"Interaction, Reaction and Performance: The Jeremiah Project"

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In this paper, I offer a description of a performance that utilizes new technologies which in doing so raises questions of how to theorize this physical/virtual interface. In my current performance practice and research, I am working on a series of practice-based projects entitled "Intelligence, Interaction, Reaction and Performance." The performances consist of physical/virtual interaction utilizing motion capture,[1] artificial intelligence[2] and/or 3D animation.[3] The first of this series was titled *Blue Bloodshot Flowers* and was a collaboration with Richard Bowden, a systems engineer from the University of Surrey. It had its public presentation at the 291 Gallery in London in 2001. The work, which I discuss below, focuses around a performance space that allows a physical performer to interact directly and in real-time with an "avatar" or data projected image.   Video clips and notes relating to the performance and the technology used can be found at our web site http://www.brunel.ac.uk/depts/pfa/Jeremiah/index.htm.[4]

My research in general investigates the aesthetic potential of digitized technology for performance. This is exemplified by a current collaborative research project with Simant Prakoonwit, a computer scientist from Brunel University. The project analyzes and explores the interface between physicality and AI technology in contemporary art practices. This practice-based research will explore the direct and real-time interaction and reaction between physical performer/s and an "intelligent virtual entity" that can learn and develop over a period of time. The manifestation of this AI technology would take various forms which will be explored and investigated over time, demonstrating both visual and aural physical/virtual interaction. The resultant avatar/s becoming a virtual performer/s.

My main argument is that in the digital, the physical and virtual are accentuated and hence, current theory needs to be adjusted to allow for this technical interface and accompanying corporeal prominence. Conventional ways of interpretation have been dominated by the transference of linguistic interpretation to the non-linguistic. This makes the body a secondary phenomenon. However, in many art forms, the body is primary and yet transient. Unless the immediacy of the body (both physical and virtual), including corporeal readings is made the focus of interpretation such performances as *Blue Bloodshot Flowers* cannot be fully appreciated. Therefore, I am arguing for an

"intersemiotic" mode of analysis,[5] that is, one that includes but also goes beyond language (Broadhurst, 1999a, 168-70).[6]

Moreover, it is my belief that tensions exist within the spaces created by the interface of body and technology. Since no body not even a naked body escapes re)presentation altogether (Broadhurst 1999b, 102) the virtual body (as any other body) inscribes its presence and absence in the very act of its performance leaving gaps and spaces within its wake. I suggest it is within these tension filled spaces that opportunities arise for new experimental forms and practices.

Important questions relate to new technological advancements within contemporary performance practice. Rather, than providing a purely technical description of one of these new practices, I will instead investigate their conceptual implications. Since, as I have argued elsewhere, language without the body does not "mean" at all, as corporeality provides language with meaning under socio-cultural and thus temporal constraints (Broadhurst 1999b, 17), what then are the implications for a virtual body? Therefore my overall question is: "Due to such new technological developments as artificial intelligence and motion capture becoming increasingly prominent in art practices, does this physical/virtual/interface give rise to a new aesthetics? What are the theoretical and practical implications of this?" My aim is to explore and analyze the effect these new technologies have on the physical body in performance. Especially in relation to the problem of re)

presenting the "unrepresentable," that is the sublime of the physical/virtual interface.

Blue Bloodshot Flowers, a development of a previous performance, was such an attempt "to exceed everything that can be presented." The initial production was a text and movement based piece which was performed at Brunel University in 2000. It was written by Phil Stanier (2001) and involves the remembrance of a love affair. There is some ambiguity on whether the affair is between two adults or an adult and a child. Also if the narrator is dead – then the ex lover is obviously long gone. The performer, Elodie Berland, is French and we used a French voiceover as a memory device with good effect. There was some sound used intermittently throughout provided by David Bessell from the London College of Music.

The project involved a collaboration with Richard who researches into methods which allow both humans and objects to be located and tracked seamlessly and in real time. The applications of this technology range from visual surveillance to virtual reality.

When I decided to combine the piece with interactive technology I initially wanted a female avatar and perhaps a child to represent the child of the love affair or the inner child. However, this all seemed too literal and when I saw Jeremiah I immediately wanted him in the performance and decided to leave it to the audience to interpret this virtual presence -

- though, of course, most people would assume it was the image of the departed lover.

Blue Bloodshot Flowers was both a pilot scheme for future projects and a feasibility study. It is our intention, since the public performance proved so successful, to develop the technology further. We have discussed the introduction of hearing and speaking to an avatar. With this in mind, we developed Saul an avatar capable of speech and Rachel can morph between male and female. Both Saul and Rachel are, like Jeremiah, head, but our next collaboration will contain a full-bodied avatar. Despite this, we – Richard, Elodie, and me -- are very reluctant to lose Jeremiah.

Jeremiah is a computer generated animated head based upon Geoface technology. He(It) has a simple bone structure which allows him to express himself and emotions, such as, anger, sadness or happiness. He was developed from surveillance technology and as such has eyes with which he can see. During the performance a video camera fitted with a wide-angle lens was used to capture movement which was relayed to Jeremiah's emotion engine. The camera was located above the backdrop. Although we could have used more than one camera, one proved sufficient.

Jeremiah's emotion engine determines the current state of emotions from simple parameters extracted from objects of interest within the visual field. This simple set of rules allows chaotic behavior in a similar fashion. For instance, Jeremiah likes visual stimulus, high rates of movement make him

happy. He likes company, no stimulus makes him sad. He does not like to be startled, high rates of change in the size of objects make him surprised. Similarly, Jeremiah does not like to be ignored, if objects exist but do not move then he assumes he is being ignored and gets angry. Also, if Jeremiah experiences too much pleasure due to too much of any particular stimulus, he will reduce its influence on him and grow bored.

Jeremiah is capable of not only interacting but also reacting. In fact he possesses artificial intelligence to the degree that he can demonstrate several emotions as a reaction to visual stimulus. Jeremiah is unique in that he embodies intelligence that is no way prescriptive. Therefore, the performance is a direct and real time interaction between performer, audience, and technology.

One of the most interesting aspects of this project is how much the performer/spectator projects into the avatar. Jeremiah, as we know, consists of computerized artificial intelligence with the ability to track humans, objects, and other stimuli and react directly and in real time. However, interacting with Jeremiah is anything but objective.

Most people when they first see Jeremiah find him fairly "spooky." After the initial contact, people tend to treat him as they would a small child or a family pet. They usually try to make him smile and to generally please him. For instance, his face demonstrates sadness when he is left alone, so much so that many people find it difficult to walk away. Although Jeremiah is

programmed to react to certain stimuli, with specific emotional expressions, he can also demonstrate random behavior that can be fairly disruptive during a performance. This unpredictability adds a further "real life" dimension to working with a virtual figure.

This aspect of the performance questions orthodox notions of origin and identity since Jeremiah's identity is in no way fixed and his origins are not easy to specify beyond listing some technical specifications. As well as questioning conventions of authorship, ownership, and intertexuality, the digital technology that created Jeremiah subverts assumptions of reproduction and representation because in every performance Jeremiah is original, just as an improvising artist is original. Jeremiah is literally "reproduced again" and not "represented."

Blue Bloodshot Flowers is divided into two sections. The first part consists of a scripted movement based interactive piece with the human performer (Elodie), while the second part involves spectators who are invited to interact directly with Jeremiah and to explore his supporting technology. Surprisingly enough, in first part of the performance, although initial interest and curiosity was directed towards Jeremiah, the spectators' attention was mainly focused on Elodie. However, the spectators' focus shifted to Jeremiah when he decided to display fairly inappropriate behavior, such as demonstrating happiness at an intense moment in the performance. We had no way of controlling his behavior, which he learnt as he went along. We

could, of course, turn him off but we were very reluctant to do this. Jeremiah was the focus of the performance during the second part when he directly interacted with the spectators.

At the 291 Gallery, audience members arrived right up until the very end of the scripted performance since I had decided not to restrict entrance. I allowed unrestricted entrance for the very reason that Jeremiah would interact with any new arrivals he spotted and of course he did, which amused everyone except possibly the late arrivals.

From a technological perspective, Jeremiah is based around two subsystems, a graphics system, which constitutes the head, and a vision system that allows him to see. The vision system surveys the scene and sends information to the head model that then reacts. So Jeremiah is both the vision system and the head model. He also contains a simple emotion engine, which allows him to respond to visual stimuli via expressions of emotions. The entire system is capable of running on a single PC but for speed of operation each subsystem ran on its own dedicated PC connected via a network crossover. The whole system is self-standing and, with the construction of a flight case, truly portable.

Jeremiah's head contains a simple Newtonian model of motion with random elements of movement and random blinking and ambient motion (Bowden 2001). It is based upon the Geoface articulated bone model (DECface[7]) and consists of a simple mesh representing the face with an underlying bone structure that allow the mesh

to be deformed. This provides a lifelike facial avatar that can be animated to produce various facial expressions. The software was custom written and produced by Richard who "prescribed" what Jeremiah's expressions would actually look like. Four basic prescripted expressions for key emotions are used within the system (Bowden, Kaewtrakulpong, Lewin 2002, 126). Jeremiah's vision system is based around a Gaussian mixture model of color distributions (statistical order of the color of each pixel within an image) that is leant using expectation maximization within the Grimson motion tracker framework. This allows Jeremiah to probabilistically differentiate between the foreground and background pixels of a new image. Jeremiah's visual system additionally suppresses shadow and removes noise allowing static background scenes to be learnt dynamically at the same time prioritizing foreground objects (Bowden, Kaewtrakulpong, Lewin, 125). Jeremiah's attention is randomly distributed between these objects weighted by their size and motion. Therefore, objects closer to Jeremiah appear larger and capture his attention more than objects further away. Thus, leading him to interact with the foreground objects in real time via expressions of emotions.

Blue Bloodshot Flowers as a performance is hybridized and intertextual, and demonstrates such aesthetic features as, heterogeneity, indeterminacy, reflexivity, fragmentation, a certain "shift-shape style," and a repetitiveness which produces not sameness but difference. A distinctive aesthetic trait

central to the performance is the utilization of the latest digital technology.

It is interesting to note that the digital as a discourse cannot convert phenomena directly but depends on a preceding production of meaning by the non-digital. Therefore, the avatar emulates the graphic design and animation of a recognisable representation which is in this case a human head. As I have stated elsewhere, the digital, like all formal systems, has no inherent semantics unless one is added. One must add meaning. Thus digitally processed contents require different than ordinary habits of reading – reading digital contents demands thinking in terms of "indifferent differentiation" (1999a, 177). A thinking that makes little distinction between the referent and meaning or for that matter between "reality" and representation.[8]

Blue Bloodshot Flowers can also be seen as a critical deconstructive practice. "Metaphysical complicity" cannot be given up without also giving up the critique of the complicity that is being argued against (Derrida 1978, 281). *Blue Bloodshot Flowers* is apparently complicit with dominant means of digital representation, even as we are trying to destabilize those dominant structures. In other words, the piece addresses concerns regarding the commodification and consumerism of technology owned and provided by multi national corporations and used by government snoopers and the military.

The employment of wide, jarring metaphors is a central characteristic *Blue Bloodshot Flowers.* The colorful and figurative use of language and the juxtaposition of metaphors evoke surreal images of sex, violence, and death. The physical interaction of the physical and virtual also creates inclusive, jarring metaphors. This mixture produces an aesthetic effect caused by the interplay of various mental sense-impressions, [9] which "unsettle the audience by frustrating their expectations of any simple interpretation and in so doing they create a new kind of synaesthetic effect" (Broadhurst1999a, 175).

In *Blue Bloodshot Flowers*, due to the hybridization of the performance and the diversity of media employed, various intensities are at play. It is these imperceptible intensities, together with their ontological status that give rise to new modes of perception and consciousness. According to Deleuze and Guattari, "experimentation has replaced all interpretation […] No longer are there acts to explain, dreams or phantasies to interpret […] instead there are colors and sound, becomings and intensities" (1999a, 162). Their view of art as "sensation"—as a "force" that ruptures everyday opinions and perceptions, "to make perceptible the imperceptible forces" (1999b, 182), provides a means of theorizing the unpresentable or sublime of this kind of performance.

Since my project is a science and art collaboration, there are marked difference in the research rationale and questions. For Richard, the Turing test describes a system as artificially

intelligent if a human user cannot distinguish the system from another human in conversation. He is attempting to test this concept of intelligence by providing an interactive human avatar with simple rules and chaotic behavior. Richard believes the interactivity and human embodiment of Jeremiah is sufficient that individuals see him as a living entity. Therefore, Richard's foremost question is "How real can Artificial Life become? How do we interact with A' Life? (Bowden and Broadhurst 2001).

My interest, on the other hand, is concerned with more arts related questions. I want to explore and analyze the effect these new technologies have on the physical body in performance. Underpinning this is a series of specific research questions:

- What are the effects of new technologies in the analysis of the performing body?

- What are the theoretical implications of virtual performance for the body and space?

- What are the implications of, and how do we theorize the resultant de-stabilization of identity and origin?

- What is the potential for participation and interactivity, inter-performer and spectatorship, within this new art's practice?

Although much interest is directed toward new technologies such as Jeremiah, it is my belief that technology's most important contribution to art is the enhancement and

reconfiguration of an aesthetic creative potential which consists of interacting with and reacting to a physical body, not an abandonment of that body. For, it is within these tension filled spaces of physical and virtual interface that opportunities arise for new experimental forms and practices.

Furthermore, it is my belief that despite or even due to new technologies there remains the need to articulate and analyze innovative performance in ways other than the linguistic. There is now more than ever the need for an intersemiotic significatory practice, that is, an analysis that includes but also goes beyond language.

In conclusion, this is an ongoing project of what is hoped will be a variety of performances which combine the physical and virtual in performance. *Blue Bloodshot Flowers* was performed at Brunel University in June, 2001 and had its first public performance at the 291 Gallery, East London in August of that year to quite a large audience. However, the rehearsal process proved extremely stimulating and may prove ultimately more beneficial for research than the finished product. Throughout, emphasis is placed more on the process of adaptation, how the performance develops and so on, than on the finished product. In this way, strategies are exposed and the apparent seamlessness of performance and technology is negated. Thus, my goal is to destroy theatrical illusion, while at the same time resisting closure from within a place that is not completely aesthetic but is nevertheless a performance.

Notes

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[1] "Magnetic or optical motion capture has been used widely in performance and art practices for some time now. This involves the application of sensors or markers to the performer or artist's body. The movement of the body is captured and the resulting skeleton has animation applied to it. This data projected image or avatar (Hindu: manifestation of a deity or spirit) then becomes some part of a performance or art practice" (Broadhurst 2002, 157-63).

[2] "The consensus … is that AI is about the design of intelligent *agents.* An agent is an entity that can be understood as perceiving and acting on its environment. An agent is rational to the extent that it can be expected to achieve its goals, given the information available from its perceptual processes" (Jordan and Russell, 2001, p. lxxv).

³ In August 2003, I presented a performance entitled *Dead East/Dead West,* at the Institute of Contemporary Arts in London. This is a production which explores "liminal spaces" within performance, a development from my previous research locating spaces between virtual and physical performers. However, in this work, I am also suggesting that such spaces are located on the threshold of race and color and as a result tensions exist within certain performances. This project involved a collaboration with a choreographer from The Laban Centre, digital interactive artists from the University of West England and 3D filmmaker, Brian McClave.

⁴ See also Richards web page at <http://www.ee.surrey.ac.uk/Research/VSSP/07%20-%20CVSSPMembersFrameset.html>

⁵ A significatory practice which involves such non-linguistic modes as those provided by the semiotics of corporeal gesture: kinetic, visual, aural, haptic, gravitational, proximic and tactile.

⁶ For Horst Ruthrof, "language cannot mean by itself but can do so only semiotically i.e., in relation to and through corroboration by non-verbal systems"(1992, 6) and "far from language constituting a replacement of non-verbal forms of signification, language and non-linguistic sign systems develop side by side toward ever more complex formations. Moreover ... they interact with one another to constitute 'reality'"(1992,

102). See especially Chapter 6, "The Limits of Langue" (102-119), for a more detailed discussion on the constraints of language. Also his more recent account of intersemiotic semantics in *Semantics and The Body: Meaning from Frege to the Postmodern* (1997).

[7] See Keith Waters (1987; 1998), also <http://www.mediaport.net/CP/CyberScience/BDD/fich_055.en.html>

[8] For a more detailed discussion of the concepts of "differentiation" and "de differentiation," see Scott Lash (1990, 5-15).

[9] "Synaesthesia" is the subjective sensation of a sense other than the one being stimulated. For example, a sound may invoke sensations of color.

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