Shelley Eshkar and Paul Kaiser in collaboration with choreographer Trisha Brown, which illustrated de Kerckhove’s point. The project explored the fluid, rapid and changing relationships between technology, the human body and space. It consisted of a performance negotiated between the dancers, choreographer, stage environment and technology. Calling their work ‘thinking images’ (Downie et al., 2005), the group developed a type of artificial intelligence technology that used a motion capture system and markers on the dancers’ bodies to produce imagery that was projected onto an invisible scrim at the front of the stage. According to the artists, rather than aim to identify the positioning of a specific body, the system responded to the spaces and dynamics created through relationships between bodies as well as bodies and space. Marc Downie (2005) explains that the choreography reveals a continuous struggle for the formation of inter-relationships, which directed him to
make ‘things that were chasing after relationships. Very simple biologically inspired artificial intelligences that would go after relationships, seek stability and fail.’


Downie gives as an example of this the type of artificial agent who attempts to form a relationship with the dancers and the changing performance environment. During the performance a virtual triangular animation element attempts to traverse the stage. It can do so by ‘hitching a ride’ (Downie, 2005) with a dancer. Through repetition, mistakes and successes it learns when to attach and when to detach itself from each dancer to make its progress across the stage more efficient. The artificial agent changes perceptions of relationships, dance space and performance by making alterations to how it progresses across the stage.

*Life Support Systems: Vanda and how long does the subject linger on the edge of the volume...*, among other works submitted for the ‘Hybrid: Living in Paradox’ event, explore the perception of the relationship between human beings and technology that is reflected in Ollivier Dyens’s (2005) article for the event ‘Hybrid Reality’. He explains that the difference between biological and technological realities can no longer be clearly experienced. This indivisibility creates conditions for a hybrid reality in which ‘we constitute a whole, whether we like it or not. Humans, machines, biological and artificial networks are intertwined into the planetary framework’ (Dyens 2005: 46). Within these conditions, Dyens argues, ‘faced with the prospect of
the disappearance not only of our familiar ways, but also of our complete biological universe, art… offers us rumours, whispers, and shades of the human condition’ (Dyens 2005: 49).

Ollivier Dyens highlights the emergence of a hybrid reality where artificial and biological networks are entangled. From the debates on the nature of this reality emerged artworks that address the perception of the human–technology relationship. This type of work could be observed during Ars Electronica’s 2005 event ‘Hybrid: Living in Paradox’ and in 2007 became a distinct Hybrid Art prize category.

3.3.2 Transdisciplinarity in hybrid art

Nevertheless, engagement with the debates on the relationship between human beings and technology was not the only characteristic that united the prize submissions. The works explored transdisciplinarity, and witnessed collaborations between the fields of art, science and technology.

In a chapter for Judy Mitoma’s book Envisioning Dance on Film and Video, Paul Kaiser (2002), one of the creators of how long does the subject linger on the edge of the volume…., highlights that the relationship between Mitoma’s and his respective fields – performance arts and computer science – was relatively unexplored, despite these fields sharing many preoccupations.

Scott deLahunta (2002: 112) in ‘Virtual reality and performance’ agrees. Reviewing early immersive interactive installations, such as Jeffrey Shaw’s The Legible City and Char Davies’s Osmose, deLahunta deduces that the transdisciplinary approach used in these works has not been translated into the fields of contemporary dance and choreography. He suggests that for these collaborations to fulfil their joint potentials, choreographers and performers have to work closely with people who develop technologies. He suggests that artists become co-creators of future technologies and not just end users.

Corby and Baily (2006: 109) in ‘System poetics and software refuseniks’ agree. They explain that artists are in a great position to create technologies that go beyond a simple ‘instrumental and utilitarian focus’ and ‘can reveal both how technology
operates in social and cultural contexts… and also suggest alternative technological forms that are inclusive of emotional, political and reflexive structures.’

Century (1999) reflects that the initial optimism expressed by artist Nam June Paik in the 1970s – that the establishment of global network technologies would facilitate new experimental artistic expressions with wider social impact – has not been met. This, according to Century, will continue as long as there is a split between the social groups that create technology and those that use it. Transdisciplinarity where the creation of new technologies is negotiated between diverse disciplines would foster creativity and innovation. As detailed in 1.4.1, Century (1999) provides a definition for transdisciplinarity and differentiates between interdisciplinary and transdisciplinary work.

The Leonardo/CAA Special Session ‘Hybridity: Arts, Sciences and Cultural Effects’, held at the 2005 College Art Association Conference in Atlanta, became the platform for debating the emergence of transdisciplinary practices between art, science and technology. Yvonne Spielmann and David Bolter (2006) in their introduction to the event explained that in cultural studies hybridity is understood to emerge in spaces where different cultures meet: through borrowing, blending and mixing, producing new heterogeneous forms of cultural practices. According to Spielmann and Bolter, early modernity saw close collaboration between art, science and technology; however, the Second World War caused the collapse of this trend. With rapid changes in contemporary digital technologies, new collaborations are being forged. The panel at the Leonardo/CAA Special Session discussed collaborative practices between art, science and technology and how this trend might reflect larger cultural shifts. The authors concluded that this new collaborative development is characterised by the word hybrid:

In applying the term ‘hybridisation’ to the contemporary interrelationship between technology, arts, and sciences, we propose to discuss the ‘third space’ as a leading paradigm, as the space where differing concepts, approaches, assumptions and techniques meet, merge, and interact. Hybridisation does not produce a new culturally dominant form, but rather demonstrates the multiplicity of possible interactions between science, art, and technology. (Spielmann and Bolter 2006: 107)
The ‘third space’ referred to by the panel is a concept used by the French philosopher Michel Serres to investigate innovation developed through transdisciplinarity.

3.3.3 Serres’s ‘third space’ of innovation through transdisciplinarity

Steve D. Brown (2000, 2002, 2005) and Jesué V. Harari and David F. Bell (1982) describe Serres as a truly transdisciplinary author whose writing transcends boundaries between disciplines, categories and divisions. Serres considers forging communication routes between disciplines to be the key to invention, referring to the route between humanities and science as the ‘Northwest Passage’.

For Serres (1968–80/1982, 1980/2007) transdisciplinarity creates new ideas by translating a message between disciplines. Translation is the process of creating communication routes between disciplines and includes the negotiation between the original message and the noise that alters it. The alterations in the message create innovation and new perspectives. He explains that new knowledge can be sought by leaving the security of the discipline behind: ‘the more you know about things outside your specialization, the more you will invent’ (Serres 1997a: 21).

Serres (1991/1997b) himself aims to occupy the ‘third space’ or the space in-between disciplines, where the process of translation is happening. Through Honoré de Balzac’s story *The Unknown Masterpiece* (1831/2001), Serres (1982/1995) explores the third space as a dynamic relationship between noise and a message. Balzac introduces three artists: two are young (Porbus and Poussin), one is an old master (Frenhofer). Frenhofer shows his experience and talent by helping Porbus to finish a painting of a beautiful woman. Upon the young artists’ requests to see Frenhofer’s own unfinished masterpiece – *La Belle Noiseuse* – the old master explains that the work is unfinished and requires a flawless model. A model is provided for him, and struck by her beauty he finally finishes his project. The two young artists are shocked when the masterpiece is revealed to be a chaotic jumble of colours, strokes and textures. On closer examination however, a woman’s foot appears in the corner of the painting. According to Serres, the state of the painting is that of the background noise, where all the possibilities of a woman and beauty are present at once. ‘The raucous, anarchic, noisy, variegated, tiger-streaked, zebra-streaked, jumbled-up, mixed-up multiple, criss-crossed by myriad colors and myriad shades, is possibility
itself. It is a set of possible things’ (Serres 1982/1995: 22). The painted foot offers an anchor that changes the state of the painting from a complete chaos of possibilities to an elusive message or order.

In *The Troubadour of Knowledge* (1991/1997b) Serres identifies the ‘third instructed’ or the ‘Harlequin’, a traveller who has become a hybrid of cultures and traditions, as the person who explores the third space that exists between disciplines. He begins by presenting Harlequin as an emperor who has returned from world travels. A crowd has gathered to hear his stories and anticipates tales of different landscapes, customs and people. Harlequin explains that everywhere is exactly the same. Disappointed, the crowd demands to know how, if everywhere is the same, he can account for his coat, constructed from patches of different materials? The emperor, embarrassed, attempts to remove the coat to discover that the clothes underneath are exactly the same – a patchwork of various materials. He continues to strip and reveals that his skin is also covered in a jigsaw of tattoos. Serres remarks that Harlequin shows himself to have become a hybrid: both male and female, and of all races, gestures and customs. He embodies the possibilities presented in Frenhofer’s painting. Hallensleben (2009: 126) sums up that the ‘Harlequin symbolizes the space in-between cultures and times, and as such embodies nobody and everybody. Thus his patchy robe becomes a metaphor for hybridity.’

Artist Orlan read from Michel Serres’s introduction to Harlequin in *The Troubadour of Knowledge* and from her own texts during several performances, including during the biopsy of her skin cells for her installation *Harlequin Coat* (Figure 3.2).
Created in collaboration with SymbioticA, winner of the first Hybrid Art prize in 2007, the work consisted of a bioreactor that sustained the life of Orlan’s skin cells as well as those of other humans and animals. In addition to the live cell environment, in a patchwork of colours the coat displayed dead skin cells gathered from previous exhibitions, and a rear projection of a video of cellular life. The artist explains (2008) that the work explores the hybridisation of and breaking down of boundaries between genders, races, sexes and art practices.

Orlan (2008, 2009) suggests that her interest in working with biotechnologies stems from her desire to work with life. She aims to explore her observations as an artist working within the scientific environment, noticing differences in how life and the body are understood across art, science and technology disciplines. For example, she expresses her surprise that ethnicity and gender are criteria used when cataloguing cells that exist beyond the life of the donor body. Wearing a Harlequin hat, Orlan reads during one of her performances: ‘science speaks of organs, functions, cells and molecules, finally admitting that it’s a long time since anyone referred to life in laboratories, but science never mentions the flesh, which specifically designates the mixing’ (Orlan 2008: 83–84). In her writing, the artist uses the word ‘body’ to describe something that is open to changing, to shift boarders; and as such it is available for performance and public debate that considers the nature of the body now and in the future.

Markus Hallensleben (2009) sees Orlan as a Harlequin who explores the third space between art, science and technology disciplines. He suggests that Orlan’s work places the body between artificial/biological, real/virtual and biological/social categories. Hallensleben (2009: 134) argues that the enactment of her cross-skinning performances and the creation of environments in which her cells join to form a unified system with the cells of others ‘is an attempt at embodying hybridity.’

3.3.4 Hybrid Art becomes a prize category at Ars Electronica 2007
In response to the growing number of ‘transdisciplinary crossover projects’ (Schöpf 2009: 140) being submitted for the annual Ars Electronica Prize, the organisation established a new Hybrid Art category in 2007. Asking for works that transcend category boundaries, the organisers in their call for submissions state that the new category is:

Dedicated specifically to today’s hybrid and transdisciplinary projects and approaches to media art. Primary emphasis is on the process of fusing different media and genres into new forms of artistic expression as well as the act of transcending the boundaries between art and research, art and social/political activism, art and pop culture.

(https://www.aec.at/prix/en/kategorien/hybrid-art/)

The call attracted a wide variety of hybrid art submissions traversing genres of data translation art, mechatronic works, bioart, multi-sensory art, performances, immersive installation environments and augmented reality. The winner in 2007 was SymbioticA – a research laboratory environment where artists and researchers can engage with life science technologies. Established in 2000 by artist Oron Catts, neuroscientist Stuart Bunt and biologist Miranda Grounds, SymbioticA balances artistic ambition with an adherence to strict practical and ethical scientific guidelines. Orlan and Tagny Duff are two of the artists who have worked with SymbioticA and who have been discussed in this literature review.

SymbioticA enables artists and researchers to work with life science technologies and explore their responses and observations as newcomers to the field. For example, Oron Catts (2012) in an interview with Aleksandra Hirszfeld describes his first encounter with a laboratory environment and its procedures and practices. He observed that the existing concept of ‘life’ and the language referring to life were insufficient when dealing with the living tissue that exists beyond the organism it was once part of. This sensitivity to the living material, Catts suggests, was not shared by scientists. In response to this encounter, Catts and the Tissue Culture and Art Project group, which was begun in 1996 and has been a part of SymbioticA’s research activities since 2000, developed the concept of ‘semi-living life forms’ or ‘semi-livings’ (Catts & Zurr, 2002). Catts explains that at the level of tissue culture, the ‘semi-living life forms’ break down the borders between species, gender, body and technology. The role of the artist working within this transdisciplinary
environment, Catts elaborates, is to observe practices, explore possibilities and provide a focal point for a critical debate: ‘as artists, we are not providing answers, we are merely providing problematic scenarios and proposing ideas for discussion’ (Catts, 2012).

Not all submissions to the Hybrid Art category address the relationship between humans and life science technologies. Working across the disciplines of theatre, public activism, mobile technology design, performance and public art, Blast Theory in collaboration with Nottingham University’s Mixed Reality Laboratory submitted *Day of the Figurines* (Figures 3.3 and 3.4) for Ars Electronica 2007 (Adams et al., n.d.). The work was presented as a public game for over one thousand participants; it lasted twenty-four days, with each day corresponding to an hour in the life of a fictional town where events from the mundane to the catastrophic unfold.

![Figure 3.3](http://www.blasttheory.co.uk/projects/day-of-the-figurines/)


Viewers enter the exhibition site and become participants by selecting a figurine that will represent them throughout the duration of the game. They are able to customise their figurine by giving it an identity and characteristics. Once the figurine is selected, it begins its journey across the set of an imaginary town, while the participant begins his or her progress across the city. The participants receive text messages that inform them about the narrative that unfolds as they act on those texts. Blast Theory (n.d.) explain that the aim of the game is to develop a community that helps one another in responding to extraordinary circumstances.

Artist Matt Adams (2012) explains that Blast Theory’s work aims to negotiate and blur boundaries between art and the real world, between fantasy and reality, between performance and observation. He explains that this is possible through contemporary digital communication technologies, which offer a much more fluid sense of identity representation. Adams points out that these technologies help us engage with the individual as part of a network of activities that form part-digital and part-real communities. Giannachi and Benford (2008: 64) support this observation and explain that *Day of the Figurines* presents ‘a more flexible, hybrid way of being’ that entangles the game with the lives of its participants. They remark that the experience presents a changed perception of temporality and suggest that

> the augmentation of the now, the presentness of the subject in time may then well be what will lead us out of the culture of speed that has been so far associated with technology, into an era which the human is not only augmented prosthetically, socially and spatially but also temporally. (Giannachi & Benford 2008: 68)

The participants of the *Day of the Figurines* experience time more flexibly. Through the use of mobile phone technologies, they live out a day that is both 24 hours and 24 days.

Since 2007, Ars Electronica’s Hybrid Art prize has become a category that presents a wide array of diverse submissions. These works use sound, dance, performance, sculpture, data-visualisation, digital processes, bioart and installation, among many other approaches to making art. However, they are unified through their
transdisciplinary approach to addressing the relationship between human and technology. As Zurr and Catts (2003: 49) explain, these works provide visions of ‘worlds under construction’ that stir up wider debates on the human–technology relationship.

The following section will discuss prominent works submitted for the Hybrid Art prize since 2007. From 2013 onwards Hybrid Art category amongst Interactive Art+, Digital Communities and Digital Musics&Sound Art is run biennially, providing less hybrid artwork to discuss. The following section aims to discuss hybrid art in connection to the debates on the human-technology relationship and does not aim to pick an example from every year submitted. However it does discuss the most prominent works that show the connection between the work of art and the debate discussed.

The following section, 3.4, will examine more closely hybrid art practices in the context of the contemporary debates on the human–technology relationship. Subsection 3.4.1 will examine the debates on technologically augmenting the human body and subsection 3.4.2 will look at the discussions surrounding the replication of human attributes in artificial systems.

3.4 Hybrid art and the debates on the human–technology relationship

3.4.1 Hybrid art and the debates on technologically augmenting the human body

In *Human Futures: Art in the Age of Uncertainty*, Andy Miah (2008b: i) states that the future is encountered ‘via a series of provocations in artistic endeavour, design interactions and cultural imaginations, which seek to consider the social impact of technology for humanity.’ This is echoed by Janet Bezzant (2008) and Mike Stubbs and Laura Sillars (2008: xxii) who explain that in an era ‘where we can easily imagine ourselves beyond the physical confines of our own mind, body and world, art can offer tools we need to think differently about ourselves.’
In 2007 the Prix Ars Electronica, celebrating artistic innovation that traverses art, science and technology disciplines, presented an award of distinction in its hybrid art category to Wim Delvoye’s project *Cloaca* (Figures 3.5, 3.6).


Delvoye’s work explores notions of organic, technological, human and machine by replicating a human digestive system mechanically. Since 2000 several versions of these machines, consisting of containers of bacteria and enzymes, have been given food and have produced excrement that is sold to collectors worldwide (Camnitzer, 2007). Enrico Lunghi (2007) explains that the work ‘keeps flirting with our modern
societies’ founding myths: of progress, of technology and hygiene, of the human machine’.

Michael Glasmeier (2007) remarks that Cloaca’s clean, technical appearance evokes associations with science laboratories, while the product that the system produces places a question mark over transformations that take place within such laboratory environments. He draws a comparison between Cloaca and the 1973 film Soylent Green. The film’s plot revolves around a murder investigation that is deeply embedded into the suffering of people living in a dystopian future. The narrative unfolds to reveal a conspiracy in which the food ration the population relies on, Soylent Green, is made from human bodies. It culminates with the protagonist, Robert Thorn, investigating a mechanical plant that processes human bodies to produce the green, wafer-thin food ration. Glasmeier suggests that some of the same apprehensions over the transformative power of technology and the future it constructs are explored in Wim Delvoye’s artwork.

Robert Zwijnenberg (2009) suggests that artists working across art, technology and science reveal contemporary concerns over how technology transforms life and biology. He quotes a phrase used by W.J.T. Mitchell (2003) in ‘The work of art in the age of biocybernetic reproduction’, highlighting that ‘artists, through their “tactical irresponsibility,” can reveal the cultural meaning of the tools and technologies of the life sciences, but also their hidden dreams and expectations’ (Zwijnenberg 2009: xxvi).

Artist Tagny Duff, who has collaborated with the 2007 winner of the Hybrid Art prize, SymbioticA, exposed some of the anxieties about the affective power of life science technologies in her work Living Viral Tattoos (Figure 3.7). The work consists of live pig flesh and donated human breast reduction flesh, both infected with the HIV virus. The process produced bruising on the flesh, reminiscent of tattoos, and was to be exhibited in small, sealed glass units (Duff et al., 2011). The artist explains that the bruise symbolises both the pessimism and the optimism within contemporary debates on the use of biotechnology for human enhancement (Duff, 2008).

Although originally accepted for the exhibition supporting the International Symposium on Electronic Art 2009 (ISEA2009) in Belfast, Duff’s project was
recalled from public display on the grounds that it contained dangerous biomaterial. Despite the guarantees provided by the laboratory that co-produced the work, the *Living Viral Tattoos* were deemed potentially harmful to the viewing public.


Artists, theorists and curators discussed the emergent issues in a symposium session, *Is the (Art) World Ready for Bioart?*, chaired by Miah. The debate culminated with Duff distributing replica glass units of *Living Viral Tattoos* among the audience. Questions on the safety of handling the units asked by viewers illustrated that the work emphasised some of the apprehensions over the use of biotechnologies in art.

Artist and designer Natasha Vita-More (2012) on the other hand expresses optimism in her work over the transformative power of new technologies that promise to significantly augment the human body and experience. In an interview with Nikola Danayalov she explains her future vision of an ‘elevated’ human condition, where a biological human being becomes ‘transbiological’. The transbiological human, according to Vita-More, is technologically enhanced to live longer and adapt more efficiently to changes in the living environment. Her art and design work is based on striving to use her body to achieve this objective.
Artist Oron Catts (2012) is highly critical of Vita-More’s approach. His work questions the status of the living tissue used in biotechnology research. He sees Vita-More’s work in particular as a narcissistic attempt to attract media attention for self-promotion and suggests that the focus on extending, enhancing and endorsing human experience above all else is selfish and ultimately revolves around the fear of mortality. Having worked with the Tissue Culture and Art Project and developed the concept of ‘semi-living’ in order to understand the status of the living tissue in laboratory environments, he expresses a concern over the legal and social status of these ‘new lives’. Zurr and Catts (2003: 49) explain that the role of artists working across art, science and technology is to provide alternative future visions and critical interventions: ‘One role that art can play is to suggest scenarios of “worlds under construction” and subvert technologies for the purpose of creating contestable futures, and exploring variations that might have an effect.’

Artist Eduardo Kac provides a variation on ‘worlds under construction’ in his 2009 submission for Ars Electronica’s Hybrid Art prize. In the Natural History of Enigma, he presented a plantimal: a plant and human hybrid (Figure 3.8).


The hybrid, ‘edunia’, is a flower developed through molecular biology that contains both the plant’s and the artist’s DNA. Kac, working with scientists, isolated the gene that identifies foreign bodies within his organism and expressed this gene within the
red veins of the plant (Figure 3.9). The reproduction of the plant through the production of seeds also reproduces Kac’s DNA (Kac, n.d.).

Carrie Paterson (2011: 49) explains that Kac’s work is intended to question the perception of boundaries between the human and the non-human – human/plant, human/animal and human/technology – by generating empathy: ‘Through his practice, we see ourselves as components of larger organic systems that include non-humans, transgenic creatures, and our own technology.’

3.4.2 Hybrid art and the debates on replicating human characteristics in artificial systems

In addition to debating technological augmentation of the human body and experience, Lunghi (2007), Camnitzer (2007), Glasmeier (2007) and Hauser (2007)
all remark that Wim Delvoye’s work *Cloaca* draws close attention to the debates on developing technologies that successfully mimic or enable the creation of systems that have human attributes.

*Cloaca* is a fully functional mechanical digestive system. Most of its functioning is unknown to the viewing public and happens in silence. During the exhibition, attendants are employed to perform the regular and ritualistic feeding of the system (Hauser, 2007) (Figure 3.10). However if *Cloaca* does not receive food or if the food is too spicy, acidic or gassy, because of the deteriorating conditions in the digestive system destroying the bacteria and enzymes, it dies. Glasmeier (2007: 13) explains that ‘it is an alchemical and self-referential procedure that – like its human counterpart – is vulnerable to constipation and bloating. Here it becomes obvious that there are limits to the ancient dream of mimicking man with a machine.’


Els Fiers (n.d.) remarks in the review ‘A human masterpiece’ that *Cloaca* gives an impression of the birth and the maintenance of a ‘mechanical baby’ who announces itself to be like a human. Fiers remembers thinking that the work is ‘a powerful, shitty portrait of man.’

Ben Lewis (2007) examined the authenticity of the claim that the system produces human excrement. Having gained access to the installation, Lewis provided *Cloaca* with a dinner that he also consumed. Concerned that the system produces something that mimics human excrement but does not produce it, he had his and *Cloaca’s* waste
examined. The laboratory results concluded that the two samples varied only in as much as there would be between two human beings, thus reflecting Delvoye’s exclamation, ‘it's not only shit. It’s human shit…’ (Delvoye in Lewis, 2007).

The replication of human attributes in artificial systems is explored by Carroll (2011) in ‘Us. And them’. Carroll described an encounter with an Actroid-DER, a female robot created to engage humans in conversation. The author notes that, despite the hyper-realistic features and claims to be ‘like a human’, the robot failed to make an emotional connection with him. The creator behind this robot is Hiroshi Ishiguro, one of the most emphatic supporters of experiments in human–robot interaction.

Having created a robot that looks like him, Ishiguro suggests that the emotional connection is there. He expresses a possibility that the robot could replace him at his work or even at his mother’s house. Carroll (2011: 76) explains that ‘his androids are cognitive trial balloons, imperfect mirrors designed to reveal what is fundamentally human by creating ever more accurate approximations’.

Engaging in the debates on human interaction with an imperfect technological mirror, artists Fred Abels and Mirjam Langemeijer of Electric Circus created street performances involving Dirk – a homeless robot (Figures 3.11 and 3.12). The performances, submitted for Ars Electronica’s Hybrid Art prize in 2010, aimed to instigate audience interactions with a robot that looks and behaves like a human being. In ‘The puppeteer and the inventor’, Abels and Langemeijer (2008) explain that in previous versions the robot was too successful at being perceived as human, jeopardising the performance. They had to strip Dirk of some of its human qualities. The balance the artists aimed for was a robot that disguises itself as a human for a short period, ultimately revealing itself to be a machine.

This balance is described by Masahiro Mori’s notion of the ‘uncanny valley’ (Carroll, 2011). The theory suggests that humans interact with robots in a positive way if (1) the robots appear to be robots or (2) the robots attempt to be humans or animals in a crude, almost caricatured way. However, the situation changes in encounters with robots that are too successful at being perceived as human, but which do not quite attain their goal. Abels and Langemeijer recall attempting to illustrate their attempts at retaining this balance when explaining one of their robots – a monkey – to child audiences. They say that it is useful to refer to the robots as ‘a little bit real’, both a little bit animal and a little bit machine.
Sherry Turkle (1999: 643), like Carroll (2011), explains that ‘we come to see ourselves differently as we catch sight of our images in the mirror of the machine.’ Encounters with new technologies offer diverse perspectives on what it means to be human and how the relationship between human beings and technology develops. These debates traverse disciplines, and artists who explore this relationship offer their critical contribution as the builders of alternative scenarios. Eduardo Kac explains:
Art today partakes some of the same concerns shared by fields conventionally seen as extraneous to the ‘fine arts’, such as biology and robotics. As art participates in the wider debate and circulation of ideas we witness in culture at large, it can help us develop new conceptual models and perhaps influence the new kinds of synergies emerging at the frontier where the organic and the digital meet. (Kac, 1997)

Section 3.2 of the literature review identified that the polarity in the debates on the relationship between human beings and technology has created a crisis that affects the future development of new technologies and the understanding of the experience of being human. These debates are not confined to the disciplines of science and technology design. As discussed in sections 3.3 and 3.4, there are artists who actively engage with the issues affecting the perception of the human–technology relationship. One such art discipline is hybrid art. These artists create new perspectives and construct alternative future visions, contributing their voice to the debate.

Reflecting on hybrid artworks, authors such as Adams (2012), Giannachi and Benford (2008), Hallensleben (2009), Karelina (2012) and Paterson (2011) report experiencing a blurring of the perceived boundary between the virtual and the real. The accounts of these experiences suggest that it may affect their perception of the human–technology relationship; however, these reports do not pursue this potential link any further.

During the performance stages for the installation exhibited at Kinetica 2009, I observed a similar blurring of my perceived boundary between the virtual and the real, which will be examined in detail in Chapter 4. As my experience came from my movement and performance, I explored whether similar research had been done in performance practices. There is research in digital performance (Broadhurst, 2007; Dils, 2002; Dixon, 2007; Kaiser, 1999; Kozel, 2007; Popat, 2006) that explores the link between the blurring of the virtual and the real and the audience’s perception of the relationship between human beings and technology.

Section 3.5 will examine the reports on the experience of the blurring of the perceived boundary between the virtual and the real in hybrid art. It will consider these reports in parallel with research in digital performance practices that indicates
that the blurring in the experience of the virtual and the real affects viewers’ perception of the relationship between human and technology.

3.5 Blurring of the experience of the virtual and the real in hybrid art

The terms virtual and real are complex and are used to refer to different things in different research disciplines. However, in this thesis – using the definitions of the Oxford English Dictionary – the term virtual will describe ‘computerized or digital simulation of something… established or conducted using computer technology,’ while the word real will mean ‘having an objective existence; actually existing physically as a thing.’ For example, the word real will describe a dancer performing in a real environment and the word virtual will describe a video or an animation of that dancer. When the experience of the two becomes blurred it is more difficult to separate them out, as for example in Blast Theory’s Day of the Figurines when a real human being takes actions in a real environment on the basis of their current experience as a virtual character in a virtual narrative, forming emotional connections with other virtual characters. Nevertheless, as the aim of this work is to blur that perceived boundary, creating an experience of being both virtual and real, the division is not easy.

Writing about Blast Theory’s Day of the Figurines, Gabriella Giannachi and Steve Benford (2008) explain that digital technologies enable the creation of art environments that offer experiences that blur the perceived boundary between the virtual and the real. Through this mixture of the two, this ‘more flexible, hybrid way of being’ (Giannachi & Benford 2008: 64), the viewer encounters new possibilities where the experience of time, space and identity are augmented to include other identities, times and spaces. Yulia Karelina (2012) supports this observation in her review of the work. She states that ‘the boundaries between the real and the virtual fade within the gameplay process, allowing the players to experience the presence in both dimensions at once.’

Markus Hallensleben (2009) remarks that a similar experience occurs in Orlan’s work. He explains that by altering her features and identity physically and digitally,
the artist produces experiences of virtual/real hybridity. Christine Buci-Glucksmann (2010: 8) agrees and suggests that the artist has transformed herself into a malleable plurality of body features and technological attributes: ‘ORLAN is a figure of a near future, already marked by the virtual, and by artifices and artefacts which decompose and transform the body and engender an aesthetic of the virtual.’

Sandra Kemp in ‘Shaping the human: The new aesthetic’ (2008: 84) reflects on experiencing art that fuses ‘biology and information systems, flesh and data’ to present experiences of the human face and body that are both virtual and real. She considers the work of Catherine Ikam and Louis Fléri. These two artists developed virtual beings, called Oscar (Figure 3.13) and Elle, who engaged with the audience by reacting to their presence and movement.


Kemp (2008: 93) notes that the virtual faces evoke contradictory feelings of ‘presence and absence, body and image.’ Lupe Nunez-Fernandez (2007) agrees with this observation and records her own reflections upon visiting the Digital Diaries exhibition. She explains that the virtual faces evoke a real sense of intimacy and humanity, which sits alongside the knowledge that the intimate connection is created in part through code.
Catherine Ikam, one of the creators of *Digital Diaries*, in a 2012 interview recounts a similar response. She explains that Oscar has become part of her family and she wishes him goodnight every evening before going to bed. Ikam asks ‘How can one be moved when a virtual face smiles at you?’ and, having researched human interaction, answers that ‘we want to have a face opposite us that smiles at us even if we know that it is not human.’

The contradictions reported by Ikam, Kemp and Nunez-Fernandez, according to Carolyn Guertin (2005: 168) in ‘Queer hybrids: Cosmopolitanism and embodied arts’, are characteristic of entangled real/virtual experiences. She explains that the work ‘becomes a contact zone that creates collisions between expected behaviours and physical laws and large forces of oscillation and contamination that challenge our perceptions of our physical world, our bodies and their boundaries.’

The notion that there is a contact zone in art where the real and the virtual meet that affects perceptions of our world, bodies and boundaries has been examined in digital performance practices. The next section will review literature that claims digital performance practices create conditions in which the virtual and the real blur, affecting the viewer’s perception of the relationship with technology.

### 3.5.1 Blurring virtual/real boundaries in digital performance practices

Steve Dixon analyses digital performance practices in *Digital Performance: A History of New Media in Theater, Dance, Performance Art, and Installation* (2007). He defines it as an area of art practice that explores ‘the conjunction of computer technologies with the live performance arts, as well as gallery installations and computer platform-based net.art, CD-ROMs, and games where performance constitutes a central aspect.’ His definition excludes however the use of ‘digital technologies in “non-live” and “non-interactive” performance’ (Dixon 2007: x).

The contact zone between the virtual and the real in digital performance, according to Sita Popat (2006), was discussed at the Second International Conference for Digital Technologies and Performance Arts. She sums up the debates, explaining that for performance practices ‘digital technologies enable a much greater and more direct effect on the viewer’s perception, challenging artists to make effective and
affective use of them.’ She refers to the type of affective environment created with the help of digital technologies as a ‘liminal space between performer and media, as a place where perceptions are caught up, shifted and transformed’ (Popat 2006: 213). Artist Susan Broadhurst (2007: 1) has explored liminal spaces extensively and offers her definition of spaces that ‘are located on the “threshold” of the physical and virtual.’

According to Dixon (2007), liminal spaces affect perceptions of the body, space and time as they are changed through the use of digital technologies. He points out that performers tend to see their bodies holistically across their external environments as well as their internal experiences. Despite the theories to the contrary, they see their virtual selves not as fragmented, disembodied or liberated entities, but as part of an embodied experience. Neither is more authentic than the other. ‘What fascinates digital artists is the ways in which embodied existence is redefined in cyberspace. So they use digital technology to examine the interaction between the physical and the virtual’ (Dixon 2007: 216). Dixon uses the example of Susan Kozel performing as part of Paul Sermon’s interactive installation *Telematic Dreaming* (Figure 3.14).

The installation *Telematic Dreaming* consisted of two beds in separate locations. Kozel occupied one location and the other was open to the public as part of the exhibition *I + the Other: Dignity for All, Reflections on Humanity*. Live video stream of Kozel was projected onto the public bed, and the video trained over the public bed was projected onto Kozel’s bed. She reports two types of performances happening simultaneously: one is of her body moving alone in the real space and the other is an intense virtual improvisation with other virtual bodies in a virtual environment.

In ‘Spacemaking: Experiences of a virtual body’, Kozel (2007: 94) reflects on how the experience of the installation affected her movements and those of the viewers. She remembers that the initial movement on both beds was hesitant with small hand gestures becoming increasingly important. With the increased gesture and movement, ‘the piece became an emotional investment that shocked and sometimes disturbed people.’ She even reports that some viewers found the experience so disturbing that they walked out of the exhibition. On other occasions, however, the movement between Kozel and a viewer was so comfortable that it reminded her of contact improvisation, where the movement itself takes over without the performer knowing the next gesture. This had affected how the continuity between the virtual
and the real bodies was experienced: ‘when the movement moved through us in this way, based on openness and trust, the distinction between which bodies were real and which were virtual became irrelevant.’ Reflecting on movement in virtual space, Kozel explains that this is what gives a new materiality to the experience. She highlights the difference between experiencing movement and experiencing an object in this context, concluding that:

What preserves the distinction between materiality and immateriality in the technology is movement: as moving beings people take on an alternative materiality, while objects become immaterial in their inertia. Virtuality is a verb-space, dynamic, shifting. (Kozel 2007: 97)

The overwhelming theme of Kozel’s paper is connectedness. The connectedness between the performer’s virtual/real bodies as well as between the performer’s real/virtual bodies and those of the viewers. The artist reports experiencing concerns over the emotional and intimate relationships she developed with the projected virtual bodies and how this might affect the development of real relationships. She explains that these concerns illustrate the connectedness she and the viewers experienced. These experiences into connectedness and back are what alter the perception of the body and the relationship it has with digital technologies, enabling virtual connections. Kozel (2007: 103) concludes:

Perception… and expression… are basic ingredients of a political community. Once these are radically transformed by altering or distorting the substance and space of a body, the worlds of politics and science converge with that of art, for art is where the radically new is first transformed into experience.

Similarly to Kozel, artist Susan Broadhurst (2007) highlights the connectivity between virtual/real bodies when examining Merce Cunningham’s performance *BIPED*. Premiered in 1999, *BIPED* was a project created by Cunningham in collaboration with Paul Kaiser, Shelley Eshkar and composer Gavin Bryars. The few sentences that Cunningham provided for his collaborators informed them that the project was ‘about technology’ and should be like ‘flicking through channels on TV’ (Cunningham in Kaiser, 1999).

*BIPED* consisted of a live performance by dancers and simultaneous rear-projected animation of virtual dancing avatars (Figure 3.15). The virtual avatars were projected
onto an invisible scrim covering the face of the stage. They were created by tracing
the dancers’ movements and were rendered into hand drawn shapes and figures using
early motion capture technology.

Figure 3.15. Merce Cunningham. *BIPED* (1999). Reproduced from
http://www.alabamadancecouncil.org/portals/0/images/BIPED%20B-

Kaiser (1999) reflects on experiencing the virtual and the real simultaneously when
looking at these animations. He describes a jump performed by an avatar where the
various lines that illustrate the body separate and are cast upwards into the air. While
the human body is unable to do this, the motion behind the avatar’s leap was
experienced as human. Broadhurst (2007) reflects on this and suggests that the
avatars and the dancers carry a trace of one another, with ‘any search for an ultimate
origin frustrated.’

Dils (2002: 95) describes the experience of the performance as contradictory and
unfamiliar. At first she reports perceiving the performers as abstractions: as lines and
various body parts moving independently from one another. Eventually she realised
that this is an illusion created between the projected scrim animations and the human
bodies appearing unexpectedly from the black void at the back of the stage. This
process of confusion and realisation also affected the dancers and the performance
creators. Kaiser (1999) remembers that during the performance at Berkeley, the first
dancer happened to be onstage at the same time as the projection of her animation. He quotes her recalling that the experience was ‘as if I were dancing inside myself’ (Steele in Kaiser, 1999), referring to both the animated avatar and her own body as herself. Kaiser (1999) remarks that:

Merce had created a special effect of his own, with dancers seeming to materialize upstage as they emerged through hidden entrances into the light. One’s perception of the dance and of the animation began to intermingle. Each becoming a lens that one could hold up to the other.

Broadhurst (2007) looks toward her own work *Blue Bloodshot Flowers* (Figure 3.16) to examine the connectivity between a real performer, an animated virtual performer and the audience. The two-part performance consists of Jeremiah – an intelligent artificial agent, who is represented by a projection of an animated face – and a live performer. Jeremiah perceives the actions of the performer and the audience via camera feedback, which feeds data into an emotion library that directs the choice of facial expressions with which he responds.

In the first part of the event, the dancer and Jeremiah present a text- and movement-based performance about a memory of a love affair. However, Broadhurst (2007) highlights that the technology in some cases produced unstable results, with Jeremiah reacting inappropriately to the dancer or to audience members. For example, during a particularly emotional scene, Jeremiah would react to an audience member arriving late for the performance.

In the second part of the event, the audience was invited to interact with Jeremiah in a more direct way, without the performer’s mediation. Broadhurst (2007) explains that it was interesting, although not surprising, to see the emotional connection between the viewers and Jeremiah. The author recounts observing the audience attempting to make the avatar smile if he displayed sadness. Even the technological instability of some unexpected feedback reinforced the emotional connection.

Broadhurst explains that the intensities in the interface between the virtual and the real in Blue Bloodshot Flowers were played out on several levels: (1) it inspired emotional interaction between the audience and the virtual avatar; (2) it extended the performer’s movement into the virtual via the avatar’s reactions; (3) it made the viewer, arriving late for the performance and stimulating Jeremiah to acknowledge this, become aware of the lack of boundary between the real and the virtual environment; (4) finally, because the avatar is imperfect, he inspired empathy that transcended the real/virtual distinction.

These intensities allow Broadhurst (2007: 10) to distil characteristics that are symptomatic of the virtual/real blurring in liminal spaces as ‘heterogeneity, experimentation, indeterminacy, fragmentation, a certain “shift-shape style” and repetition.’ She has also identified the use of ‘“defamiliarizing” devices, such as the juxtaposition of disparate elements, that in creating a distancing effect cause the audience to actively participate in the activity of producing meaning.’ This observation finds reflection in Elizabeth Grosz’s (2001: 11) thought that ‘the relationship between the virtual and the actual is one of surprise, for the virtual promises something different to the actual that it produces, and always contains in it the potential for something other than the actual.’

Digital performance practices have embraced the affective power of digital technologies to create works that foster the creation of spaces where the virtual and
the real merge. The experiences of these environments affect the perception of the body, time and space and locate it in connectivity. The body is experienced as both virtual and real, questioning the boundaries between humans and technology.

This runs in parallel with practices in hybrid art where artists aim to affect the audiences’ perceptions of the human–technology relationship. For example Orlan experiments with the notion of the human body and its perceived boarders. By subjecting it to digital as well as physical mutations, she re-introduces it as something that is pliable, incorporating other organic, inorganic and virtual components.

Blast Theory on the other hand explores the mutability of identity as well as the perception of time. The participants of the performance game live out two lives and identities simultaneously: the virtual ones assigned to them by the game and the real ones. They experience a day as both speedy twenty-four hours as well as slow twenty-four days. The virtual and the real narratives that the audience lives out are happening at different co-existent speeds.

Delvoye is also exploring perceptions of boundaries: particularly between the organic and the mechanical. His works, made of sections of mechanical parts, produce a waste product that is claimed to not only be organic, but to be the same as human. His Cloaca has been referred to by Els Fiers (n.d.) as a ‘mechanical baby’ both organic and mechanical; human and machine.

### 3.6 Summary

This literature review has shown that the debates in human augmentation and technology design indicate that perceptions of the human–technology relationship are polarised between progressive support for and conservative resistance to new technologies that aim to augment the human body and experience. This polarity reveals a crisis that, according to Turkle (1999, 2003, 2007, 2011) affects future technological developments and the experience and the understanding of being human.
These discussions however are not confined to the disciplines of science and technology. Miah (2008a), Stubbs (2009), and Stubbs and Sillars (2008) highlight that art practices that aim to address the relationship between human beings and technology contribute to the debates. Artists Kac (1998, 2005a, 2005b), Catts (2004), and Catts and Sillars (2008) agree, explaining that artists working across art, science and technology disciplines suggest problematic future scenarios and alternative visions to the future development of the relationship between human and technology.

One such area of art practice is hybrid art. Relatively unexplored in academic texts, the discipline began to show its characteristics and definition during the Ars Electronica 2005 event ‘Hybrid: Living in Paradox’. Hybrid artworks display a high diversity of approaches to making art; however, they are unified in addressing the relationship between human and technology, using a transdisciplinary approach. This transdisciplinarity places hybrid art practices in the ‘third space’, which according to Serres (1968–80/1982, 1980/2007) is an environment that fosters creativity and communication.

Upon experiencing hybrid art, Giannachi and Benford (2008), Hallensleben (2009), Buci-Glucksmann (2010) and Carolyn Guertin (2005) have reported experiencing a blurring of the boundary between the real and the virtual. While there are no sources that examine this further in hybrid art, there is research on digital performance practices that suggests that the blurring experienced between the virtual and the real affects perceptions of the relationship between human and technology.

Popat (2006), Broadhurst (2007), Kozel (2007) and Dixon (2007) refer to the real/virtual blurring as a liminal space and explain that it affects how performers and viewers experience body, time and space. They identify that the experience of the body in liminal spaces is both virtual and real. The resonance that works leave on the viewing body changes perceptions. According to Broadhurst (2007: 191), ‘it is these imperceptible intensities, together with their ontological status that give rise to new modes of perception and consciousness.’

The following chapter will describe the development of my hybrid art practice. It will draw on research discussed in this chapter that suggests that the blurring of the perceived boundary between the virtual and the real has the potential to affect the viewer’s perception of the human–technology relationship.
CHAPTER 4

DEVELOPMENT AND EVALUATION OF PRACTICE

4.1 Introduction

This chapter will describe the development and evaluation of my hybrid art practice, which traverses the disciplines of dance, performance, media art and installation. This forms a major research element of the project, providing settings for testing whether the blurring of the perceived boundary between the virtual and the real affects the audience’s perception of the human–technology relationship.

In 2009 I performed a movement sequence for the first installation in this project called Labyrinths. Labyrinths transferred real movement, filmed in a purpose built set to a virtual environment, which was then wrapped around a real sculpture. I wanted to move as if my body was unrestricted by the real world so that the movement can be transferred to the limitless possibilities of the virtual environment. The attempt to break down the boundary between the virtual and the real within my movement, prompted research in the virtual and the real and whether the blurring of this boundary affects the audiences’ perception of the human–technology relationship.

The analysis of the work and the audience behaviour indicated that the audience experienced the same type of blurring and that there might be an effect on their perception of the human–technology relationship. The work developed afterwards aimed to build on observations made during this and each subsequent piece. The practical work culminated in the event that allowed me to gather audience feedback data that would be used to assess whether the work had affected the viewers’ perceptions of the human–technology relationship.

The strategy was to develop work that presents real sculptural and architectural spaces that provide settings for virtual performances. Nevertheless, the performances are by a real performer and not by a digital animation performing for virtual environments. There were eight public exhibitions of six installations in various venues, ranging from large international events such as the Kinetica Art Fair to
small, intimate galleries. Each installation began with a performance designed to exist as a virtual video skin projected onto real sculptural objects. The process can be broken down into three stages: (1) performance, (2) filming and editing, (3) installation. Observations made from audience interactions, debates and personal reflections fed into each subsequent project.

This chapter will use these three stages to describe the progress of the six projects, starting with the work completed for the 2009 London Kinetica Art Fair and culminating with the installation created in 2012 to gather data from audience feedback. The card-sort data gathered from the event provided a measurable way to determine whether the 2012 installation, which aimed to blur the experience of the virtual and the real, affected the way the audience perceived the relationship between human and technology.

4.2 Development of practice

4.2.1 Labyrinths

*Labyrinths* was a hybrid art installation created for the 2009 Kinetica Art Fair, London. This annual international event celebrates innovation in collaborative practices that traverse art, design, science and technology. Seeing 9000 visitors in three days, the exhibition presented work from over 150 artists. Robert Pepperell (2009: 7) in his introduction to the fair writes that it ‘echoes some of the ambition of the Victorian universal exhibitions in combining threads from across art, science and technology, and in doing so gives us an overview of advanced thought and practice.’ The fair was a busy environment and, with the artists required to stay with the work for the three days, it provided a great venue to observe audiences and receive feedback on the work.

The installation was created in collaboration with Alistair Burleigh from Wrap3, which was a creative display solutions company. This collaboration was based on overlapping roles, however Alistair developed the projection technology needed to complete the project and I contributed to the work as a performer and dancer. We developed the concept for the piece together discussing my PhD research and his undergraduate work. I explored the collaboration from the perspective of a performer
that aims to research the blurring of the perceived boundary between the virtual and the real in performance and installation. We built the set, filmed, built the installation and presented it for Kinetica together.

The *Labyrinths* installation consisted of a sculptural object, assembled from five cubes, wrapped in a digital video projection (Figures 4.1 and 4.2)(for a video see https://vimeo.com/82029820).


The projection was of multiple copies of a virtual performer exploring the five assembled cubes. The performer was able to climb, jump, slide and walk between the various cubes, unimpeded by the gravity or the positioning of the cubes. She is also able to meet another version of herself, traverse into the depth of each cube and transport herself across the sculpture in an accelerated virtual jump (Figures 4.3, 4.4, 4.5). The technology used to wrap the sculpture with the virtual skin was developed by Wrap3, a creative display solutions company, and was pushing the boundaries of what was possible in digital displays in 2009.

Figure 4.3. Alise Piebalga and Wrap3. Labyrinths (2009). Mixed media.

Figure 4.5. Alise Piebalga and Wrap3. *Labyrinths* (2009). Mixed media.
The installation aimed to create a multilayered approach to blurring the experience of the virtual and the real. Layer one provided a real sculptural object that became a setting for a virtual environment explored by a virtual performer. On another level, the virtual performer is not a digital animation but a video of a real human body exploring virtual spaces, unaffected by gravity or the direction of each cube.

Creating the performance for the video provided the first challenge. The performance was recorded in a studio environment on two stacked, chrome-key-prepared two-metre cubes, with each cube representing a face of the sculpture’s cube. The camera position was static and optimised for each cube and a further view recorded transitions between the cubes.

As the performer I was able to explore each cube separately, as well as climb from one into the other via hidden handholds. It was possible to swing, walk, lie down, sit or stretch and slide on the sides of the cube. The two cubes were not separated via a floor, so that the movement transitioning between the cubes was visible to the camera. Yet it was also important that the video could be flipped and mapped onto any cube face without visible forces contradicting that positioning – but as the performer I was affected by real world constraints, such as gravity acting upon body, hair and clothes, and it was challenging to move as if these constraints were not there.

The performance movement was affected by its virtual destination on two levels: (1) small, compact movements of hands and legs provided the ability to control the visibility of the real world constraints on the body; (2) large movements such as stretching or swinging across the cube offered an opportunity to explore movement that would take on a new form when flipped or mirrored in post-production. The performance developed a large library of movements; however, only a fraction of them could be transferred into virtual environments. Transitional movements were performed that would transform the digital performers across the sculpture. Simple crawls or climbs were added to the movement vocabulary as well as transitions that a digital body might make: such as a jump that dissolves the body and reconstitutes it in another space.

My observations as the performer were based on the unusual experience of moving and exploring a real space as if it were a virtual one – in attempting to defy physical
constraints as well as by being inspired by the possible ways in which a virtual body could move. Ultimately the performance was a negotiation between the two – between exploring a real space and performing for a virtual one. These experiments mirror artist Olafur Eliasson’s thoughts on space. In an interview for Thinking-in-Practice he explains that:

   It is necessary to unlearn space in order to embody space.
   It is necessary to unlearn how we see in order to see with our bodies.
   It is necessary to unlearn knowledge of our body in three dimensions in order to recover the real dimensionality of our body.
   Let’s dance space.
   Let’s re-space our bodies… (Eliasson, n.d.)

The next challenge in blurring the experience of the virtual and the real was filming and editing. The challenge pivoted around balancing post-production elements that enhance the virtual environment but do not transform the performing body into an animation. The aim was to achieve the effect that Kaiser (1999) observed of BIPED that, while some graphic elements reveal the dancers to be animations, the feeling of the movement originally mapped from real moving bodies is retained. The digital post-production process completed the performance by placing the movement intended for a virtual environment within a virtual environment, giving it the freedom of possibilities. ‘In virtual space, [the movement] is irregular mirrorings, spiralings, floatings and the surprising cultural freedom of bodies set loose to breathe, drift, crawl, fly and freefall in elemental spaces’ (Guertin 2005: 169).

The final stage in creating the virtual/real blurring was in the installation itself. During the exhibition it was observed that viewers perceived the projected performance and the physical sculpture to be integrated. The performer is unmistakably a real human body but one who explores a virtual environment – climbing around corners, unaffected by any gravitational forces – that is altogether presented as a real object in an exhibition environment.

The viewers engaged with the work on four levels:

(1) There were many attempts to discover how the virtual world was mapped onto the physical sculpture. Viewers asked questions about the technology behind the project as well as attempting to figure it out by breaking projection beams. This
activity created a performance in itself: as viewers moved, their shadows and the installation changed. My collaborators and I noted this down and used this observation in the next project to blur further the experience of the virtual/real boundary.

(2) There were questions regarding the performance: How was the project filmed? What was it like to perform for a virtual space?

(3) There was a noticeable engagement with the virtual performer. Some viewers picked one copy of the performer and attempted to follow her on the journey across the sculpture, aiming to find her after she jumps, dissolves and reassembles on another part of the sculpture. This created a flow around the sculpture that originated from the virtual performer’s movements, creating a fleeting relationship between the viewer and the virtual performer.

(4) Perceiving the virtual environment and the real sculptural objects to be intertwined, the audience in some cases attempted to pick the cubes up, thinking that the animation would be lifted with it. A review by a viewer remarks on the blurring of the perceived boundary of the virtual and the real: ‘I like the concept of the virtual enhancing and modelling the physical especially when it’s melded with some thoughtful performance art’ (Shepard, 2009).

*Labyrinths* was the first work produced as part of this research project and formed a testing ground which aimed to see whether the blurring of the perceived boundary between the virtual and the real in hybrid art had the potential to affect the audiences’ perceptions of the human–technology relationship. Audience observations and personal reflections on the work suggested that this is a good potential avenue for further practical experiments.

Alistair and I learned that in order for the audience to experience the perceived blurring of the virtual and the real, we needed to:

- Provide environments that are both virtual and real. For example a virtual environment projected onto a real sculptural object
- Provide performers that are both virtual and real. For example a real human body exploring a virtual environment
- Create a crossover of these virtual/real spaces and virtual/real performers
These three conditions helped to create a work of art that blurred the audiences’ perception of the boundary between the virtual and the real. These guided future projects.

4.2.2 Forking Paths

Following the successful use of the performance footage in *Labyrinths*, it was reused in the second collaborative installation with Wrap3, *Forking Paths* (Figures 4.6 and 4.7) (for a video see https://vimeo.com/79400620). The collaborative roles between Alistair Burleigh and I were exactly the same as in *Labyrinths*. He developed the technology for the installation and I worked on it from the performance perspective. We developed concept, built the sculpture and worked on the projection together, based on our discussions of audience engagement with *Labyrinths*.

The installation was exhibited at the ‘Future of Sound/Future of Light’ event at the Arnolfini gallery in Bristol. The event, hosted by Martyn Ware, brought together works exploring contemporary audio-visual technologies in art and design.

The installation consisted of a large cuboid and a smaller cube with semitransparent planes (Figure 4.8).
The performance footage was projected onto the small cube where the semi-transparent material enabled all the planes of the cube to be viewed simultaneously (Figure 4.9). The large cuboid was wrapped with an animated sequence of lines and colour blocks. A virtual version of the small cube was projected intermittently onto the large cube (Figure 4.10).


Figure 4.10. Alise Piebalga and Wrap3. *Forking Paths* (2009). Mixed media.
During *Labyrinths*, observations indicated that viewers were absorbed in the intertwined relationship between the physical sculpture and the virtual performance. However, as viewers came closer to examine the performer, they interrupted the line of the projection with their own bodies, producing a large shadow on the sculpture. This removed the virtual skin and revealed that the sculpture was blank. An observable effect was produced whereby the audience were distanced from the experience. A solution was found in creating virtual shadows that intermittently cross the projection, hiding the viewer’s shadow among them.

Observations during the exhibition revealed that:

(1) A new layer with which to blur the experience of the virtual and the real was created by projecting virtual shadows onto the sculpture. Upon perceiving another shadow in addition to their own, viewers would look around for the source of that shadow. They developed a response in their physical environment prompted by experiencing the virtual. This response reflects Philip Beesley’s (2010, 2012) work and Kathrine Elizabeth Anker’s (2010: 170) thoughts on his work *Hylozoid Grove*:

> To actively move through the space of the installation, and meet its luminous and overall white, transparent aesthetic interface must be further expected to awaken processes of affect, and feeling in the user, as the integration of more parts of the sensory-motor perception system, including proprioception, become integrated in the overall user experience. Sensory-motor skill and proprioception have central influences on processes of learning in the individual on a general scale.

(2) The introduction of the semi-transparent projection material aimed to reunite the virtual environment of the sculpture with the exhibition space. *Labyrinths* inspired the viewers to attempt to lift parts of the sculpture, hoping that the virtual world would lift with it – this somewhat divorced the installation from its immediate real environment. The semi-transparent planes of *Forking Paths* enabled a simultaneous experience of the real-exhibition and virtual-projection environments.

(3) The effect was particularly strong on the small cube, where the projection material created the ability to observe the virtual performers on all the projection planes of the small cube simultaneously.
Forking Paths built on the previous work called Labyrinths, exploring further the aim to blur the perceived boundary between the virtual and the real. It used the idea of virtual shadows and explored further the integration of real space and the virtual projected environment. We learned that in addition to the methods we developed in Labyrinths, we achieved a successful blurring of the virtual and the real with two additional strategies:

- By blurring the boundary between the real exhibition space and the virtual projection environment. We achieved this by using semi-transparent projection material for some parts of the sculpture
- By intertwining the viewer with the projection. We projected shadows onto the sculpture. This entwined the virtual shadows with those produced by the viewer.

4.2.3 Immortal

The relationship between the physical exhibition space, the sculpture, the virtual environment and the projected dancer was further examined during the 2011 project Immortal (Figures 4.11 and 4.12), exhibited at the Wayward Gallery in London. This was the last in the series of three collaborations with Wrap3 and was yet again based on the same roles we had developed during Labyrinths. Alistair Burleigh developed the new self-contained projection technology that enabled me, as the dancer perform with my own virtual copies. By 2011 my research was strongly based on the blurring of the virtual and the real and how it might impact the viewers’ perceptions of the human-technology relationship. I was very keen to explore how a real performer might work with virtual ones, while Alistair was excited to learn of the possibilities offered by a self-contained projection unit. The concept, yet again was developed together.
The performance presented two metre-high cubes with a projected video of a performer fragmented across all the faces of the cubes. This technology was new at the time and presented a chance for self-contained virtual environments on moveable physical objects. And a new element was introduced: a real performer manipulating the cubes throughout the duration of the exhibition in order to reconstruct the virtual dancer’s body.
The performance challenge for the video footage was to develop movements that could easily be divided across the various faces of the two projection cubes without creating a chaotic jumble of body parts. The movements had to be slow and simple, in some cases adopting an everyday experience of reading, lying down or sitting. This resulted in a jigsaw puzzle of multiple versions of the performance, fragmented in time and distributed in space.

The projectors were contained within the acrylic cubes, disabling any shadow formation and providing a potential for manipulating the cubes during the exhibition. The exhibition performance lasted six hours during which I assembled the parts of the virtual performer from the cube faces into a whole. Nevertheless, as soon as I achieved this objective, the projections would divide the body again into different formations (Figures 4.13 and 4.14). As the performance progressed, the real body crawling and moving among the cubes became mixed up with the virtual body needing to be assembled. The virtual performer and the real performer of the same scale became divided and reassembled between the faces of the cubes. As the real body became tired during the performance, the movements and the body positions mimicked the virtual performers – sitting, crawling, lying down.

Immortal took direction from Broadhurst’s (2007) research conducted during her work Blue Bloodshot Flowers, in which the performer develops a relationship with her or his virtual partner. While in this case the cubes were moved by me and not by the audience, it presented the possibility for anyone to be engaged in assembling and reassembling a digital version of the self. Discussions with viewers after the performance debated the extent to which the real performer’s movements were perceived to be entangled with the movement of the virtual ones.

An example was used of a particular sequence of movements I performed repeatedly in order to reconstruct the virtual bodies. I would establish the one body I wished to assemble and place that plane of the cube toward the audience. I would then spin and move the other cube until I could find a match (Figure 4.12). As I did not know which part of the cube contained the match, I would spin, re-spin and move around and in-between the cubes. Knowing that I had a very short time before the video jumbled the bodies up again, this had to be done fast. The frantic real body movements became absorbed with the spinning arms, legs, heads and torsos. Once the match was found, I would push the cubes together, stepping away from them and momentarily breaking the relationship with the virtual performers.

In Immortal, we learned that we could introduce yet another element in our challenge to blur the viewer’s perceived boundary of the virtual and the real by having a real
performer in the space interacting with the virtual copies of herself. While visually
the installation created a blurring between the real and the virtual performers’ bodies,
it did not allow the audience to move around the space and the installation. This
element was successful in previous installations and has been explored further in the
works discussed below.

**4.2.4 I Know What It is When I Find It**

Fragmentation, according to Broadhurst (2007), is one of the aesthetic attributes of
artworks that explore liminal spaces. The fragmentation of movement across
sculpture planes stimulated the next stage of experiments, which took guidance from
Merce Cunningham’s (1991) discussion of the process he and Charles Atlas used to
create a two-screen installation of the performance *Torse* and Susan Broadhurst’s
observation that in Cunningham’s work ‘familiar relations of the human body are
frequently dislocated in time and space’ (Broadhurst 2007: 80–81).

Cunningham and Atlas used three cameras to capture everything that happened on
the stage during the performance of *Torse* (Figure 4.15) and produced projections for
two screens. One camera was static while the other two moved around, operated by
the two artists. Roger Copeland (2002) notes that an important aspect of
Cunningham’s work was based in the creation of collage. The two screens are a
collage of one performance: one presents a static view while the other moves among
the performance, providing unusual viewpoints for the audience. In this case,
technology enables a new experience of the performing body.

*I Know What It is When I Find It* was a project created in 2009/2010 for the Ffloc Gallery at the University of Wales, Newport. It aimed to present a collage of various perspectives of a single movement, distributed in space and across projection objects. The movement was performed while wearing a large, red dress that was split into four three-metre-long sections that were fastened to the floor of the studio space. It permitted enough freedom for movement; however, it restricted any significant traverse across the space. When filming *Labyrinths*, I reflected on the challenge presented by the visible physical restraints on the body that performs for a virtual environment. To remove some of these restraints, five cameras were positioned to target the fringe of the movement, on the edge of the dress or high above the performance (Figure 4.18).
There were four cameras focused on each of the four edges of the dress, recording the movement in the cloth initiated through the performance. The fifth camera was placed above the performance, filming the movements of the performer only and not those of the dress. The footage was projected onto five latex screens suspended in the gallery, with the projection line above the viewer’s walking path, producing no shadows (Figures 4.16, 4.17 and 4.19).

Figure 4.18. Alise Piebalga. *I Know What It is When I Find it* (2009/2010). Stills from video footage.

Figure 4.16. Alise Piebalga. *I Know What It is When I Find it* (2009/2010). Mixed media.
The installation made use of two new technological discoveries, developed for the project, that would help design further solutions for the entanglement of the virtual performance and the real exhibition environment. (1) While forming the latex screens I was able to mix white and semi-transparent latex to achieve a swirled look that mirrored the effect created by the projected virtual dress and the performer. The
swirls are not visible from a distance, when seeing the dress; nevertheless, as the viewer comes closer, the swirls become more visible, and the dress and the performer less so. The experience switches between the virtual performance and the real sculptural object. (2) The latex screens created a display solution that fully absorbs the projected light. This provided the opportunity to distribute them in the exhibition space with the audience being able to walk between the screens and touch the skin-like quality of the latex. The projections had to be masked live for this effect to take place, so that any overspills of light were eliminated.

A debate session led by Robert Pepperell was organised to coincide with the exhibition. It was noted that the rhythm of the movement of the human body in a spin is retained, despite it being fragmented in space and distributed virtually across several objects. Presenting the body extended through the video onto projection objects opens the movement up to include the space in-between. The space, which was traversed by the exhibition audience, was virtually part of one body in movement. Removing nearly all the dancer’s body in the footage and presenting the movement at the fringes, like the edges of the dress, achieves this.

Erin Manning’s (2009) research on movement influenced the work. She explains that the moving body is both virtual and real. The virtual body holds all the potentialities of the movement and is dynamic in responding to a performing partner and the environment. The elasticity with which the body responds is guided by rhythm. ‘The body-elastic is pure plastic rhythm, the body of the between where the movement is on the verge, quasi-actual, almost virtual, hanging, pulsing, spiraling’ (Manning 2009: 35).

The balance between giving enough evidence of the movement to expose the rhythm and removing the rest reflects Michel Serres’s (1982/1995) account of the three painters, Porbus, Poussin and master Frenhofer, the last of whom presented to the two younger painters his masterpiece, La Belle Noiseuse. Porbus and Poussin were horrified to discover that the painting was a jumble of colour, texture and line, with a woman’s foot at the edge of the painting the only indication of the subject of the painting. Brown (2002: 14) observes that the foot ‘is the tiny differentiation – like the clinamen which initiates turbulence – that turns noise into putative order… It is order in its virtual state, where all the possibilities are present.’
*I Know What It is When I Find It* used fragmentation and distribution of real movement virtually across real space. It shows the moving body as both virtual and real. I learned that it is important that the viewer is able to walk in-between the projection screens and touch them. This invites the viewer to be a part of the blurred virtual/real environment.

### 4.2.5 Skin Side Up

The experiments in distributing real movement – in this case a narrative – virtually across objects while retaining a sense of rhythm continued with the next project, *Skin Side Up*, which was produced in 2009–2010 for the Bristol Festival (Figures 4.20 and 4.21). The final installation consisted of multiple miniature latex projection screens, which measured 20 × 10 cm and were distributed in a 1.5 m square grid with a projector projecting on both sides of the screens. A performance of footage filmed for *I Know What It is When I Find It* was projected on one side, distributed across the screens, while the other side presented a video of the performers appearing in the windows and doors of a house. Viewers were able to spin the latex screens, flipping between the footage of the performers and the house. The house footage provides a break in the rhythm of the movement of the performance, opening up narrative possibilities.

![Figure 4.20. Alise Piebalga. Skin Side Up (2009/2010). Mixed media.](image-url)
This project also used a technique developed during the *Forking Paths* installation that anticipates audience movement and the interaction through interception of the projection line. The latex screens have the unique quality of being semi-transparent while allowing a different projection on either side. If the projection line was interrupted from one of the projectors, the footage of the other would take over the installation. The project presented an experience in which the performance narrative was continuously shifted by the audience, who either spun the screens or interrupted the projection line, giving the impression of physical actions affecting the virtual environment. During the Bristol Festival exhibition I observed that the audience divided into two sections: one group participated in the performative spinning of the screens and moved to intercept the projection, while the other sat and watched it as a live performance produced between the audience members and the virtual performers.

*Skin Side Up* built upon the experience and the successes of the previous projects. However it also introduced a new effective element of interactivity. It presented two performance narratives that could be shifted by viewers spinning individual projection screens. When spun these projection screens revealed either one of the projection narratives to be dominant. This allowed the viewer to affect the real sculpture, the virtual performance and the narrative simultaneously, while walking through the installation environment.
4.2.6 Enclave and Enclave 2

The final two projects, Enclave and Enclave 2, built on experiences gathered in the previous projects of fragmenting movement virtually across sculptural objects and made use of the new high definition portable cameras, such as GoPro Hero2 Professional. These small, lightweight cameras provided the opportunity to film unusual angles of the performing body, isolating body views as well as opening the opportunity to film dance spaces that might become formed between two dancers or body parts.

On the basis of observations made during I Know What It is When I Find It – that the space between the projection screens fills in the movement – I developed a way of capturing the space created between two performing dancers. Manning (2009: 14) in Relationscapes, reflecting on William Forsythe’s work, explains the dynamic between two dancers:

We take a step. My step leads me forward, but before I can step I must call on you to move almost before my own displacement. It is this almost-before I must communicate. This silent question takes the form of an opening. Technically: the energy that is preaccelerating through my body convenes in a direction that can be harnessed.

Susan Kozel (2007) observed a similar dynamic created during her performance for Paul Sermon’s Telematic Dreaming project. She reports experiencing successful body improvisations with her projected, virtual partners if the movement was based on openness and trust. Enclave aimed to capture this energy between two performers, fragment it virtually and place the audience within that body dynamic.

Two dancers were invited to perform a choreographed performance phrase several times with the dancers taking turns to wear cameras placed in their hands and on their heads and chests. This would capture the combination of the dancer’s movement and his or her partner’s actions (Figures 4.22, 4.23, 4.24).
The amalgamation of the footage filmed would be simultaneously looking inward toward the movement and outward away from the movement. So, for example, if one of the performers stayed still and the other was walking toward her, the viewer would be able to see the walking dancer approaching from the perspective of the
static dancer, as well as simultaneously seeing the static dancer from the perspective of the walking one.

The footage obtained was presented in an installation for a show titled *Archipelago* at the Bonington Gallery in Nottingham from 1 to 8 February 2012. For the installation to reflect the six camera angles and still fragment them in space, I built three cruciform structures (Figures 4.25, 4.26, 4.27) and suspended them, providing projection space for six projections. Each cruciform structure was intended to have projected on it the corresponding footage from both dancers. For example, the footage obtained from the male dancer’s head camera would be projected onto the same structure as the female dancer’s head camera footage.

Figure 4.25. Alise Piebalga. *Enclave* (2012). Image from the proposal for the show.

The reflections on the project were presented in a paper during the ‘Perspectives on the Material World’ research conference on 28 June 2012 (Piebalga 2012). The discussions explored whether the space between the distributed screens fills in the performance and whether the installation reflects the relationship between the performing body and the technology that has become part of that performance. On the basis of these debates, the second version of the project simplified the filming process to highlight that relationship.

The second stage, *Enclave 2*, used two wearable cameras to capture a single dancer performing a slow improvisation session in a studio environment. A camera was attached to each of the dancer’s hands in the first performance (Figures 4.28, 4.29, 4.30, 4.31), and to a leg and the head in the second. This enabled the dancer to focus on performing in collaboration with the cameras, as opposed to performing with a partner. The resulting video looks in toward the performance, reducing the surrounding visual noise and producing dynamic movement that is collaborative.


The exhibition of *Enclave 2* was held in the fine art studio at Nottingham Trent University between 24 and 27 September 2012. The new footage was projected on eight suspended Perspex screens distributed in space (Figures 4.32, 4.33, 4.34, 4.35, 4.36). The films from the two hand cameras were synced and projected side-by-side, fragmented across the screens, followed by the films from the head and leg cameras.

The installation, like the previous works, presented a virtual performance fragmented across sculptural objects in a real exhibition environment. However, the use of the new portable cameras enabled another layer of virtual/real relationship. The viewpoints presented by each camera are not perspectives that either the performer or
the audience can have of the performance. They present movement as it is, looking in and out simultaneously, enveloping the viewer in a virtual dance space created by a real, performing human body. This was a particularly successful addition to the installation. To the audience it presents the performing body as both virtual and real. Yet again, the distribution of the virtual performance in exhibition space across semi-transparent screens built on the lessons learned from the previous projects on how to blur the perceived boundary between the virtual and the real. This installation provided the setting for the card-sort event run to gather empirical viewer data on whether the work affected perceptions of the relationship between human and technology.

Figure 4.34. Alise Piebalga. *Enclave 2* (2012). Mixed media.

4.3 Card-sort event

During the exhibition of *Enclave 2*, I gathered audience feedback data, aiming to measure whether the installation had affected viewers’ perception of the relationship between human and technology. The card sort was run in two days, gathering feedback from twenty-five participants both male and female, ranging in age from eighteen to fifty-five.

The event was held in a gallery at Nottingham Trent University, where passers by were invited to participate. The audience selection was based on approaching people participating in an open day at the university. The date was selected in order to overcome some of the limitations the location of the gallery introduced. The gallery is based in the art, design and photography wing of the university, which would dictate that during the academic year, people familiar with arts practices and debates would be the likely participants. The open day date opened the experience up to a more diverse audience.
The participants were asked to complete the card sort twice: once before and once after viewing the installation. To ensure that the task was performed with reference to the installation and did not recall previous answers, the viewers were not informed that the card sort would be performed twice. On each occasion, participants were given an envelope with sixteen cards. On each card was a term that was closely associated with the performance. The chosen words were selected from reflections the performers and I made during our performances for Enclave and Enclave 2. We wrote down words that we felt expressed how it felt to perform with the small, portable cameras attached to various body parts. We reflected on how this technology affected our movement, how we felt we performed for the camera and how the camera performed with and for us.

The words movement, speed, slow motion, organic and mechanical were the terms associated with the reflections on movement in relation to the small, portable cameras used during the performance – for example, the slow but sometimes staccato and mechanical movements adopted for the part of the body that has the camera and the faster movements of the other body parts. Effect, body, rhythm, pattern, and sensation were associated with how the movement itself was experienced – for example, the pattern generated by the slow/fast body parts, or how much more body awareness is created when moving in relationship to the camera and getting into an uncomfortable or painful position. Partner, performer, observer and observed reflected the experience of the partnership created with the cameras. Finally, the words performance and dance described the process of performing with the cameras.

On the back of each card there was a numberless scale. One end of the scale indicated human and the other technology. The viewers were instructed to place where on that scale they perceived the term to be: closer to the human end of the scale, closer to technology or in the middle, thereby showing they perceived the term to belong equally to the domains of human and technology. However, it was clearly indicated to the viewers that the scale did not represent a value system. The viewers were asked to complete another set of cards after seeing the work.

To be able to evaluate the data, the answers were given a value. The answers closest to the value 0 represented the human area of the scale and the numbers closest to 8 represented the technological area, with 4 representing equally both humans and technology. These numbers provided the information for the box and whisker
diagrams examined in the following section. The box and whisker diagrams are a visually effective way of comparing patterns taken from data before and after viewing the work. Section 5.4 will provide tables and diagrams examining trends in the data, indicating whether the perception of the relationship between human beings and technology has been affected.

4.4 Individual card-sort results

This section explores the data taken from the audience before and after viewing the work. Finally, it will draw conclusions on the basis of that data.

1. Card ‘Mechanical’

The responses to the initial card, ‘Mechanical’, can be seen in Box plot 1. The lowest response was at 4, indicating the middle of the scale; however, as it is the only response that low on the scale, it is represented in the diagram with a dot. A more significant number of responses started at 5, with the highest at 8, belonging to the domain of technology. The median lies at 6.3, with ten responses being in the sixes. This distribution indicates that before viewing the work, the audience placed their answers firmly in the domain of technology.
Table 4.1 Box plot 1 and Box plot 2 for the card ‘Mechanical’.

The post-installation results shown in Box plot 2 indicate that the answers have changed with the median now at 6, and two responses descending toward 3 and 7 in the range of fives. This demonstrates a shift toward the middle of the scale by 0.3 of a unit, suggesting a more symbiotic understanding of the roles of human and technology in constructing the concept mechanical.

2. Card ‘Slow motion’

The box plot for the initial responses to the ‘Slow motion’ card indicates that most answers are in the range between 4 and 6, creating an interquartile range of 2, with the median at 5. This indicates a good concentration of answers in the middle of the scale with a slight bias toward technology. There are nine answers in sixes, two at 7, four in the fives and six at 4.
Table 4.2 Box plot 3 and Box plot 4 for the card ‘Slow motion’.

Box plot 4 describes the responses to the ‘Slow motion’ card after the viewers experienced the installation and while the median has remained at 5, the interquartile range has risen to 2.75, indicating that the answers to the card ‘Slow motion’ have very slightly shifted toward the technology end of the scale. There are eleven answers now in the range between 6 and 8.

3. Card ‘Dance’

The initial box plot for the card ‘Dance’ shows that the perception of dance is firmly within the domain of the ‘human’ end of the scale with seven responses being in the range between 0 and 1 and only one response being above 4. The median for the initial responses for this card is at 1.
Table 4.3 Box plot 5 and Box plot 6 for the card ‘Dance’.

Box plot 6, showing the results obtained after the installation, indicates that there has been a slight change overall in responses, with the third quartile elevating to 4 and the median to 2. Considering all the results this is a significant shift toward the middle of the scale.

4. Card ‘Partner’

The initial results for the card ‘Partner’ indicated that, like ‘Dance’, the perception of partner is firmly within the ‘human’ level of the scale. Box plot 7, shows the median at 1 and the interquartile range at 3.75 between 0.25 and 4.
Box plot 8, summing up post-installation results, indicates an interesting move toward the middle of the scale across the board, with the median moving to 2.5 and eight results being at 4. This is a significant move in responses, indicating a substantial change in the perception of how the notion *partner* fits within the relationship between human and technology.

5. Card ‘Effect’

Box plot 9 for the card ‘Effect’ indicates that the answers are concentrated in the middle of the scale with the median at 4; but with very few answers below 4, eight answers at 4 and ten above 4, it shows a slight inclination toward the technology end of the scale.
Table 4.5 Box plot 9 and Box plot 10 for the card ‘Effect’.

While Box plot 10 shows that, uncharacteristically, there has been a significant move toward the ‘technology’ end of the scale, with the median at 5, there is still a strong concentration of answers in the middle of the scale with eight answers at 4, six in the fives and two in the threes. The shift in some polar individual responses, with two at 8, four in the sixes and one at 7.5, has ensured the shift away from the middle of the scale.

6. Card ‘Pattern’

Box plot 11 illustrates responses to the ‘Pattern’ card, and, similarly to the responses for the ‘Effect’ card, the results are concentrated in the middle of the scale with the median at 4.8 and a majority of responses in the range between 4 and 6.
Table 4.6 Box plot 11 and Box plot 12 for the card ‘Pattern’.

The post-installation responses have not changed radically, remaining in the range between 6 and 3.65 with the median falling to 4, shifting toward the middle of the scale, indicating a shift of 0.8 toward the middle of the human–technology scale.

7. Card ‘Body’

Box plot 13 illustrates the responses for the card ‘Body’ before viewing the installation; with the median at 1, eleven responses between 0 and 1 and all responses below 4, it is evident that the concept of body is firmly perceived to be in the human domain of the scale.
Table 4.7 Box plot 13 and Box plot 14 for the card ‘Body’.

While Box plot 14 illustrates that the responses are all still between 0 and 4 in the human domain of the scale, the median has shifted from 1 to 1.5, with nine responses now being between 0 and 1 and twelve responses between 2 and 4, instead of 10. This indicates a shift toward the middle of the scale, changing the perception of the concept of body by 0.5 of a point toward the middle of the scale.

8. Card ‘Observed’

The results from the card ‘Observed’ are illustrated in Box plot 15. The responses are spread widely across the scale without great polarity. The median is at 4 with the responses spread between 2 and 7.5. There are eight answers at 4 and four answers at 5, showing good concentration in the middle of the scale.
Table 4.8 Box plot 15 and Box plot 16 for the card ‘Observed’.

The responses after the installation indicate that the median remains at 4, suggesting no significant change. However, it can be observed that there has been a very slight shift in answers concentrating more toward the middle of the scale, particularly when compared with the answers that were placed significantly toward the technology end of the scale in the pre-viewing answers.

9. Card ‘Observer’

The card ‘Observer’ provides a contrast. While the median is at 2.5 in the human domain of the scale, the responses show fluctuation between 0 and 7. There are seven answers between 4 and 5.
Table 4.9 Box plot 17 and Box plot 18 for the card ‘Observer’.

The answers illustrated in Box plot 18 show a considerable change. While the responses still range between 0 and 7, the median has altered significantly toward the middle of the scale at 4. There are fifteen answers between 3 and 6, with one answer at 7 and the rest still between 0 and 3.

10 Card ‘Performer’

The card ‘Performer’ provides results that range between 0 and 4. With one answer at 6, the perception of performer sits within the human end of the scale, providing the median precisely in the middle at 2. There are twelve answers between 0 and 2 and only three at 4.
103

Table 4.10 Box plot 19 and Box plot 20 for the card ‘Performer’.

The post-installation result, shown in Box plot 20, indicates a slight change, with the median at 2.7 and nine answers between 4 and 7, with five answers alone in the fours. The general shift is 0.7 points toward the middle of the human–technology scale.

11. Card ‘Performance’

The pre-installation results for the card ‘Performance’ show a contrast to the card ‘Performer’. The answers range between 0 and 5, providing a median at 3. While there is a lack of polar answers at the technology end of the scale, fifteen results are between 3 and 5, showing a strong middle of the scale presence.
Table 4.11 Box plot 21 and Box plot 22 for the card ‘Performance’.

Box plot 22 provides the results for the card ‘Performance’ after viewing the installation. The median has not changed and remains at 3; however, there are now two answers at 6, one at 8, three at 5 and five at 4, showing that there has been a slight shift toward the upper end of the answers. While this shift is not radical enough to alter the median of the responses, it nevertheless shows a slight move toward the middle of the human–technology scale.

12. Card ‘Sensation’

Box plot 23 for the card ‘Sensation’ provides interesting results. While there are four answers between 3 and 4, the majority are between 0 and 2.15, with the median at 1. These results show that the perception of sensation lies within the human domain of the scale.
Table 4.12 Box plot 23 and Box plot 24 for the card ‘Sensation’.

Post-installation responses are summed up in Box plot 24 and show a slight shift toward the middle of the scale. There are now six answers between 3 and 8 and the median has shifted to 1.8.

13. Card ‘Organic’

Box plot 25 for the card ‘Organic’ indicates that, like the cards for ‘Sensation’, ‘Body’, ‘Partner’ and ‘Dance’, the perception of this notion is within the human domain of the scale. Twenty answers are between 0 and 2 with only two at 3 and 4. The median is at 1.
Table 4.13 Box plot 25 and Box plot 26 for the card ‘Organic’.

The post-installation results in Box plot 26 indicate that while there is some shift toward the middle of the scale, with five answers between 3 and 5, and the third quartile going up from 1.65 to 2.25, the majority still holds the median at 1.

14. Card ‘Rhythm’

The ‘Rhythm’ card generated Box plot 27; its results are concentrated largely in the middle of the scale, with fifteen answers in the fours, two at 5 and 6 and one at 3. The median resides at 4. The strong middle-of-the-scale concentration indicates that the initial perception of the concept of rhythm is seen as something that evolves in collaboration between humans and technology.
Table 4.14 Box plot 27 and Box plot 28 for the card ‘Rhythm’.

The post-installation responses in Box plot 28 show that there has been a slight shift in individual responses, with four answers in the fives and two at 7; however, there is still a strong concentration of answers in the middle of the scale with ten at 4 and one at 3.8. The median remains at 4. The results indicate that while the general perception of rhythm is still as a collaboration between humans and technology, the individual response range has altered slightly.

15. Card ‘Movement’

Similarly to the card ‘Rhythm’, the card ‘Movement’ provided answers that were strongly concentrated in the middle of the scale, with fourteen answers in the fours, two in the fives and three in the threes, with the median at 4 (Box plot 29). Yet again, this would point to the perception of the concept of movement as symbiotic between humans and technology.
Table 4.15 Box plot 29 and Box plot 30 for the card ‘Movement’.

The post-installation results do not show significant changes in the responses. With the median still at 4 and fourteen answers in the fours, one at 8 and two in the threes, there is little change in the perception of where the concept of movement resides in the human–technology scale (Box plot 30). With only a slight shift in the first quartile, the card ‘Movement’ becomes the most consistent in matching pre- and post-installation results.

16. Card ‘Speed’

Contrastingly, responses to the card ‘Speed’, tracked in Box plot 31, show concentration in the fives and sixes of the scale. With only one response at 0, and the rest starting in the fours, it would indicate that the notion of speed is seen either as symbiotic between humans and technology or more toward the technology end of the scale. The median is at 5.
Table 4.16 Box plot 31 and Box plot 32 for the card ‘Speed’.

With two answers missing, it is difficult to describe how accurate the post-installation plots are; however, a general trend of answers moving toward the middle of the scale can be observed. The median lies at 4, there are eleven answers in the fours, five in the fives and two at 6. There are more answers in threes and fours than in the pre-installation responses, therefore indicating a slight change in individual responses.

4.5 Evaluation of the card-sort results

The section above provided box and whisker diagrams for quantifiable data drawn from the pre- and post-installation responses for each pair of cards presented during the card sort for the Enclave 2 installation in September 2012; its purpose was to determine whether the hybrid art installation affected perceptions of the relationship between human and technology. Section 4.4 below will summarise and evaluate the outcomes for the card sort as a whole.

Table 4.17 summarises the median positions for each card before and after the installation had been viewed. It also indicates whether there has been a change in
responses and whether the move has been toward or away from the middle of the scale.

<table>
<thead>
<tr>
<th>Card</th>
<th>Median before</th>
<th>Median after</th>
<th>Median difference</th>
<th>Toward or away from the middle of the scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical</td>
<td>6.3</td>
<td>6</td>
<td>0.3</td>
<td>Toward</td>
</tr>
<tr>
<td>Slow motion</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>Slightly away</td>
</tr>
<tr>
<td>Dance</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>Toward</td>
</tr>
<tr>
<td>Partner</td>
<td>1</td>
<td>2.5</td>
<td>1.5</td>
<td>Toward</td>
</tr>
<tr>
<td>Effect</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>Away</td>
</tr>
<tr>
<td>Pattern</td>
<td>4.8</td>
<td>4</td>
<td>0.8</td>
<td>Toward</td>
</tr>
<tr>
<td>Body</td>
<td>1</td>
<td>1.5</td>
<td>0.5</td>
<td>Toward</td>
</tr>
<tr>
<td>Observed</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>Observer</td>
<td>2.5</td>
<td>4</td>
<td>1.5</td>
<td>Toward</td>
</tr>
<tr>
<td>Performer</td>
<td>2</td>
<td>2.7</td>
<td>0.7</td>
<td>Toward</td>
</tr>
<tr>
<td>Performance</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Slightly toward</td>
</tr>
<tr>
<td>Sensation</td>
<td>1</td>
<td>1.8</td>
<td>0.8</td>
<td>Toward</td>
</tr>
<tr>
<td>Organic</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Slightly toward</td>
</tr>
<tr>
<td>Rhythm</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>Movement</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>Speed</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>Toward</td>
</tr>
</tbody>
</table>

Table 4.17 Table comparing results for all cards.

Out of sixteen cards, five registered a significant difference of 1 or above. The cards at 1 were ‘Dance’, ‘Partner’, ‘Effect’, ‘Observer’ and ‘Speed’, with ‘Partner’ and ‘Observer’ at 1.5. While four moved toward the middle of the scale, ‘Effect’ moved toward the ‘Technology’ position on the scale.

Five other cards indicated a move of between 0.3 and 0.8 toward the middle of the scale. These were ‘Mechanical’, ‘Pattern’, ‘Body’, ‘Performer’ and ‘Sensation’.

Six cards provided no significant changes in the answers obtained; however, it is possible to determine that out of these cards two indicate a slight move away from the middle of the scale, three indicate no determinable change and two show a minor move toward it.
It is evident that thirteen cards out of the sixteen indicate that a change in responses to the card sort has occurred due to viewing the hybrid art installation. Out of the thirteen, eleven show a move away from a polarised perception of the relationship between human beings and technology toward the middle of the scale, which signifies a more symbiotic understanding of this relationship.

The surface graph (Table 4.18) indicates that the most prominent changes in responses occurred over two points, either going down -2 in scale toward the human end, represented in the graph by yellow, or going up +2 in scale toward the technology end, represented in the graph by green. The higher peaks indicate a more significant change in responses. For example, the deep blue peaks indicate a change in responses from 6 to 8 while the red peaks show changes from -4 to -6.

The words *partner, body, observed* and *performance* have four responses each that have changed 4 points and above, with the word *observer* returning the highest number: five large changes of 4 points and above. The words *sensation* and *organic* each show a response that has changed 8 points from the human end of the scale to the technology end, and the word *observer* has changed 7 points in the same direction. Finally, the word *partner* has one response that jumped -6 points from the technology end to the human.

Table 4.18 Surface graphs for all cards.
The overall consistency in responses together with the changes in the responses indicate that the task was well understood by participants, who engaged with the card sort and the presented installation with mindful attention to the relationship between the concepts presented on the cards and the human–technology scale.

This is supported by the percentage of changed answers detailed in Table 4.19, which shows a good balance between stable and changed results, ranging between 48 per cent and 68 per cent.

<table>
<thead>
<tr>
<th>Card</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical</td>
<td>67%</td>
</tr>
<tr>
<td>Slow motion</td>
<td>56%</td>
</tr>
<tr>
<td>Dance</td>
<td>68%</td>
</tr>
<tr>
<td>Partner</td>
<td>68%</td>
</tr>
<tr>
<td>Effect</td>
<td>67%</td>
</tr>
<tr>
<td>Pattern</td>
<td>48%</td>
</tr>
<tr>
<td>Body</td>
<td>64%</td>
</tr>
<tr>
<td>Observed</td>
<td>72%</td>
</tr>
<tr>
<td>Performer</td>
<td>72%</td>
</tr>
<tr>
<td>Sensation</td>
<td>64%</td>
</tr>
<tr>
<td>Performance</td>
<td>68%</td>
</tr>
<tr>
<td>Organic</td>
<td>52%</td>
</tr>
<tr>
<td>Rhythm</td>
<td>56%</td>
</tr>
<tr>
<td>Observer</td>
<td>63%</td>
</tr>
<tr>
<td>Movement</td>
<td>52%</td>
</tr>
<tr>
<td>Speed</td>
<td>65%</td>
</tr>
</tbody>
</table>

Table 4.19 Table of changes.

This consistency in how significantly the audience have changed their responses has interesting overall implications for the results of this research. These will be discussed in the next chapter.

In summary, the card sort indicates that the hybrid art installation has changed perceptions of the relationship between human and technology. Changes occurred in
around half the responses to each card with 68 per cent of answers shifting toward the middle of the scale. This would indicate a shift in the perceived relationship from a polarised perception to a position that considers the relationship to be of a symbiotic nature. This shift will be discussed in the next chapter.

4.6 Summary

This chapter examined the development of my hybrid art practice in response to research into debates on the relationship between human and technology. It aimed to develop experiences that would blur the perceived boundary between the real and the virtual in order to affect the viewer’s perception of the relationship between human and technology. The chapter surveyed eight public exhibitions of six installations and reflected on the experience of the work as well as on audience feedback or interaction.

The approach developed throughout the practice was based on Broadhurst’s suggestion that the attributes of artworks that examine liminal spaces in which the tensions between the virtual and the real play out are indeterminacy, fragmentation, experimentation and heterogeneity. They defamiliarise the viewer’s experience of the human body.

Throughout the practice, I developed work that investigated the body as both virtual and real. Some installations explored performing for virtual environments, others looked at distributing performance virtually across real sculptural objects, retaining the sense of unity in movement through rhythm. Finally, with the development of small portable cameras, the work aimed to capture and present movement as it is not normally experienced by either dancers or audiences. The Enclave installations provided virtual environments in which body and movement were presented from every perspective at once, simultaneously coming and going.

Enclave 2 provided the opportunity to gather qualitative and quantitative audience feedback data, with the aim of establishing whether the installation affected the viewer’s perception of the relationship between human and technology.
The method, developed on a closed-card-sort technique, gathered data from twenty-five participants, ranging in age from eighteen to fifty-five. Each participant was asked to rate their perception of a word on a card using a scale indicating human at one end and technology at the other. The responses were gathered before and after viewing the installation and overlaid in order to understand whether there has been a shift in the audience’s perception of where each term lies on the human–technology scale.

The results showed that each card presented a change of opinion varying from 48 per cent to 68 per cent between the original and the post-installation responses; this is enough to demonstrate consistency in answers, thus showing that the task was mindfully engaged with. Thirteen out of sixteen cards indicated a demonstrable shift and eleven of those showed a shift from a polarised perception of the relationship between human beings and technology to the middle of the scale, marking a more symbiotic understanding of that relationship. Chapter 5 of this document will place these findings in the context of the rest of the research.
CHAPTER 5

SUMMARY AND CONCLUSIONS

5.1 Introduction

This thesis identified that there is a crisis in the current perception of the human–technology relationship. The crisis is fostered by two opposing positions that consider the impact new and emerging technologies may have on the future of the human race. However, these debates on the relationship between human beings and technology are not confined to the fields of science and technology theory. There are artists who aim to address this relationship; moreover, these artists claim that their works have an impact on the audience’s perception of the human–technology relationship.

This thesis examined one such art discipline, hybrid art, and asked how experiencing hybrid artworks affects the viewer’s perception of the human–technology relationship. It defined hybrid art as an area of practice that addresses the relationship between human beings and technology using a transdisciplinary approach.

This research identified reports from viewers and authors who had experienced a blurring of the perceived boundary between the virtual and the real during hybrid art installations. This observation corresponded with my own reflection during an early performance for one of my hybrid art installations. I observed this blurring in my perception of my body and movement in relation to the virtual space where the final performance was to be transferred. This guided further research into performance practices that could address the blurring of the perceived boundary between the virtual and the real. This type of experience has been researched in digital performance and there are claims that it may affect perceptions of the human–technology relationship.

The project this thesis details fostered the development of my hybrid art practice, with works acting as sites for testing whether the blurring of the experience of the real and the virtual in hybrid artworks does indeed affect the viewer’s perception of the human–technology relationship. By identifying that hybrid art has this effect on
the perception of the relationship between human and technology, the project contributes to the wider debates on the role art plays in developing future technologies and affecting how the experience of being human is understood.

This chapter will: (1) sum up the research methodology adopted; (2) review the research results from the literature review, my hybrid art practice and the data gathering/evaluation method developed, which engaged with the audience feedback from one of my hybrid art installations; (3) evaluate the results from the literature review, the hybrid art practice and the data evaluation; (4) identify any implications that this research might have for larger debates in the field of art and the relationship between human and technology.

5.2 Summary of research methodology

There were three research methods used in this project: (1) theoretical and historical enquiry, (2) development of hybrid art practice, (3) assessment and evaluation of audience feedback data.

The theoretical and historical enquiry explored contemporary debates on the relationship between human and technology, on hybrid art practices and on the literature in digital performance practices that examines the relationship between the virtual and the real. Hybrid art has a short history and, while there are online sources that define hybrid art as a distinct art discipline, there is limited reliable academic literature. Subsequently this research project reviewed the submissions for and the development of Ars Electronica’s Hybrid Art prize category to find the defining characteristics of the hybrid art discipline and its engagement with debates on the relationship between human and technology.

While there are reports on experiencing the blurring of the perceived boundary between the virtual and the real in hybrid art, their numbers are limited. However, there is literature in digital performance practice that suggests that this might affect the perceived relationship between humans and technology. To bridge this gap, I developed a hybrid art practice that aimed to blur the perceived boundary between the virtual and the real in hybrid art in order to affect perceptions of the human–technology relationship.
The hybrid artworks developed through this practice were exhibited publicly. The exhibitions provided environments for observing how audiences interacted with and received the work. There were eight public exhibitions of six hybrid art installations in venues ranging from small, intimate galleries to international events.

Finally, to gather empirical data that would enable me to assess whether the hybrid art I created by blurring the boundary between the virtual and the real affects the perception of the relationship between humans and technology, I developed a method based on a card-sort technique used to construct information architectures. Before and after viewing one of my hybrid art installations, viewers were asked to respond to words written on cards by identifying where on a human–technology scale they would position those words. The responses, displayed in box and whisker diagrams, provided a visually efficient way of assessing whether perceptions had changed. These four methods formed the research programme as a whole, providing results discussed in the next section.

5.3 Summary of research findings

5.3.1 Literature review

The literature review revealed that contemporary debates on perceptions of the relationship between human beings and technology are polarised. This polarity creates a crisis that affects how future technologies are developed and how they might affect understandings of being human. It is expressed through either progressive support for or conservative resistance to the development of new technologies that promise significantly to change the human body and human experience. For example, Francis Fukuyama (2002) and Leon Richard Kass (2004–5, 2007) express concerns that these technologies might have a devastating effect on human nature, core values and the continuity of the human species. On the other hand, Nick Bostrom (2005a, 2008), Gregory Stock (2003) and others suggest that changing through technology is part of human nature and the development of augmentation technologies could eradicate suffering and enhance people’s living experience.
Sherry Turkle (1999, 2003, 2007, 2011) explains that the development of technologies that could significantly alter the human body and human experience necessitates debates that regard technology as more than a tool for or against change and look at why and how humans develop relationships with technology. She argues that changes to how we see technology can significantly influence our experience of that technology. A good illustration of Turkle’s point can be found in Riccardo Manzotti and Robert Pepperell’s (2012) ‘The new mind: Thinking beyond the head’. The authors explain that the recent theory that understands the mind as extended beyond the brain does not allow technology to be seen as separate from and in antagonistic relationship with humans. They ask us to consider an artist’s pencil as an example of technology that is part of an extended human mind. The pencil is an expression of the human mind by containing within it the skill and the experience of its makers and users. In addition, when considering the pencil, it becomes part of the mind that considers it. According to Andy Miah (2008b) and Mike Stubbs and Laura Sillars (2008: xxii), it is within these changes to how we see technology that art can make an intervention.

Artists who address the relationship between human beings and technology present their work within these debates. In 2005 Ars Electronica organised the ‘Hybrid: Living in Paradox’ event, which invited submissions from artists who explore technological augmentation as well as a resistance to augmentation through the mixing of creative expressions.

An award of distinction was awarded to the project *how long does the subject linger on the edge of the volume…* (Figure 3.1) by Marc Downie, Shelley Eshkar, Paul Kaiser and Trisha Brown. The project explored collaboration between dance practices and computer sciences and produced a performance in which projected artificially intelligent virtual agents interacted with dancers, creating a joint performance. Ollivier Dyens (2005: 46) writing for the event reflects that ‘we constitute a whole, whether we like it or not. Humans, machines, biological and artificial networks are intertwined into the planetary framework.’

Following the event, a group of artists emerged who are closely associated with Ars Electronica’s Hybrid Art prize category. Established in 2007, the prize unified art practices that, using a transdisciplinary approach, address the perception of the human–technology relationship.
The transdisciplinary approach in these emerging art practices was discussed at the Leonardo/CAA Special Session called ‘Hybridity: Arts, Sciences and Cultural Effects’, held at the 2005 College Art Association Conference in Atlanta. The panel concluded that art practices that traverse the fields of art, science and technology inhabit the ‘third space’ ‘as the space where differing concepts, approaches, assumptions and techniques meet, merge, and interact’ (Spielmann and Bolter 2006: 107). This third space has been theorised by the French philosopher Michel Serres, who proposes that transdisciplinarity fosters innovation and encourages the communication of that innovation across disciplines. Through this transdisciplinary approach, hybrid artists address the relationship between human beings and technology.

The winner of the 2007 Hybrid Art prize was SymbioticA. Established in 2000 by artist Oron Catts, neuroscientist Stuart Bunt and biologist Miranda Grounds, it is a research laboratory for artists who want to explore collaboration between art and life sciences. Catts (2012) reflects on the work SymbioticA helps to make, saying that these works create a platform for debate. They provide ‘problematic scenarios’ that require critical attention.

A good example of this type of intervention is Tagny Duff’s work Living Viral Tattoos (Figure 3.7), created in collaboration with SymbioticA. The work, consisting of both human and non-human flesh infected with the HIV virus to create tattoo-like bruising, was originally accepted for the Symposium on Electronic Art 2009 exhibition and conference, only to be removed later. The issues surrounding the work and the reasons behind it being taken out of the exhibition were discussed in a special session during the conference. The debates considered public safety issues and the difference between artists and scientists working with potentially harmful biomaterials. Some of the questions asked were about who is allowed to work with technology that can affect human life. Eduardo Kac, winner of the 2009 Hybrid Art prize reflects on the debates this type of art instigates:

Art today partakes some of the same concerns shared by fields conventionally seen as extraneous to the ‘fine arts’, such as biology and robotics. As art participates in the wider debate and circulation of ideas we witness in culture at large, it can help us develop new conceptual models and perhaps influence
the new kinds of synergies emerging at the frontier where the organic and the
digital meet. (Kac, 1997)

Artists and writers (Adams, 2012; Giannachi and Benford, 2008; Hallensleben, 2009;
Karelina, 2012; Paterson, 2011) report that in hybrid artworks there is a blurring of a
perceived boundary between the virtual and the real that may alter the perception of
the relationship between human beings and technology. For example, Giannachi and
Benford (2008), writing about Blast Theory’s Day of the Figurines, explain that the
work offers a merged experience of both the virtual and the real. The participants of
the mobile-technology-assisted game, according to the authors, experience a more
fluid sense of the self. They can take actions simultaneously as real people and as
virtual characters as part of a virtual narrative in a real world scenario.

The effects of this experienced blurring of the perceived boundary between the
virtual and the real have not been examined further in hybrid art. However, they have
been explored in digital performance practices. Dixon (2007), Popat (2006),
Broadhurst (2007) and Kozel (2007) suggest that within digital performance the
simultaneous experience of the virtual and the real affects how the body, space and
time are perceived.

Dixon (2007) considers the example of artist Susan Kozel performing in Paul
Sermon’s interactive installation Telematic Dreaming (Figure 3.14). The work
consisted of two beds placed in separate locations with projectors above each that
projected the occupants of each bed onto the other. Kozel was on one and the public
were invited to be on the other. The artist notes that her experience of her own body
changed during the performance, becoming extended through her virtual projection.
She reports feeling physically the effects of actions taken upon her projected body by
the members of the public. In addition, she explains that this also applied to the
emotional and physical connection she felt to the projected bodies on her bed and
reports of the audience reacting in a manner that would suggest that they also felt this
connection. By creating these blurred virtual/real scenarios, digital performance
artists explore how they affect the perceived human–technology relationship.
This research guided further the development of my hybrid art practice into blurring the perceived boundary between the virtual and the real in order to produce work that affects the perception of the human–technology relationship.

### 5.3.2 Findings from the development of practice

The line of enquiry detailed in the previous section encouraged the development of my hybrid art practice with the aim of creating works where the experience of the boundary between the virtual and the real is blurred. The work produced real sculptural or architectural installation environments that became sites for virtual performances and explored movement by a real performer for virtual environments.

The first installation, *Labyrinths* (Figures 4.1–4.5), created in collaboration with Wrap3, was exhibited at the 2009 Kinetica Art Fair in London. This busy venue required the artists to remain with the work for three days, which provided a great opportunity to gather audience feedback to the work. Filmed in a studio environment, a performance by a real body was transferred into a virtual performance environment. This virtual performance was subsequently projected onto a real
sculptural object. The effect was that of multiple copies of a virtual performer exploring a virtual environment, projected onto a real object.

The installation revealed the blurring of the perceived boundary between the virtual and the real on several levels and showed further research avenues. (1) It highlighted that an interesting relationship occurs when a real body performs for a virtual environment. As the performer, I aimed to imagine the possibilities of movement within an environment in which there are no physical constraints on my body, while at the same time negotiating the restrictions imposed by gravity, the movement of clothes and the constriction of walls. (2) It showed that audiences engage with a performance of a real body in a digital environment, projected onto a real sculptural object. Some viewers attempted to pick up parts of the sculpture, thinking that the virtual environment might lift with it. (3) It created an opportunity to explore further the idea that when an audience member breaks the projection beam, it creates bodily awareness in the space and its effect on the virtual environment. A review by a viewer (Shepard, 2009) remarks on how well the virtual and the real enhance one another, particularly when combined with ‘thoughtful performance’.

The second installation, *Forking Paths* (Figures 4.6–4.10), exhibited at the Arnolfini gallery in Bristol, used some of the same techniques developed in *Labyrinths*; however, it added virtual shadows that intermittently passed over the sculpture. These were created in response to observations made during the previous project that the audience broke the projection beams with their shadows, thereby revealing the sculpture to be blank and causing viewers to look for the reason behind this effect. The virtual shadows in *Forking Paths* encouraged viewers to look for the source of those shadows within the real space. This revealed a connection between the virtual projected environment and the real exhibition space.

The virtual and the real performers were brought together in a work called *Immortal* (Figures 4.11–4.14), exhibited at the Wayward Gallery in London. It explored the relationship between the real exhibition space, the sculpture, the virtual environment and the virtual performer, where over a prolonged performance period I attempted to reconstruct scattered parts of the virtual performers’ bodies. The virtual performers were projected across the faces of two metre-high projection cubes, which I was able to spin and manipulate to achieve my task. As my body scrambled around, spinning
and moving the cubes, it created a jumble of real and virtual body parts in a unified
dance of assemblage.

Fragmenting the movement of a real performer virtually in an exhibition space was
explored in *I Know What It is When I Find It* and *Skin Side Up*. Using five cameras, I
filmed five angles of the same movement – a slow spin. The camera angles were
trained at the fringes of the movement: the four corners of the long dress I was
wearing and one shot high above. The videos produced were projected onto five
purpose-built latex screens, scattered across the exhibition space. The audience was
able to walk between the screens and through the movement. The feedback revealed
that the harmony of the movement is retained and that the space between the screens
pulls on the movement and extends it virtually: the movement of that spin is
perceived to be both real and virtual.

The following two projects, *Enclave* and *Enclave 2*, built on this research and filmed
close-ups using new portable cameras: very intimate little views of body parts in
movement. Neither the audience nor the dancers were able to see these views without
the aid of the cameras. Projecting them simultaneously on screens distributed in the
exhibition space opened up the performing body virtually, presenting real movement
through the library of angles. For example, cameras worn by the male dancer in
*Enclave* recorded various angles of him partnering a female dancer. The same
choreography was then performed again and filmed by the cameras worn by the
female dancer partnering the male dancer. Projected together and distributed across
screens in the exhibition space, it offered a perspective of movement that had
become both real and virtual. It was real because it was performed by a real
performer, but presented and distributed virtually in space. This dynamic relationship
between the material and the immaterial, according to Kozel, changes perceptions:

> Perception… and expression… are basic ingredients of a political community.
> Once these are radically transformed by altering or distorting the substance and
> space of a body, the worlds of politics and science converge with that of art, for
> art is where the radically new is first transformed into experience. (Kozel 2007:
> 103)

### 5.3.3 Findings from the card-sort event
The effect these hybrid artworks may have on the viewers’ perception of the human–technology relationship are difficult to understand just by noting my own reactions to the work and observing those of the audience. The final hybrid artwork, Enclave 2, was used to run a card-sort event that aimed to gather audience feedback data. The method, based on a technique used to construct information architectures, gathered both quantitative and qualitative feedback data.

Using a scale running from human to technology, it analysed perceptions of terms closely associated with the installation on the basis of data gathered from participants who recorded their responses to the terms before and after viewing the work.

The selection of words was inspired by my observation during the filming for Labyrinths that my experience of my performance is altered because the movement is intended for virtual spaces. During the filming stages for Enclave, I asked the performers, including myself, to select words that come to mind when thinking about how it feels to be working with the small portable cameras. We then reflected on how these words illustrate those feelings, coming up with loose categories.

- The relationship we felt to the cameras was reflected by the words partner, performer, observer and observed. For example when moving we noticed that we treated the camera as another performer or a partner, thinking about how its performance will come out, as well as simultaneously being aware of being observed by the camera eye and observing its movement.

- Movement, speed, slow motion, organic and mechanical were the words that represented how the movement or producing movement felt in relationship to the cameras. For example, moving the body part with the camera slowly and moving the other parts faster.

- Effect, body, rhythm, pattern and sensation illustrated how the performer experienced the movement itself, whether the different speeds that body parts moved produced a certain rhythm or a pattern, or how much more we were aware of our bodies when holding the portable cameras.

- And finally performance and dance represented the feeling about the process of performing with the cameras. We felt that Performance was what is seen by the camera and dance is the movement pattern developed in the process.
The audience were invited to indicate where on a numberless scale from human to technology they feel the term lies, first before viewing the installation and then again after viewing it. They were informed that the scale does not represent any negative or positive values – the middle indicates both human and technology equally. The data produced before and after viewing was compared.

After the event, the scale was given a numerical value from 0 to 8, 0 indicating human and 8 indicating technology, in order to make a comparative analysis possible. Data analysis revealed that the initial responses to the terms were more polarised to either end of the scale. For example, the words *mechanical, speed, slow motion* and *pattern* were polarised toward the technology end of the scale, with the median at 6.3, 5, 4.8 and 5; on the other hand, words such as *dance, partner, body, performer, observer, performance, sensation* and *organic* were polarised toward the human end of the scale, with the median at 1, 1, 1, 2, 2.5, 3, 1 and 1, respectively.

The results indicate that after viewing the work responses become less polarised and moved toward the middle of the scale, which describes both humans and technology equally. So the words *mechanical, speed, slow motion* and *pattern* moved from the technology end of the scale toward the human end, while the words *dance, partner, body, performer, observer, performance, sensation* and *organic* moved from the human end of the scale toward the technology end. The terms with the median at 4 in the pre-viewing responses, *observed, rhythm* and *movement* remained at 4, the middle of the scale, with the exception of two terms, *slow motion* and *effect*, which moved away from the middle of the scale.

The surface graph of the data revealed a consistency in how many points the responses changed by, with the majority occurring over 2 points toward either end of the scale. However, the words *partner, body, observed* and *performance* have four responses each that have changed by 4 points and above. The word *observer* shows the highest number – five large changes of 4 points and above.

Finally, the largest point changes that the surface graph shows are for the words *sensation* and *organic*, which each had a response that changed by 8 points from the
human end of the scale to the technology end. Observer had one response that changed 7 points from the human end of the scale to the technology end. The word partner had one response that jumped 6 points from the technology end of the scale to the human end.

This indicates that in response to the hybrid artwork presented, the largest change in audience perception is to where the concepts of partner, body, observed, observer and performance stand on the human–technology scale, while the words sensation, organic and observer inspired the most radical single change from the human end of the scale to the technology end. The word partner was the only one to have a large change in response from the technology end of the scale to the human end. The evaluation of this data and findings follow in section 5.4.

5.4 Evaluation of findings

5.4.1 Evaluation of literature review findings

The evaluation of the literature review reveals that the topic of the nature of the human–technology relationship is very important and the debates have a significant impact on how future technologies are developed. This in turn, according to the authors discussed in section 3.2, affects what it will mean to be human in the future. For example, there are theories that suggest that technologies that enable augmentation of the human body and mind could both eradicate human illness and suffering and completely jeopardise the continuation of the human species. Similarly, work that explores the creation of artificial agents that mimic human attributes highlights both the potential benefits of such technology and raises concerns over humans isolating themselves from each other. With the technological environment changing so rapidly, these debates need to happen, and they need to happen without delay.

Artists are also interested in exploring the issues surrounding the human–technology relationship. They claim that they have a way of connecting the debates in the fields of science and technology to wider audiences, changing perceptions. However, they also aim to provide new perspectives within the debates, provide visions of potential new worlds under construction and problematic scenarios, and open up the
disciplines of science and technology to new processes. This transdisciplinarity fosters innovation and communication across research fields. This approach has the potential to make artists and audiences the co-creators of new technologies and, subsequently, human futures.

The emerging discipline of hybrid art is one such art discipline that aims to address the human–technology relationship through a transdisciplinary approach. While there are a limited number of academic sources on hybrid art and its impact on audiences, the artists themselves have expressed their own analysis of how their works affect the audience. Reflections on hybrid artworks have highlighted the blurring of the perceived boundary between the virtual and the real as one potential way in which hybrid art affects the viewer’s perception of the human–technology relationship.

This project adopted this approach and combined it with a literature review of digital performance practices that have proposed a similar process, aiming to develop hybrid artworks that affect the audiences’ perception of the human–technology relationship by blurring the apparent boundary between the virtual and the real.

5.4.2 Evaluation of practical work

The practical work developed through this research process revealed that the blurring of the apparent boundary between the virtual and the real in hybrid art could be achieved on the levels of performers and audience.

- On the performers’ level the blurring happens when trying to understand movement in a real space that is intended for virtual environments. Certain questions occurred through the process: What types of movement transfer best to virtual spaces? How can one eliminate the visible effects of real world constraints? How can one explore the possibilities virtual spaces might offer within a real studio environment?
- On the audience’s level there was a definite engagement with the fact that it was a real human body and not an animation that was exploring these virtual spaces and bending, jumping and stretching to reach a hold on that space.
- There was also an engagement with the fact that these virtual environments were wrapped around a sculpture in the space, rather than just projected onto
a wall. This is well illustrated by viewers attempting to lift parts of the sculpture, thinking that the virtual skin would lift with it.

- Viewers realised that when interrupting the projection beam, they have a physical effect on the virtual environment. By introducing virtual shadows into the projection, they look for the cause of that shadow in the real space.
- Modern video technology enables the presentation of human movement that is both virtual and real. Movement virtually distributed in the exhibition space is still perceived as the movement of a real performer, but it is dispersed so that the audience can walk through it and among the intimacy of a unified body that has now been scattered.

5.4.3 Evaluation of data

Data gathering on the basis of the method detailed above was held during the showing of Enclave 2. The process itself worked well and the audience engaged with it mindfully and with pleasure.

The findings showed that before viewing the work the audience held a more polarised view of the human–technology relationship, because words like mechanical, speed, slow motion and pattern were seen to belong to the domain of technology, while words like organic, dance, body, performer, observer, sensation, performance and partner were perceived to be human attributes. However, the exceptions were observed, rhythm, effect and movement, which were placed in the middle of the scale representing both human and technology equally.

After the viewing, the audience responded by moving twelve out of sixteen concepts toward the middle of the scale. This clearly shows that the hybrid artwork has had an effect on the audience’s perception of the human–technology relationship. Moreover, they moved toward the middle the concepts that were polarised toward either end of the scale. This indicates that the audience’s perception of the relationship between human beings and technology had changed, from seeing concepts like partner, body and performance as mainly human attributes to seeing technology as playing a part within these constructs. So the word body reflects something that is part human and part technology. The same applies to words that were originally placed at the
technology scale, like mechanical, speed, slow motion and pattern. Post-viewing they were seen as both human and technology.

The indication that the hybrid artwork has affected the viewers’ perception of the human–technology relationship by changing it from a more polarised, antagonistic understanding to a more symbiotic one is reinforced by the fact that the words movement, rhythm, observed and effect, which were originally placed in the middle of the scale, remained there after viewing the artwork and were not moved.

The surface graph (Table 4.18) shows that most responses changed over 2 points toward either end of the scale, which is an indication that the task was mindfully engaged with and not overloaded. The larger changes of 4 points and above occurred on average in three responses per word. The largest number of changes was in the word observer, which saw five. The same word also had one of the largest point changes in a single response: a jump of 7 points from the human to the technology end of the scale. However, the only word that changed completely from one end of the scale to the other, with a jump of 8 points, was the word organic. This indicates that the more polarised the original position, the more significant the after-viewing change was.

To the thesis question, ‘How do developments in hybrid art affect the perception of the human–technology relationship?’ the project provides the answer that hybrid artworks can affect the perception of this relationship by blurring the experience of the perceived boundary between the virtual and the real. It provides this answer by presenting the evidence gathered during my hybrid art installations and by analysing the audience feedback data. The data reveals that the perception of the human–technology relationship has changed from a polarised understanding of this relationship to perceiving it to be more symbiotic in nature. For example, when considering the concept of partner, before viewing one of my hybrid art installations the audience saw the word as belonging more to the human domain than the technology domain. After experiencing the work, they perceived technology to play a greater part in the understanding of the concept of partner.

The key words used in order to measure the changes in the audiences’ perceptions of the human–technology relationship were selected as part of the process of creating that particular work of art. They were chosen by performers using word associations
based on the feel of the movement they performed with the small digital video cameras. While some of the words like *rhythm, movement, pattern, dance, performance* reference that experience in particular; other words such as *body, speed, mechanical, organic, partner* are used by other hybrid artists to discuss their work in relationship to the debates on the human–technology relationship. For example Orlan discusses how the understanding of the nature of the body changes in response to her altering her body surgically as well as virtually. Delvoye with his work Cloaca explores the notions of organic and mechanical. He particularly questions the perceived boundary between the two concepts by creating a machine that produces, not only organic, but also human waste. Finally Blast Theory highlights how the perception of time and identity changes by playing out virtual lives and scenarios through mobile phone technologies, while Electric Circus looks at the notion of a meaningful and playful partnership between human and technology. The key words used in this thesis are integral to the created work of art and to the data gathering method developed, however they are also part of a larger debate on the human–technology relationship in art as well as in other disciplines.

5.5 Research implications

5.5.1 Who is this research aimed at?

My research aims to contribute to the debates and inform researchers and practitioners in several fields:

(1) It provides a review of a relatively unexplored area of art practice called *hybrid art*, thereby informing the fields of art history and theory.

(2) It contributes to the debates on the human–technology relationship and how the understanding of this relationship affects the design of future technologies, subsequently shaping human futures. In this field, the thesis aims to highlight the importance of other voices within the debate. Particularly on the impact art may have.

(3) It uses performance art and new media, producing new works of art that add to the field of hybrid art.
(4) It explores the blurring of the boundary between the virtual and the real, which is explored in digital performance practices.

(5) Through the card-sort method, it has developed a way to gather and evaluate audience feedback data, contributing to work in the field of practice-based research. Furthermore, it developed artworks that affect perceptions of the human–technology relationship and contributes to the wider debates that discuss the role of art in determining human futures.

5.5.2 What knowledge gap does the research fill?

The project fills a knowledge gap in hybrid art practices, providing a historical and theoretical overview and new artworks in the field. The evaluation of the feedback data provided evidence demonstrating that hybrid art practices affect the perceived human–technology relationship by blurring the boundary between the virtual and the real. It also indicates that this type of work shifts viewers’ perceptions of the relationship between human beings and technology from a more polarised perspective to a more symbiotic one. For example, the understanding of the notions of *partner, dance, observer, performer*, among others, has changed through the process of viewing these works of art, to include both technology and human.

The practice developed throughout this project has provided new insights into how to successfully blur the perceived boundary between the virtual and the real, which in turn affects the audience’s perception of the human-technology relationship:

1. Developing sculptural spaces that consist of both virtual and real elements. For example in *Labyrinths* we used a real sculpture that provided the structure for a projected virtual environment.
2. Using a combination of real and virtual performers. In *Forking Paths* and *Immortal* we used a combination or real and virtual performers. I performed in real spaces for virtual environments. The performing body was then replicated and transferred to navigate spaces that are not restricted by gravity or walls. In *Immortal* we pushed the idea further by re-introducing a real performer that interacts with the virtual ones.
3. Dividing real movement, such as a leap or a crawl via projection and screens throughout the exhibition space.

4. Enabling the audience to walk between the movement that is fragmented and unified at the same time.

5. Using new video technology that enables the artist to place the viewer within a dance/performance space that is not traditionally accessed by either the dancer or the viewer. For example in *Enclave* I used GoPro cameras to film a performance from the perspective of the two dancers. The two viewpoints were projected simultaneously, placing the viewer in an unusual virtual dance space.

These approaches were successful in blurring the perceived boundary between the virtual and the real, affecting the audience’s perception of the relationship between human and technology.

The thesis also developed a new way for gathering audience feedback data based on a card-sort method. This allows the artist to engage with the quality of the audience’s art experience and assess whether the work has had the desired effect, thus opening up the subjective art experience – often thought of as inaccessible to anybody other than the viewer – to new research and insights. This suggests a new way of investigating art’s effectiveness. This aspect has eluded many artists and researchers in the hybrid art discipline. There are resources that claim that hybrid artworks affect the audience, but there has not been a method developed that can provide quantitative and qualitative data that proves this. This thesis is an experiment not only in finding new ways of understanding how hybrid art affects the audience but also in developing a method for measuring the effect.

### 5.5.3 Future Research

Understanding how performances affect audiences and the blurring of the boundary between the virtual and the real are currently highly topical in contemporary circus practices. Circus industry has undergone significant changes recently and aims to integrate projection and robotic technology in performances. My future research is cantered around the blurring of the perceived boundary between the virtual and the real in contemporary circus performances. It will use the experience I gained in my
hybrid art practice and aim to apply the findings to developing events that use projection, mobile phone technology and robotics in combination with live performances that rely on a tradition of skill. This future ambition brings new challenges to the research project. Particularly in translating findings based on small installation environments to larger live events, where the performer’s skill and mastery has to feature prominently. I am currently working on exploring some of the challenges and possibilities with a few local and national performance and circus companies. In addition, I am writing grant applications for research and development based on combining my hybrid art and performance practices.

In addition to the future research ambition described above, I am working with circus groups in adapting the card-sort method I developed in order to understand how audiences engage with the work. Small shows and individual performers traditionally have scratch nights or early showings in order to see how the work affects the audience. These provide perfect environments for running card sort events, gaining qualitative and quantitative data for future development. These card sort events take the place of more traditional questionnaires and interviews. This allows me to explore the developed method further, addressing some of the limitations experienced during this research project. New venues and new audiences provide new challenges.

5.5.4 Why is this research important?

The thesis demonstrates that hybrid art affects perceptions of the relationship between human beings and technology by entangling the virtual and the real. This contributes to the larger debates that place art experiences at the heart of developing new perspectives and perceptions. In the case of hybrid art, the artworks affect the perceived relationship between human and technology. By affecting these perceptions, art influences how technology is designed for the future, shaping the understanding of what it means to be human. The research recommends that art practices should be considered as co-developers of new technologies and the implications these have on the human condition.

It also places the aims and objectives of artists at the heart of art practice and highlights the responsibility artists have in trying to understand how their work
affects their audience. The thesis shows that hybrid artworks shift perceptions of the human–technology relationship from a more polarised understanding to a more symbiotic one, placing emphasis on the word relationship. This needs to be investigated further and to be understood particularly by people who strive to understand, explore and change the world by creating works of art.
LIST OF REFERENCES


Stubbs, M. (Ed.) (2009). We are the Real-Time Experiment: 20 Years of FACT. Liverpool: FACT / Liverpool University Press.


Tullis, T. & Wood, L. (2004). How many users are enough for a card-sorting study? Poster presented at the annual meeting of the Usability Professionals’ Association (UPA), June 10–12, Minneapolis, MN.


