Digital Dance: (dis)entangling human and technology

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Promotores: Prof. dr. J.F.T.M van Dijck
Prof. dr. M.A Bleeker

Overige leden:
Dr. M.J. Kattenbelt
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Prof. dr. P.P.R.W. Pisters
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To my parents and sister

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Introduction

0.0 A peculiar duet

The dance performance[1] takes place in the venue Fabrica in Brighton. The audience looks down from all sides of the theatre upon a square, white floor, which functions as a stage and as a screen. The performance begins with the appearance of three straight, short white lines projected on the floor. The lines move horizontally from the left to the right of the stage during which they extend in length. To the right of the stage, the three white lines converge to form a diagonal mark and then disappear. A moment later, a bright, white light illuminates the entire theater. A dancer is lit up from where she is seated in a curled position on the left of the stage. Similar to how the lines moved before her, she too walks horizontally from the left to the right of the dance floor while maintaining her curled over posture. In the meantime, a white line traverses her body vertically and moves with the dancer to the other side of the stage. During this passage, the line moves forward and backward in coincidence with the dancer's movement, as she shifts her body weight forward and backward. Gradually, a second light appears onstage. This time the light forms a silhouette around the dancer's body and contracts and expands together with the dancer's movements. In addition, the silhouette intensifies its amount of light as the dancer intensifies the force of her movements, in particular the movements of her arms and legs. The scene ends with the dancer and the light next to each other. Now, the technologically projected light and dancer seem to perform the same movement phrase[2] while both moving in the same direction. Finally, the dancer stands still and watches as the white light grows to cover the entire dance floor, and then, slowly shrinks back down to a spot in the dark before disappearing.

The above paragraph describes the opening scene of *Glow* (2006), a relatively recent example of what this thesis calls 'staged digital dance'.[3] *Glow* is made by the

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[1] This is one of the few exceptions where the term performance refers to a culturally organized event, which brings together performers and the audience in a (most often) shared time and space. Otherwise, in this thesis, I understand performance as an act; that is, the display of certain skills to an audience.

[2] A movement phrase refers to organized movement into units of time and space.

[3] Staged digital dance is not an officially existing term. It is a term that I use in this thesis to refer to choreographic practices that are based on the creation and execution of a pre-set choreography on a theatrical stage to a seated audience. This is only one subset of dance performance within a larger range of practices that fall under the category of 'digital dance' and incorporate various kinds of experimentation with contemporary digital and networked communication technologies.

choreographer Gideon Obarzanek and the media artist Frieder Weiss. Weiss's website promotes *Glow* as a "spectacular 27-minute duet for body and technology, an essay on the relationship of dance and cutting-edge software technology."[4] A curious performance to witness a duet between body and digital technology, *Glow* was created and performed with the "latest video-based real-time interactive technologies that operate with sophisticated motion-tracking software", and which I viewed as an audience member in Brighton in 2008.[5]

Watching *Glow* left me feeling disoriented. Although apparently simple in its ideas, there is something peculiar about *Glow's* choreography as a result of the replacement of one of the human dancers with interactive technology in its presentation of a duet. To start with, the projected images are present on the stage throughout the entire performance. Therefore, the actions executed by the technology, perceived in the form of projected images, are over-exposed for the perception of the spectator. Secondly, the projected images play an active role throughout the performance in conjunction with the movements of the dancer. In turn, the movements of the dancer seem to complete the movements of the technology and vice versa. Hence, the choreography of *Glow* seems to portray two different types of movement to be perceived onstage: human and technological. What is more, when viewed separately, the movements of the physical dancer and the movement of the projected images make little sense. When viewed together, the movements executed by the human dancer and by the projected images impress upon the viewer an unusual aesthetic experience and choreographic concept for dance. *Glow's* choreography raises many questions, in particular on the 'nature' of its duet: What kind of duet is this? How can one dance with computer technologies? And why do I feel so disoriented by watching *Glow*?

The second viewing of *Glow* made me realize that *Glow's* choreography is peculiar because it does not fulfill my expectation of a dance performance, which is—in a strict sense—to see dancing bodies on stage. Generally speaking, as a viewer, when watching a dance performance what draws my attention the most are the kinesthetic qualities of dance movement and how the choreography organizes the dancing bodies in time, space, and energy. Technology, however, at this point, did not form part of my expectations from a dance performance. Rather, at this moment, I perceive technology at moments in which technology creates a certain effect on the dancing body: for example, when sidelights add

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[4] http://www.frieder-weiss.de/works/all/*Glow*.php Accessed on 12.01.2010

[5] http://www.frieder-weiss.de/works/all/*Glow*.php Accessed on 12.01.2010

an extra lyrical effect to the movements of the dancer. Or I may perceive lighting based on how it adds a certain 'mood' to the choreography. In sum, there seems to be a certain hierarchy in my perception of a dance performance. In this ordering, the human body is of primary significance while technology seems to play a supporting role (and is of secondary prominence). Moreover, I realize that until *Glow*, I have paid little attention to relationships between dancers and technologies.

Glow's integration of technology in its choreography, however, seems to unsettle this primary/secondary positioning of the human dancer and technology to that I am used to. *Glow*'s choreography requires a distribution of attention between the human dancer and the projected images provided by the technology. In fact, in *Glow*, technologies seem to occupy a role equal to the dancer's and they seem to function as a central element of the choreography. What is more, the aesthetic effects of the technology, perceived in the form of visual imagery, are staged so as to demonstrate a relationship between the human and non-human components within the choreography. Although non-human, the central role played by technology throughout the choreography leads to unconventional notions of technologies as performers onstage, alongside the human dancer. As a result, it seems that both human and technology in different ways perform the dance, in the sense of executing and/or showing an act in front of an audience. This implies that projected imagery created by the interactive technology is a part of the choreography 'proper' and not an add-on to enhance the aesthetic impact of the choreography.

As I will show in my thesis, *Glow* as an artistic gesture very much stands out against the 'conventional' staging of Western theatrical dance since its establishment in the (late) nineteenth century. Historically, in dance, technology has been most often understood as an assisting device to enhance the physical presence of the human dancer or to facilitate the development of the narrative. The examination of aesthetic and infrastructural changes in Western theatrical dance presentation since the nineteenth century, when Western theatrical dance became an autonomous art form, enables us to comprehend how theatre conventions contribute to present expectations of staging and choreography. In the conventional mode of address of Western theatrical dance, the role of technology is reduced to a minimal level and the aesthetic effects created by technology, such as lighting, are rendered - by both design and convention - much less visible for the perception of the audience. The staging of such choreographies channels the focus to the human dancer whilst technology and its aesthetic effects remain of secondary prominence. In sum, in Western theatrical dance, the position of technology has developed within a hierarchy of perceptual importance, with the human positioned at the

center of attention and the technology at its periphery. Set against this backdrop, staged digital dance problematizes these human-centered expectations in dance with regards to the definition of performer, and it requires thinking differently about the actions executed by technology as that of technological performance.

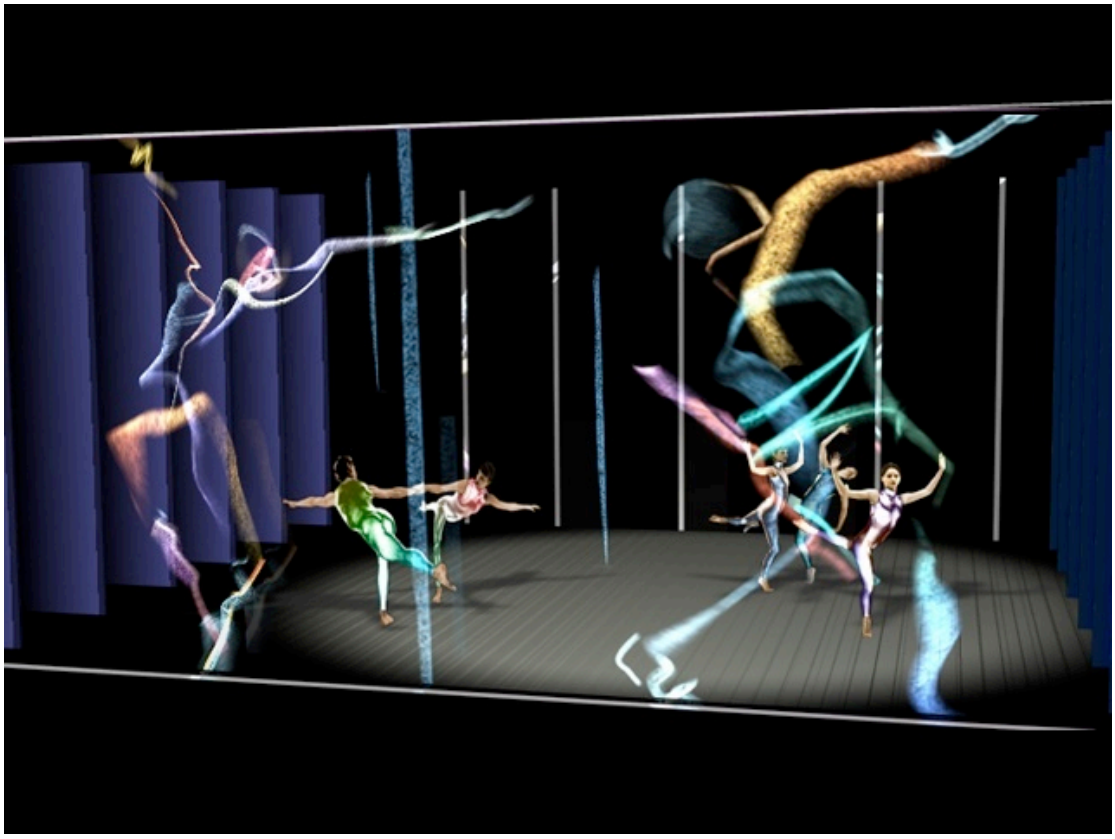

Fig. 0.1 — *Biped* (1999)

Certain authors have raised questions that are similar to mine, with which they problematize the human-centric conventions in dance as well as the status of the technology in digital dance practices. Kent DeSpain's article 'Dance and Technology: A Pas-de-deux for Post Humans' (2000) written after watching *Biped* (1999) [Fig. 0.1], is useful to understand the continuing impacts of human-centered staging conventions in Western theatrical dance. Created with digital motion-capture[6] technologies choreographer Merce Cunningham's celebrated piece *Biped* is performed live in a theatre; its choreography consists of the staging of physical bodies and animated virtual dancers onstage, projected on to a transparent scrim that allows the audience to see the physical

[6] Motion-capture is an optical or magnetic process of inputting movement into a computer that records the movement as a result of sensors (or markers) attached to certain parts of the (real) dancers body. The moving body parts are recorded electronically and then converted into digital data that allow the movements to be manipulated and represented within a wide array of visual forms. (Rubidge, Sarah. 'Defining Digital Dance. *Dance Theatre Journal*. Vol, 14. no 4, (1998): pp. 41-45)

dancers alongside the virtual ones. DeSpain's article on *Biped* captures a self-reflective process that begins with the realization of the strong humanist conventions in dance:

> (…) Over the course of the past century, all of the arts saw an unprecedented acceleration in the abstraction of the materials and content of artistic media away from their origins in human culture and nature. Dance (…) has been a site of resistance because of the bodily essence of the medium. No matter how much one works to choreograph non-referential movement, it is ineluctably contexted and referenced through the somatic presence of the performer. In contrast to the visual arts, it might even be argued that minimalist or serialist experimentations in movement actually accentuate the humanism of the dancing.[7]

Having noted the art form of dance's human-centered conventions, DeSpain elaborates on how the human-centric staging in dance is challenged by the non-human ghostly virtual dancer's kinesthetic response between the virtual figures and him:

> From even a few feet away I feel a bit detached from this 'dancer'. Lacking individuality in the way I am used to experiencing it, I don't feel compelled to attend to its dancing. So I step closer. Here, almost surrounded by the screens, my customary fourth wall protection is lost. As if on stage, I finally join this dance, beginning to feel some of that sense, that connection—my body to your body, your moving to my moving—that has kept me in this field through many lean years. Yet, who am I connecting with?[8]

Being confronted with the perception of non-human performers alongside human dancers leads DeSpain to engage with questions on the human-centric defining features of the art form of dance. Realizing that dance can entail more than 'just' humans, with fright and fascination, de Spain poses the following questions:

> Must dance involve humans? Are the dances of birds and bees merely metaphorical? Can imagined creatures dance? Can movement have value and meaning that to us beyond the limitations of human dancers? (…) How much of the meaning we derive from dance comes from the humans, and how much might inhere within abstract qualities of movement (direction, shape, speed, complexity, etc.)?[9]

Here, we can see that DeSpain questions the human-centered tendency within the art form of dance, wondering whether *Biped* points to the need to open up this art form to non-humans. In fact, the title of his article indicates clearly that DeSpain considers a transition from a human(ist) paradigm to a posthuman paradigm in the art form of dance. The posthuman paradigm in dance, which stands in contrast to the historically established

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[7] DeSpain, Kent. 'Dance and Technology: A Pas-de-deux for Post Humans'. *Dance Research Journal*. Vol. 32, no.1, (Summer 2000): p.11.

[8] DeSpain, 2000: p. 2.

[9] DeSpain, 2000: p. 6, 12.

conventions in the understanding, staging, and perception of dance, and the complexities related to this issue, is of great relevance for the arguments of this thesis and will be addressed in the later chapters (four and five) of this thesis. Much of my work in the early chapters of this thesis however, is dedicated to a theoretical and practice-based coming to terms with how staged digital dance marks a turning point in unsettling of the hierarchy-based and human-centered understanding in the art form of dance.

0.1 Digital dance: an interdisciplinary field

The twentieth century, as dance scholar Kerstin Evert (2002) emphasizes, so key to the comprehension of dance today, contains within it two prominent eras in terms of the integration of media technologies in dance: the 1960s and then in the 1990s.[10] The 1960s mark the slow entry of computers in the art form of dance, while the 1990s designate the acceleration in the convergence of computer and dance practice on an international scale. Indeed, the increase in the amount of experiments with dance and digital technologies in the mid-1990s was so significant that it created the need for a term to distinguish those dance practices that fundamentally rely on the integration of computer technology for its realization. Scholar and practitioner of this burgeoning sub-field of dance practice, Sarah Rubidge (2004) argues that despite the lack of a univocal practice, 'digital dance' seems to be a commonly recognized term amongst practitioners and theorists to designate dance practices that rely primarily on digital media with regard to the creation and presentation of their aesthetics and content.[11]

Rubidge explains that since its establishment in the mid-1990s, the practice of digital dance quickly began to develop in several directions within various forms, aesthetics, and styles while experimenting with different types of digital technologies.[12]Telematics,[13] motion-capture,[14] holographic images,[15] Artificial

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[10] Evert, Kerstin. Dance and Technology at the Turn of the Last and Present Centuries' in Dinkla, Soke, Leeker, Martina (eds). *Dance and Technology. Moving towards Media Productions.* Berlin: Alexander Verlag, 2002: pp. 30-62.

[11] Rubidge, Sarah. 'Dance Criticism in the Light of Digital Dance'. Keynote paper at Taipei National University of the Arts. Seminar on Dance Criticism and Interdisciplinary Practice. 2004, http://www.sensedigital.co.uk/writing/CritIntDiscTaiw.pdf Accessed on 02.02.2011.

[12] Rubidge, 2004. http://www.sensedigital.co.uk/writing/CritIntDiscTaiw.pdf. Accessed on 02.02.2011.

[13] Telematic technology originated as the combination of telecommunications and computing (from the Greek "tele" meaning far away, and "matos" a derivative of machinari). *Telematic Dreaming* (1993) created by new media artist Paul Sermon and performed by dancer/choreographer and researcher in digital dance, Susan Kozel is an early example of the integration of telematic technologies in art practices.

[14] Bill T. Jones's *Ghostcatching* (1999) is another example of the integration of motion-capture technologies in dance practice from the 1990s. The captured images were 'extracted' from Bill T. Jones's physical dance movements.

[15] Holography is a technique which enables the creation of three-dimensional images; yet, what is created is the illusion of three-dimensionality based on the change of position and orientation of the viewing system to the human eye. *Seigradi* (2008) by the Italian company Santasagre illustrates a beautiful example of the implementation of holographic images in the practice of dance.

Intelligence,[16] SecondLife,[17] and real-time interactive technology operating with motion-tracking software[18] are certain examples of the different technologies implemented in digital dance.[19] Across all of these experiments, although technology plays a crucial role in the creation and realization of digital dance performances, the artistic aims, and the form and content of these performances vary greatly from each other, also as a result of the intrinsic qualities offered by the technology utilized in the artwork.

In relation to my own focus, it is important to be aware that there are at least three different types of digital dance practice created with real-time interactive technology,[20] operating with real-time motion-tracking software, which I suggest it is possible to categorize as: 1) choreographic installations;[21] 2) mixed practices, which combine elements of staged digital dance and choreographic installations;[22] 3) staged digital dance. Although each of these practices incorporate the same type of technology, each entails a

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[16] Susan Broadhurst's *Blue Bloodshot Flowers* (2001), which portrays a physical dancer and the avatar Jeremiah, is an example of the integration of Artificial Intelligence within this field. Artificial Intelligence refers to the intelligence of machines, it is also a branch in computer studies that aims to create 'intelligent agents'.

[17] *Senses Places* initiated by dancer and scholar Isabel Valverde expands dance improvisation into the virtual realm of SecondLife. SecondLife is an online virtual environment launched in 2003; it enables users to interact via online avatars.

[18] The operation and characteristics of real-time interactive technologies in staged digital dance establishes the focus of this thesis. Such technologies are examined in detail through specific case studies in chapters two, four, and five.

[19] This is by no means an exclusive list of technologies implemented in digital dance nor of the type of artistic practices created within this field.

[20] This is not an exclusive categorization; rather, it refers to major trends within digital dance practice created with real-time interactive technology operating with motion-tracking software.

[21] What I refer to as choreographic installations follow certain principles of installation art. Different from staged performances, choreographic installations are often based on non-structured and non-trained audience participation for the realization of the artwork. In this respect, this type of choreographic practice shares certain features with participatory art developed in the 1960s, such as the exclusion of professional dancers, emphasis on the art work as a process rather than an object, and preference for non-theatrical settings. Most often, choreographic installations do not have a closure, nor are they bound by temporal restrictions. Often, choreographic installations entail unstructured audience participation. The creators shape the technical dimension of the installation by determining the artwork's visual and aural aesthetic as well as the spatial arrangement of the interactive system within the installation space. Once set up, the installation can be activated by any visitor at any time during the opening hours of the location where the installation is installed. Some examples of this type of digital dance practice are *Sensuous Geographies* (2003) by the choreographer Sarah Rubidge and the composer Alistair MacDonald and *trajets* (1999-2011) by Gretchen Schiller and Susan Kozel.

[22] What I refer to as mixed practices combine elements from choreographic installations and staged digital dance. Thus, a mixed practice may be either a staged dance performance performed by professionals that allows audience participation in certain moments of the performance, or it may involve a choreographic installation that combines professional performers and audience participation. *Passage* (2007) created by the company kondition pluriel is an example of a mixed practice, which combines a professional performer and audience participation. In general, examples of mixed practices are rare in comparison to choreographic installations or staged digital dance.

quite different kind of choreographic practice in terms of creation and reception as well as engaging quite different genres of dance and art more broadly. It is only the third category 'staged digital dance', created with 'first generation interactive technology' –to use Johannes Birringer's term which I explain below– that is of concern to this thesis.

Generally speaking, staged digital dance as a strand of this larger field of digital dance experimentation extends existing choreographic practices of Western theatrical dance with which choreographers have worked in the past, through the addition of interactive technology alongside the human body. It tends to be the case in these works that the location, time, date, and the duration of artwork are fixed rather than open.[23] The choreography has a beginning, middle, and end, and is to a large extent prescribed (meaning finalized) during the rehearsals. The aesthetics and form of the choreography, in staged digital dance, most often illustrates a correlation between the movements of the human dancer and the actions executed by the technology (i.e., projected images) on the basis of certain kinesthetic qualities, which are most often motivated by the dramaturgy. I examine the creation and perception of staged digital dance in detail in chapter two.

The discourse of digital dance in this thesis is understood to be composed and influenced in an ecological sense. This ecology of digital dance discourse includes practice-based knowledge and awareness, academic literature, and review writings by dance critics. The latter I take to represent the audience perspectives of reception. The examination of these three kinds of contributing parties to staged digital dance discourse is useful because, as I will show in the course of this thesis, there are certain inconsistencies among them, which are fruitful in coming to terms with how the hierarchy of perceptual importance actually operates.

[23] Of course there are always exceptions that do not comply with categorization.

0.2 The interactive system

Although there are various ways to define the type of interactive technology that is utilized in the selected case studies, in this thesis, I define these as 'real-time interactive technologies operating with motion-tracking software.' Certain points are important to keep in mind with regards to this type of technology.

To start with, the idea of a responsive technical system —in contrast to many marketing strategies of interactive technologies—is not new. Avant-garde artists in the early 1920s had already envisioned a kinetic stage, which could react to the movements of the human performer. I discuss the historical precursors of interactive technology in chapter one.

Interactive system does not refer to a single technology but entails a system that consists of several components. Writer and practitioner in digital performance, David Saltz (1997) describes three necessary components to create an interactive performance.[24] The first requirement is a sensing device capable of reading human movement or input, such as video, infrared lights or sensors attached to the body that detect the presence of the performer and translate aspects of the performer's behavior into digital language. The second is a computer and (pre-programmed) motion-tracking software. Finally, this output needs to be translated into real world phenomena that humans can perceive. It should be added that the translation of input into output takes place in 'real-time'. Real-time refers to the perception of a computational process, indicating the amount of time with which the computer processes incoming data into output.[25] In sum, interactive technology entails a system that is composed of sensors (e.g. infrared lights, video, sensors attached to the dancer's body), motion-tracking software (e.g. Isadora, Eyecon); as well as computer, projector, and a surface for projected images. The projected visual images are the outcome of a process enabled by the collaboration of the system's various components. Although the audience is exposed only to the projected visual images, for the purposes of critical analysis, all components in the system need to be acknowledged because the projected images can be perceived only if all components execute their tasks correctly.

Central to staged digital dance is the fact that the output of the interactive system (meaning the projected images) is not only a translation of data provided by the dancer's

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[24] Saltz, David. 'The Art of Interaction: Interactivity, Performativity and Computers'. *Journal of Aesthetic and Art Criticism*. Vol 55, Issue 2, (Spring 1997): pp. 118-119

[25] http://www.merriam-webster.com/dictionary/realtime, Accessed on 13.02.2011

movements, but they are also a reaction to them. Writer and practitioner in digital dance, Johannes Birringer (2008) considers interactive technology operating within a reactive logic as first-generation interactive systems.[26] First-generation interactive systems merely respond to external stimuli in ways that are pre-programmed (often) by the media designer. They cannot create or regulate their behavior whereas certain interactive systems, which Birringer labels as second-generation interactive systems, such as artificial intelligence are capable of doing this.[27] Experiments with first-generation interactive systems are particularly interesting in so far as they raised many discussions and fears about the supposedly reduced position of the dancer as a potential data supplier for the technical system used to create staged digital dance choreographies. Specifically, they generated (old) fears about the disembodiment of the dancing body (equated to a degradation of the dancing body) within the field of dance itself, a point that I address in chapter three.

From my own perspective in developing this research project, it is unusual that despite the common integration of this type of interactive technology in dance, very little has been written on the role of this type of technology as a performing element in the literature of digital dance. This is unfortunate because real-time interactive technology operating with motion-tracking software is the most frequently applied technology in the practice of digital dance. In fact, as Rubidge writes (2001), this type of technology "seems to hold an unchallenged place as the raison d'etre of the genre."[28] In this respect, by examining the role of interactive technology in the choreography of staged digital dance, and by developing an analytical model for the evaluation of the actions executed by technology as performance, this thesis will contribute to existing research in digital dance beyond the moment of emergence of these practices.

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[26] Birringer, Johannes. *Performance, Technology&Science*. PAJ Publications: New York, 2008: p. 153.

[27] Birringer, 2008: p. 147, 153.

[28] Rubidge, Sarah. 'Action, Reaction, Interaction'. *Dance Theatre Journal.* Vol. 17, no. 2 (2001): p.38.
The reason for this frequent application is most likely related to the easy access of this type of technology (at least since the mid-1990s) for choreographers and visual artists. Moreover, the costs of the motion-tracking software as a consumer product on the market are relatively low. Motion-capture, for example, is a more expensive technology, which few choreographers have access to.

0.3 Introducing the objects of analysis

Three relatively recent choreographies, which are representative of staged digital dance created with real-time interactive technology operating with motion-tracking software, are selected as case studies in this thesis.

Glow (2006), is created by the choreographer Gideon Obarzanek and the media designer/programmer Frieder Weiss.[29] It portrays a 27-minute duet between a human dancer and visual images created in real-time by an interactive system. It has premiered in Australia in 2006 and is currently still on tour worldwide. Obarzanek describes *Glow* as a visual metaphor that represents "our own constant struggle with our primitive state of duality."[30]

Apparition (2004) is made by the media designer Klaus Obermaier[31] and the engineers of the Ars Electronica Lab in Linz. It premiered at the Ars Electronica Festival, which is one of the most prestigious international festival on arts and technology. It portrays two human dancers and projected visual images provided by an interactive system of motion-tracking technologies. Different to the making of *Glow*, in *Apparition,* the choreography was created by the dancers Desireé Kongerød and Rob Tannion.[32] *Apparition*'s dramaturge Scott deLaHunta describes the work's artistic aim as the creation of a type of choreography where "your partner is software, (…) when virtual and real images share the same space, (…) [and] when everything moving on stage is independent and interactive at the same time."[33] In *Apparition*, some scenes portray an engagement between the human dancers and the real-time visual images provided by the interactive system whilst other scenes do not demonstrate any interactivity between or co-presence of the two different performing elements onstage at all.

16 [R]evolutions (2006), by the New York based company Troika Ranch, is created by the media artist/programmer/composer Mark Coniglio in collaboration with the

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[29] Obarzanek and Weiss have also created *Mortal Engine* (2008), a sixty-minute choreographic work portraying ten dancers. In *Mortal Engine,* Obarzanek and Weiss further develop the artistic and technological ideas utilized in *Glow.*

[30] http://www.chunkymove.com/Our-Works/Current-Productions/Glow.aspx, Accessed on 18.12.2010

[31] Obermaier has created other works that combine dance and technology such as, *D.A.V.E* (1999), *Vivisector* (2002), and *Le Sacre du Printemps* (2007).

[32] http://www.exile.at/*Apparition*/ Accessed on 10.08.2010

[33] http://www.exile.at/*Apparition*/ Accessed on 10.08.2010

choreographer Dawn Stoppiello.[34] The makers describe *16 [R]evolutions* as the depiction of the "struggle of four invented characters" to find balance between the "primitive and intellectual sides of humanity."[35] The in real-time created visual imagery is integrated in particular scenes but not throughout the entire work.In contrast to *Glow* and *Apparition*, *16 [R]evolutions* has stronger narrative elements.

[34] Coniglio and Stoppiello founded Troika Ranch in 1994 with the aim to create artworks that combine dance and interactive digital media. Some examples of their work include: *In Plane* (1994), *Yearbody for Solo Dance and Internet* (1996), *Vera's Body* (1999), *The Chemical Wedding of Christian Rosenkreutz* (2000), *Reine Rien* (2001), *Surfacing* (2004), *Loop Diver* (2009). Katherine Farley describes Troika Ranch's main objective of integrating digital media into live performance as the "conviction that technology needs to serve the dance's narrative structure. [For Troika Ranch] in order to facilitate a story or unify a sequence of events, technology must be both useful (i.e. easily accessible) and purposeful (artistically)." From "Digital Dance Theatre: The Marriage of Computers, Choreography and Techno/Human Reactivity". *BST Journal,* vol 3, no. 1, (2002). Available on http://www.people.brunel.ac.uk/bst/home.html. Accessed on 10.09.2012.

[35] http://www.troikaranch.org/vid-16rev.html Accessed on 17.03.2011

0.4 Outline of chapters

This thesis aims to make the following contributions to the critical dance discourse:

1) to come to terms with the continuing impact of the construction and destabilization of the hierarchy of perceptual importance within the cultural practices - creative development, staging, and reception - of digital dance;
2) to critically think through the performativity of technology in digital dance;
3) to re-think the complexity of the human-technology 'duet' or "interperformance" in digital dance practice.

Framing the thesis' contribution to staged digital dance discourse, chapter one examines the development of the position of technology in dance and theater in the (late) nineteenth century, showing how specific artistic and infrastructural changes in this era led to the establishment of a hierarchy of perceptual importance, which positions the human at the center of attention and the presence of technology and its aesthetic effects at its periphery. Understanding these conventions as staged digital dance's conceptual and infrastructural heritage, this chapter shows how the reduction of technology to assisting devices is also perpetuated by the cultural practices of dance, during the creation and perception of the choreography.

The second chapter explores changes that staged digital dance has brought to the cultural practices and conventions of dance, via the case study *Apparitio*n. In order to demonstrate these shifts in dance as a cultural practice, I examine changes to first, the professional roles and expertise of those involved in the creation of a choreography, and second, the audience's perspective, which is represented by dance critics' reviews of my case studies of staged digital dance works. More specifically, this chapter shows how the integration of the interactive system and its aesthetic effects into staged digital dance destabilizes the hierarchy of perceptual importance explained in chapter one. It also underlines that the notion of performance can be applied to the actions taken by the interactive system.

While questions surrounding the use of technology are very much built into the choreographic concepts of staged digital dance in practice, the role of technology in digital dance tends to be given limited theoretical attention in digital dance literature. The third chapter examines recent literature on digital dance to show that the notion of technological

performance is missing from this discourse. It notes how digital dance literature tends to fall into three categories ('from frozen to live media', 'metaphysical extension', 'body and technology in dialogue') and shows how each category extends the hierarchy of perceptual importance in one way or another. As my review on the literature on digital dance in this chapter will show, although there have been some attempts to recognize the technology as an element of the choreography, I argue that these tend to be reductive and simplified in to certain programmatic, non-nuanced ways of thinking about technology as a type of performance in its own right.

Extending the notion of performance to the actions taken by the interactive system constitutes the focus of the fourth chapter. This chapter is primarily based on Jon McKenzie's study *Perform or Else* (2001) and demonstrates how a more expanded and interdisciplinary observations of the various uses of the notion of performance results in quite different understandings of this term and its evaluative criteria. McKenzie has made a rather radical break on the notion of performance within the domain of techno-research (e.g. computer science, rocket science) - as technological performance - which allows me to draw upon how the performance of technology is evaluated in this field. This chapter translates the model used for evaluating technological performance within the field of techno-research onto staged digital dance, and using the case study of the opening scene of *Glow*, applies it to the actions of the interactive system in that work.

The final chapter takes the notion of performance further as *interperformance* to understand choreography in staged digital dance as that which emerges from the relationship between human and technological performance concepts. Discussing the notion of agency and approaching the notion of performance in terms of technical capacities, this chapter makes it clear that, although being different performing elements, human and technology can be brought together through common concepts of performance and techniques. Illustrating this argument in a close reading of *16 [R]evolutions*, this chapter ends by pointing out that staged digital dance marks the entry of the art form of dance into the posthuman paradigm.

CHAPTER 1.

Introducing ‘The hierarchy of perceptual importance’: Human-centered conventions in dance, theatre, and performance

1.0 Introduction

In order to come to terms with what is specific to staged digital dance experiments created with first generation interactive technologies, a conceptual appreciation of the performance conventions that are being interrupted in the emergence of such works in the 1990s is necessary. As I have shown in my introduction, staged digital dance is understood to present strong challenges to human-centered foundations of dance and performance, as well as to what audiences even expect to be moved by, when they attend performances falling under the moniker of 'dance'. I argue in this chapter that what is perceived as counter-conventional in staged digital dance is not without precedent in dance history. To comprehend staged digital dance of the 1990s onwards as interruptive, is to recognize that the cultural practice of Western theatrical dance is still very much rooted in - and celebrated by makers, critics and audiences alike in accordance with - humanist foundations established in the nineteenth century. Dance and theatre, which have both fallen under "performance studies" since the 1960s, have parallel and intermingling histories, in particular in terms of artistic and infrastructural changes these art forms went through in the nineteenth century. I understand that these developments play out as imaginative progressions in a larger context of nineteenth century western humanist thought. In *Humanism* (1997), philosopher Tony Davies explains nineteenth century humanism as Man's inseparable defining quality, which is also universal, essential and shared by all human beings of whatever time or place. Nineteenth century humanism created a "myth of essential and universal Man" who, as I will show, also sits at the imaginative center of our conceptions of Western theatrical dance. Davies emphasizes that the nineteenth century understanding of humanism is "still deeply engrained in contemporary self-consciousness and everyday common sense, so deeply that it requires a conscious effort."[1] In this chapter, I trace the influences of such humanist thinking in the literature on the development of the role of technology in dance and theater.

To gain a larger view of what exactly is being perceived as so exciting and or destabilizing about staged digital dance, it is necessary to comprehend the cultural practices and heritages through which human-centered conceptions of the staging of dance and the *downplayed* role of technology within this art form have been cultivated, developed, perpetuated and indeed, countered. Where and how, in other words, the dominant understanding, and professional perpetuation of Western dance as a human-

[1] Davies, 1997: p.24

centered art form has been set up as ‘conventional’. Accordingly, this chapter introduces and frames the dominant historical and cultural conventions through which Western theatrical dance has consistently downplayed the (dynamic and destabilizing) contribution that technologies have made to performance since the late nineteenth century, and gives key examples of counter-practices to these heritages and conventions. By doing this, I aim to avoid an (im)possible history of ‘dance and technology’ and instead make contextualized sense of the conceptual precursors to staged digital dance.

I pursue this historical and theoretical overlap of dance and theatre also because I need to make use of the archive that remains and the scholarship that is most salient. In section one, I bring forth what is relevant from scholar of scenography Christopher Baugh’s conception of the role and position of technology in theater and performance in the nineteenth century. Baugh’s tracking of the history of performance conventions in *Theater, Performance and Technology*. *The Development of Scenography in the Twentieth Century* (2005) is particularly useful in coming to terms with human-technology relations, as these have been embedded in the cultural practices and infrastructures of Western performance.[2] Baugh productively considers the concept of technology extremely inclusive, incorporating architectural and lighting elements, machinery for augmenting movement such as the ‘flying machines’, and even new fabric dyes key to costuming innovations, and so on.[3] Baugh tends to give limited attention to media technologies, though he does acknowledge the recent incorporation of computer-based “new media technologies” into dance. I will deal more with this neglect in chapter three.

Assessing the early relationships set up between human and technological elements of theatre between the sixteenth and twentieth century, Baugh observes that technology has most often been perceived to function to ‘assist’, ‘support’, or frame performance, and especially to direct the focus of attention to the human body onstage. One of Baugh’s major insights that results from such an understanding of technology within performance history, is that this supporting role played by technologies, in particular

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[2] Baugh, Christopher. *Theater, Performance and Technology*. *The Development of Scenography in the Twentieth Century*. New York: Palgrave Macmillan, 2005.

[3] In this study, Baugh does not explicitly refer to a definition of technology. In the introduction of his book, at times he uses a plural definition ‘technologies of theatre’, at other times, he uses the terms ‘theatre technology’, ‘stage technology’, ‘technologies of stage design’. Sometimes, he specifies certain uses of technology, such as “technology inherent in Italian Renaissance perspective scenery” (p. 4), “scenic technology of wooden grooves” (p. 5), “the new technologies of gaslight mantles and the electricity” (p. 5). He also refers to machines and machinery in terms of technology. Moreover, his description of “the distillation of coal products during the 1830s created aniline dyes that in turn enabled the production of fabrics of a hitherto unseen brilliance” (pp. 3-4) points out that aniline dyes is also considered as a technology.

in the nineteenth century, established quite neat and exclusive functional divisions between the human and technological elements onstage. In so far as the human elements occupy the center of the frame of attention through such divisions, all other elements that go in to the staging and reception of the artwork tend to take up only the peripheries of spectator's attention. Interestingly, Baugh uses a rather curious expression to describe this division, which he does not place too much emphasis upon in his own work, but which I would like to consider as quite key to the insights generated by his text, and in turn as even more central to my own thesis. The expression that he uses is "the hierarchy of perceptual importance."[4] In Baugh it operates more as a descriptive term; however, I argue, through the insights generated by Baugh, that as a culturally and historically formed 'convention' the hierarchy of perceptual importance captures what is most robust and ongoing in the conceptual assumptions surrounding what performance and dance should actually consist of.

I consider in this thesis that it is this concept of the hierarchy of perceptual importance that is being challenged and staged in the production and reception in dance works utilizing digital interactive technologies, in so far as such works queer assumed conventional relationships between technologies and human performers within their choreographies. To show this, in section two, I first draw on certain artistic developments in dance in the nineteenth century to show how technology is quite similarly seen as an external element in dance, perhaps even more so than in theatre, because of the fact that the staging of theatre tends to involve many more non-human elements than in dance, which relies primarily on the human body as the medium of communication. Dance has an under-documented, ephemeral history of practice, so we need to look to parallel and overlapping practices and theory to make sense of performance histories and contexts in this way. In fact the main reason for my pursuit of this overlap of shared heritages between theatre and dance is that more recently, strong and rigorous historical and theoretical work in performance studies has begun to address the uses of technology across theatre and performance as a whole. These studies have great utility in coming to terms with the heritage of conventions surrounding human-technology relations that still inform the creation and reception of contemporary dance practice, including staged digital dance.

In section three, I elaborate on the artistic hierarchies within the creation and reception of the cultural practices of dance, which evolve as a consequence of the hierarchical division between humans as performing elements and technology as non-

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[4] Baugh, 2005: p. 8.

performative, assisting devices. The challenges to the hierarchy of perceptual importance in performance practice in the twentieth century establishes the focus of the fourth section. The final section summarizes my research questions and the contribution my thesis will make to the existing discourse of dance and technology.

1.1 Staging the hierarchy in theater: 19th century

Baugh's assessment of the development of the position of technology in theater in the nineteenth century helps us to come to terms with the cultural and conventional heritage of performance. Baugh argues that the nineteenth century establishment of the hierarchy of perceptual importance, contributes to Western theatre's specific and persistent cultural practices of creation, staging, framing and presentation in which a (human-centered) understanding of the functioning of theater remains dominant. Below I give a brief explanation of the changes that took place in the nineteenth century as described by Baugh. Baugh also provides a table of important changes in Western European theatrical presentation that cover a span of three hundred years, which is presented in appendix one for the interested reader. I will use Baugh's insights into the history of technologies in theatre and performance to generate further insights for dance theory, by observing parallel human-centric conventions of Western theatrical dance creation and presentation that date also from this period.

According to Baugh**,** both artistic developments and infrastructural changes have been influential in establishing the nineteenth century paradigm of theater, in which the theater text and its mediation via the actor stands central.[5] In this paradigm, technological elements, such as mechanics, décor, and lighting function to assist the actor or to enhance the dramaturgy, which led to a hierarchical understanding between the human and non-human elements in theatre.

The first to bear in mind is the development of theatrical realism, which transformed the evaluative criteria applied to theatre plays of this era. Baugh suggests "material realism" as an appropriate term to describe conceptions of scenography and scenographic language within the theatre of the nineteenth century.[6] The legacy of the painter Philippe de Loutherbourg's short visit at Drury Lane Theater in London, 'material realism' not only led to "new scenic style with significant technological implications but also to a period of seismic transition in the *functioning* of theatre."[7] For Loutherbourg an aesthetic unity and pictorial harmony that would allow the integration of the actor with the scenic environment

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[5] It should be added that Baugh does not claim that the staging of human-centric theatre is restricted to the nineteenth century theater; his argument is instead that the staging of theater in particular in that century helped to create a hierarchical understanding of the roles of human and non-human elements in Western theatrical presentation.

[6] Baugh, 2005: p. 11

[7] Baugh, 2005: p. 2

onstage stood central. Hence, a harmony between the theater text, its mediation via the actor, and the non-animate stage elements, such as scenery, machinery, gaslighting and costume were the priority in theatre of this period. Nevertheless, despite the dramaturgical integration of human and non-human elements, technology serves as means to this end: to facilitate the believability of the human actor's role and to create an aesthetically accurate surrounding, which corresponds with the narrative of the play. Technologies in other words, here meaning machinery, gaslighting and so on, though important in terms of the verisimilitude of the play, remains at the periphery of perception either because they remain hidden behind the infrastructure of the stage or their visual effects are not designed to draw a lot of attention.

During this same period another significant shift was underway which changed the understanding of theater from a mode of presentation to a mode of representation. Whereas in the eighteenth century, the actor would *show* a character, in the nineteenth century, the actor was expected to *become* the character that he is playing. Besides changes in acting styles new approaches to stage costumes and authenticity, such changes were accompanied by infrastructural transformations in theaters, which reinforced the hierarchy of perceptual importance further. Whereas previously the players and audience shared the same space, an architectural separation was now set up between the auditorium and the stage, and the stage was also raised to a higher level than the eye-level of the audience. These changes demanded the full attention of the audience to actions onstage, and institutionalized the human-centered mode of address in theater into the architectures of reception. In fact, Baugh argues that the changes that took place in the nineteenth century all aimed to absorb the audience into "the fictional world offered by the theatre."[8] Baugh underlines that the confluence of changes that took place in theater in the nineteenth century are highly significant because they led to a dominant understanding of the functioning of theater that remained constant until the beginning of the twentieth century. Despite certain challenges in the twentieth century, Baugh points out that this historically dominant understanding within the current context of theater and performance still prevails. I demonstrate contemporary examples of such humanist thinking in relation to theater and performance in chapter two, and in chapter three, I address the humanist thinking within the field of digital dance.

[8] Baugh, 2005: p. 15.

1.2 Staging the hierarchy in dance: 19th century

Due to their shared philosophical heritage of nineteenth century humanism, and their parallel aesthetic development, much of what has held for theatre in terms of its paradigmatic human-centeredness, which I have outlined above, is also very much embedded in the conventions of Western dance inherited from the nineteenth century. In dance, similar to theatre, the role of technology has predominantly tended to be conceptualized as an external element that enhances the physicality of the human performer or as a supporting element for the dramaturgy. In order to make the case for my application of the concept of the hierarchy of perceptual importance to dance in particular, as a more recently formed artistic practice - and the kinds of theoretical and practical insights we can generate from such an application - it is important at this point to briefly mention specific developments in dance history that accord with Baugh's framework of a hierarchy of perceptual importance. I have summarized these artistic reforms in a table in appendix 2, which outlines the specificity of changes in the role and use of technology in Western theatrical dance presentation in the eighteenth and nineteenth centuries.[9]

Artistic and infrastructural developments in nineteenth century European theatrical dance presentation show many similarities to developments in the nineteenth century theatrical presentation described above. Firstly, it is important to underline the fact that only in the late nineteenth century did the presentation of European theatrical dance come to be considered an autonomous art form and not just a complementary aspect of another artwork. Prior to this autonomy, dance appeared inside of other art forms such as the opera-ballets of the early eighteenth century, where it functioned as an additional entertaining element, rather than as a serious art practice in its own right.[10] In opera-ballets, dance appeared as interlude, and the dancers had to make great effort to maintain audience attention when performing. Dance historian Gayle Kassing explains that the ballet-master[11] Jean-Georges Noverre in the eighteenth century was one of the first to

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[9] The information presented in this table is based on a collection of sources, which I gathered from Gayle Kassing's *History of Dance. An Interactive Arts Approach* (2007), Selma Jeanne Cohen's *Dance as a Theatre Art* (1974), Alexander Bland's *A History of Ballet and Dance in the Western World* (1976), and Susan Leigh Foster's *Choreography and Narrative. Ballet's Staging of Story and Desire* (1996).

[10] Kassing, Gayle. *History of Dance. An Interactive Arts Approach*. United States: Human Kinetics, 2007: p. 120.

[11] A ballet-master is a person responsible for the training and rehearsal of the dancers and also for the artistic direction and choreography.

grasp the artistic potential of ballet, which led him to create the ballet d'action.[12] The most important aspect in ballet d'action was a unification of dance with other stage elements rather than seeing dance in a collage of separate elements. Nineteenth century narrative ballets were choreographed to tell a story through the linking of costumes, scenery, music, and particular dance steps.[13] As appendix 2 demonstrates, nineteenth century narrative ballets were largely influenced by Noverre's ideas on the presentation of dance.

Moreover, as the table shows, and similar to theater in the nineteenth century, this increased appreciation of dance as a serious art form was supported by infrastructural changes of its presentation spaces. Whereas in the eighteenth century the dancer performed only in a narrow area that crossed the stage in front of the audience, the separation of the auditorium and the stage in the nineteenth century enabled the dancing body to more easily command attention as art. Indeed it is very much the case that the hierarchy of perceptual importance is installed in the very foundations of Western theatrical dance as an autonomous art form, wherein the dancing body, demanding to be taken seriously as a movement practice without voice for the first time makes claims upon audience attention.

There are of course important differences worth mentioning between artistic movements occurring in theatre and dance in the late nineteenth century. At this moment for example, whereas theatre was dominated by dramatic realism, romanticism was the highlight experience of nineteenth century ballet, signified in a series of artworks known today as Romantic ballet. Nevertheless, in line with the arguments of this thesis, the nineteenth century Romantic ballet had just as powerful a role in shaping approaches to aesthetic form, content, and dramaturgy which send technological elements to the background of perception. Dance historian Kerstin Evert (2002) points out that the nineteenth century Romantic ballet is unthinkable without technological aids, such as the use of oil or gaslights, filters and light projections, as well as the development of 'flying mechanics' and the pointe shoe.[14] Gaslights and filters made it possible to create a particular mood lighting to be used in the romantic scenes set against a naturalistic landscape. Flying mechanics refers to a mechanical system to which a human actor/

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[12] Baugh (2005) explains that Noverre's ideas were influential for the move towards pictorial unity and aesthetic harmony in the late eighteenth century scenographic values instituted by Phillipe de Loutherbourg. (p. 15)

[13] Kassing, 2007: p. 122.

[14] Evert, Kerstin. Dance and Technology at the Turn of the Last and Present Centuries' in Dinkla, Soke, Leeker, Martina (eds). *Dance and Technology. Moving towards Media Productions.* Berlin: Alexander Verlag, 2002: p. 30

dancer is attached via a rope. As staff positioned in the wings of the theater pull the rope, the actor/dancer is lifted, which creates the illusion that the actor is flying for the perception of the audience - all of this being further enabled through a suspension of disbelief by the audience that rejects or neglects the technology. Hence, the technological mechanism behind the human 'feat' is a means to this end, the creation of (the illusion of) spectacular human flight. The pointe shoe in a different way sets up a new kind of movement range for the body, which is now elevated. By introducing balances and steps performed on the ends of the toes in dance technique, the pointe shoe helped to create a delineated image of a "gravity-defying"[15] and ethereal female body.[16] The pointe shoe in combination with reforms in the staging of dance culminated therefore in a specific mode of perception for the audience, which not only positioned the ballerina as the central focus onstage but as dance scholar Susan Foster (1996) argues "stimulated new routings of desire" towards the female dancing body, turning her into an object of the viewer's desiring gaze.[17]

Despite such dependence on technologies for the creation of the nineteenth century Romantic ballet, an overview of works on dance history demonstrate that such inventions tend to be figured as staging technologies only, or as a peripheral element of production. Alexander Bland for example in *A History of Ballet and Dance in the Western World* (1976) underlines that at the start of the nineteenth century, in dance, stage design tended towards simplicity and was not meant to draw more attention than the physical performance; it was a backdrop, perceptually visible, and not designed for tricks and surprise effects.[18] Foster (1996) underlines another function of stage design: to re-immerse the audience's attention in the narrative at times when spectacular and exceptional dancing may pull the audience away from this.[19] It is possible to argue that lack of attention to, and simplification of, technological performance capacities - the aesthetic impact of what technologies actually do - renders technology as a kind of

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[15] Evert, 2002: p. 30.

[16] Susan Leigh Foster (1996) explains that the early nineteenth century witnessed a division in dance vocabulary on the basis of gender. From this point onwards, male competence is evaluated by "their ability in high leaps, jumps with beats, and large multiple turns" whereas "feminine dancers were required to master (…) intricate footwork, turns, and extended balances associated with pointe work." Foster, L, Susan. *Choreography and Narrative. Ballet's Staging of Story and Desire*. Indiana: Indiana University Press, 1996: p. 202.

[17] Foster, Leigh, Susan. *Choreography and Narrative. Ballet's Staging of Story and Desire*. Indiana: Indiana University Press, 1996: p. 255.

[18] Bland, Alexander. *A History of Ballet and Dance in the Western World*. London: Barrie and Jenkins Ltd, 1976: p.165

[19] Foster, 1996: p. 216.

spectacular supplement, attention to which needs to be kept to a minimum, in theory and practice, in order to keep all attention focused instead on the dancer onstage.[20]Another example of this invisibility of the operations of technology in dance can be found in the limited attention given to the innovation of lowering stage curtains between the acts of a play or ballet in the nineteenth century, which dance scholar Selma Jeanne Cohen (1974) points out prevented the audience from seeing "the mechanics of scene changing."[21]In all of these instances, despite the significant dependence on technology in the realization of the nineteenth century dance, we can see that both the material presence of technologies and their aesthetic effects remained largely hidden or conceptually bracketed from the perception of the audience. This leads accordingly to an overwriting of the existence and perceived presence of the important performances of technologies in and for dance. By technological performance, I mean the actions executed by the technology and their aesthetic impact on the perception of the choreography, the concept of which I explore in greater detail in chapter four.

It is also very much worth noting that greater attention to bodily performance was also being cultivated and promoted around dance performers during this period as dance burgeoned into a celebrity culture. This cultural dimension contributes greatly to consolidating and reinforcing the hierarchy of perceptual importance in and outside the theatre. In the nineteenth century, we see a shift especially in the status of the female dancer, which shapes the audience's attention towards perceptual priorities on stage: full attention was now expected to be shown to the dancing female body, which of course also downplays the role of technology.[22] Bland (1976) has convincingly gone so far as to state that the star system of dance could not have taken place to the extent that it did in the nineteenth century if it was not for the invention of gas lighting, which allowed the dancers to be individually perceivable from one another and from stage settings.[23] This technology in particular allowed the dancers to be noticeable by the audience precisely as individual

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[20] In *Choreography and Narrative. Ballet's Staging of Story and Desire* (1996), Foster writes that the reforms in the infrastructure of theatre in the late eighteenth and early nineteenth centuries, scenic designs, and new available lighting led to a separation of the roles of audience and dancer. The theatre became a place for audience members to "see and be seen", which restricted their "performance of socializing to before and after the presentation." (p. 218). The audience, in short, were offered a voyeuristic presence.

[21] Cohen, Jeanne, Selma. *Dance as a Theatre Art.* London: Dance Books Ltd, 1974: p.67

[22] As I show in appendix 2, this important shift in the introduction of a star system and the rise of the female dancer in the nineteenth century may have had a stronger impact in reifying the dancing body than the actor culture of theatre. Or at least it is the case that Baugh's study does not pay great attention to the role of celebrity players in contributing to the hierarchy of perceptual importance within the context of theater.

[23] Bland, 1976: p. 167.

performers, and the difference of their performances accentuated through technical effects, that of the lighting, as well as their own embodied competence with dance technique. Cohen emphasizes similarly, that in the nineteenth century, “innovations in theme, in technique, (and) costume” accentuated the artistic and physical qualities of the female dancer and further fostered audience attention to be “all centered on her.”[24] Furthermore, this rise of the star system, which gives such particular focus to the ballerina, indicates that the position of the (female) body onstage is even more stabilized and centralized. What is framed as the work is the relation between the choreography and the performance of the dancer: the demonstration of her artistic and technical skills in front of an audience which has been cultivated by recent, stabilizing conventions to discriminately attend to these.

These key examples drawn out from the many developments within nineteenth century European theatrical dance presentation allow us to draw some general conclusions about dance’s own paradigmatically human-centered development. First, artistic and infrastructural developments have contributed to the understanding of the human dancer as the central point onstage, while technologies, according to cultural, philosophical and staging conventions, are conceived as functioning to assist or support the framing of the dancer, or to supplement the dramaturgy only. This leads to a hierarchical ordering between technology and the human dancer, in which the human is considered as the performing element and the technology, if perceived at all, is assumed to be the non-performing component in the overall choreography. Second, the division of roles between the human and technological elements on stage instantiate and reinforce a mode of address that becomes inherent to our understanding of dance and choreography, in which the focus of audience attention is persistently channeled to the human onstage. Thirdly, this neat and hierarchical division of roles set up between the human and technological components onstage diminishes the notion of there being actually existing relations, indeed, performative relations occurring between these elements of such supposedly different categorical kinds (human vs. technology), in the creation and reception of the choreography itself. Fourthly, these changes were to generate the establishment of certain cultural practices of dance (by which I mean all of the different roles, labors and relations that go in to the creative development, staging and reception of dance). In sum, it is possible to conclude that also in dance, technology has been most

[24] Cohen, 1974: p. 68

often conceived and utilized as a means to an end in order to complement the needs of the dramaturgy and to enhance the presence of the dancing body onstage.

When we think of dance, a common cultural tendency is to think of moving (human) bodies. While the central position of the (human) body and movement is a late nineteenth and early twentieth century phenomenon that has been challenged by contemporary choreographers in the second half of the twentieth century,[25] this common conception still holds a prominent position in how we speak of dance in practice and discourse today. For example, DeSpain (2000) describes dance as the most "human of all art forms (…) by the simple logic that its medium of expression is the human body itself." [26] Learning classical and (various) modern dance technique(s) is still an important part in dance education and these are the means with which dance schools promote their educational program.[27] Moreover, the use of dance movement establishes the basis for movement therapy, a

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[25] André Lepecki's and Susan Leigh Foster's study on dance and choreography are useful to illustrate the changing understanding of dance and choreography. In *Exhausting Dance. Performance and the politics of movement* (2006), Lepecki emphasizes that the commonsensical association of dance with movement is a fairly new recent historical development. Although dance has been driven towards unstoppable motility since the Renaissance, it was "only in the 1930s that the strict ontological definition between uninterrupted movement and dance's being was clearly articulated as an inescapable demand for any choreographic project." (pp. 3-4). This outcome, according to Lepecki, becomes dance's modernity or its kinetic mode of being-in-the-world. This twentieth century understanding of dance as movement, he argues, is challenged by certain contemporary choreographers, such as Xavier Le Roy and Jérôme Bel. Bel, for example, in *The Show Must Go On* (2001) resists expectations of seeing movement in dance by making his dancers kneel down and remain motionless during the song 'Killing Me Softly'. Whereas Lepecki focuses on questions of the ontology of dance, Foster (2011) offers an elaborate account of the changing meaning of choreography, showing how choreography is a dynamic concept that adapts itself to social-cultural and economic factors in different moments in history. In *Choreographing Empathy. Kinesthesia in Performance*, Foster (2011) explains that the meaning of choreography as it emerged at the end of the eighteenth century referred to the practice of notating dances. The term generally fell out of use during the late eighteenth and nineteenth centuries, reappearing again at the beginning of the twentieth century, now specifically implying the act of creating a dance. Here, it entailed not only the arrangement of movement but also the personal statement of the choreographer, which carried universal significance. Choreography went through another set of modifications in the 1960s, which challenged its early twentieth century understanding through various ways: by implementing collective forms of dance-making, by taking non-dance technique movements as a starting point for the choreography, by incorporating improvisation into choreographic practice, through participating in specific projects as a result of public and private funding, and via the positioning of dance in a global circulation of marketability, which fragmentized choreography, opening it up across ages, physical (dis) abilities, and hybrid bodies.

[26] DeSpain, 2000: p. 11.

[27] For example, the Modern Dance Department at the Theaterschool (AHK) in Amsterdam states that "a dynamic dance profession needs contemporary and individualistic dancers with a high technical standard and theatrical dance capabilities.During the first two years of the study program, emphasis lies on developing the necessary dance technical skills and building up a dance vocabulary based on classical ballet and contemporary dance, off the floor and from a standing position. Lessons in improvisation, composition, partner work, contact improvisation, movement research, movement analysis, physical theatre, drama, music, dance history, philosophy, dance health, Alexander technique and contemporary repertoire ensure a deeper and broader development of your skills towards becoming a versatile, accomplished and excellent dancer/dance performer." http://www.ahk.nl/en/theaterschool/dance-programmes/modern-theatre-dance Accessed on 19.06.2012.

psychotherapeutic use of dance movement for cognitive and emotional conditions. In examples such as these, it is a given that the human body is the source of movement, of what is taking place. The human is thus deemed what performs. My own work is instead invested in unpacking the consequence of this human-centered understanding of dance, in so far as it tends to lead to simplistic categorical and functional division of roles between the human and technological components through which dance is developed and presented. If only the human is deemed to perform, is considered to take on central and active roles, technology is assumedly non-performing, passive, and for the most part, static or fixed as an element, taken up with only to service the human performer and dramaturgy. We can see this human-centric understanding of dance perpetuated by the cultural practices professionalized for this art form.

1.3 Artistic hierarchies in the cultural practice of theatre and dance: creation and perception

The hierarchy of perceptual importance tends to be perpetuated by more recent dance practices that remain invested in the twentieth century idea of dance as being ontologically concerned with human movement - especially as this concern plays out in the the process of creative development and in the perception of that development's final product by the audience. Here, to understand theatre and dance as cultural practices is to recognize that the shared, habitual activities of theatre and dance artists, which seem to be self-evident and which are repeatedly performed as "professional" roles and medium-based investments, have been shaped by cultural developments and forces that are as historically constructed as they are ontologically invested.

Baugh underlines that the hierarchy of perceptual importance that emerges from the above-mentioned historical and cultural formations of early Western theatrical presentation in the nineteenth century has also perpetuated a similar hierarchy of values in the roles of those involved in the creative development of experimental art works. Performance making involves an artistic hierarchy, which breaks down into distinct roles and functions during the production of a single work, and most importantly ascribes greater value to specific artistic roles over others. According to Baugh, situated at the very top of this artistic hierarchy as it operated during the nineteenth century Western theatre is:

> A writer of plays (…) whose words are mediated by the director-interpreter of plays, and on to a company of actors supported by a team of scenic and technical artists and artisans who realized a theatrical presentation of a play.[28]

This quote points not only to this hierarchical division of artistic roles but also ascribes lesser value to inhuman and technological material elements onstage. Scenic and technical artists appear later in a chain of command and labor to support the realization of the presentation of a writer's text. The artistic hierarchy of text over technology reinforces this hierarchical mode of working where the theater text is created first and 'support' staff are only later invited to join the collaboration further along in the creation process. In such a model, the effects created by the scenic and technical artists can only have a delimited impact on the creation of the theater production. Utilized and positioned as craftspeople,

[28] Baugh, 2005: p. 217.

those working directly with theatre technologies, scenic and technical 'support' staff, facilitate and complete the presentation of a prior-visioned artistic work.

The hierarchy of perceptual importance therefore organizes and gives different values to the text, body, and technological components (broadly defined) of an artistic work, and this is recaptured in the artistic recognition given to writers', performers' and technician's labor (in that order) by audiences. This cannot but contribute to the creation of a dominant human-centered mode of address, which manipulates what the audience attends to perceive on stage and what they consider to be less worthy of aesthetic attention. All of this amounts to the reception or audience side of the hierarchy of perceptual importance, whereby despite the role of non-human elements on stage and the artistic labor of technical staff, only human performers' bodies are seen as the performing elements of the work, and technology in turn is assumed to be a non-performing element. In other words, the perceptual effects created by the stage technology are made less visible for the perception of the audience in the artistic and institutional relations of theatre makers.

Similar to theatre, dance conceived as a cultural practice shows an artistic hierarchy among the parties involved in the creative development process. In the artistic hierarchy of dance, the choreographer is seen as more important than the dancer, and both are seen as more creatively important to the performance than the technical staff, such as lighting or costume designers, and so on. This hierarchical order within the cultural practices of dance even plays out in studies seemingly dedicated to dance design and still holds a strong place within the cultural practices of dance.[29] Dance scholar Judith Gray for example writes that a choreographer "should be able to demand a most exciting and innovative lighting design to complement a dance performance (…) and enhance its form."[30] Gray's words not only preconceive a hierarchical structuring of roles between the parties involved in creative production, but also perpetuate a similarly linear chain of commanded production, in which the choreography is created first and exclusively, while so-called technological supports such as lighting or costumes, are designed when the choreography is largely complete.

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[29] I would like to emphsaize here that I do not intend to generalize about the operation of an artistic hierarchy within the field of dance; rather, I aim to draw attention to strong tendencies within this artistic practice. Many examples of less hierarchical creative processes exist, such as choreographies that fall under the category of post-modern dance traditions as these began to emerge in the 1960s.

[30] Gray, A, Judith (ed.). *Dance Technology. Current Applications and Future Trends*. US: 1989: pp. 127-128.

To consider dance as a cultural practice is to also attend to professional delineations of roles, and cultural practices of reception. The hierarchy of perceptual importance is recapitulated in conventional conceptions of dance professionals' tailoring of their very specific contributions towards human-centered audience pleasure. Cohen for example, describing the elements that go into the successful production of a finished theatrical dance piece include "a performer equipped with movement skills, a role to be played, a stage to lay on, music, costume, and décor to enhance the spectacle, an audience to respond to it."[31] It is the human performer that is "framed" here as the primary focus, while the other elements are gathered around this, to enhance that focus in one way or another. Practitioner and teacher of stage design, Horace Armistead (1961)writes that professional stage design depends on the requirements of the dance performance, and should be constructed to "enhance not obscure the ballet."[32] Also for stage designer Ruben Ter-Arutunian (2004), elements of stage design, such as costumes, scenery, and lighting, function primarily to "organize" the stage and to provide a dramatically conditioned atmosphere that will complement and emphasize dance movement, and thus, the dramaturgy of dance.[33] Costume design, which I conceive as a technology throughout this thesis and in line with Baugh, is the artistic labor most often considered as supplementary - it is conceived to enhance the physicality of the dancer by giving precise definition to the dancer's body, accentuating principles of anatomy, and tailoring design towards the enhanced display of dancers' figures in motion.

A brief look at studies on the role of lighting in dance complete my argument regarding the embeddedness of the hierarchy of perceptual importance in cultural practices of dance. For instance, lighting designer Jennifer Tipton (2004) writes about lighting as almost the supplementary outside of dance practice: "we see the shape, feel the rhythm, sense the passion-perceive dance on its many levels and in its many forms by the light that reveals it."[34] In Tipton's view, lighting functions to enhance the impact of the kinetics of human movement by carving the body out of space for the perception of the

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[31] Cohen, 1974: p. 2

[32] Armistead, Horace. 'Designing for the ballet' in Larson, Orville (ed). *Scene design for stage and screen: readings on the aesthetics and methodology of scene design for drama, opera, musical comedy, ballet, motion pictures, television and arena theatre.* East Lansing: Michigan State University Press, 1961: p. 211

[33] Ter-Arutunian, Ruben. Designing for dance' in Cohen, J, Selma (ed). *International encyclopedia of dance*. (vol 5). Oxford: Oxford University Press, 2004: pp. 390-393.

[34] Tipton, Jennifer. 'Lighting in Dance' in Cohen, J, Selma (ed). *International dictionary of dance* (vol 5): Oxford: Oxford University Press, 2004: p. 192.

audience. Following a similar logic, theatre scholar Willard Bellmann (1977), argues that lighting complements performance by guiding spectators' perceptual attention towards certain events or characters when this is necessary for the development of the dramaturgy.[35] For Bellman, by enhancing the physicality of the human body, lighting aids to reinforce a hierarchical mode of address for the audience, which determines what the audience should see and how they should perceive what they see - namely an accentuated dancing human body. In all of these ways, we can see how the cultural conventions and professionalized relations of choreographic, staging, design, costuming, music, lighting elements and practices, the way these come together in creative development and in the reception of dance by audiences, all contribute to perpetuating the hierarchy of perceptual importance in dance. Each can be seen to contribute to a human-centered notion of performance, which gives a supplementary status to the technological realm.

Nevertheless, it would be a misconception to think of the operations of the hierarchy of perceptual importance, set up in the nineteenth century, to have been stable, or following a 'progressive' or linear trajectory throughout history. Baugh's longitudinal assessment of the conventions and legacies concerning the use of technology within Western theatrical performance pays close attention to how the hierarchy of perceptual importance was also challenged in specific periods – at the turn of the twentieth century, in the 1960s, and in the 1990s especially - by experimental and avant-garde artists, in the context of changing cultural and social investments informed also by scientific discoveries and innovations, which I elaborate in the following section. The examples that I present from Baugh here are a selection of experiments that show most relevance for the arguments of this thesis. I add to Baugh's examples additional works that have exceptionally interrogated the integration of technology within the art form of dance.

[35] Bellmann, F, Willard. *Scenography and Stage Technology. An introduction*. New York: Harper and Row Publishers, 1977: p. 381.

1.4 Counter-practices: performing technologies in dance, theater, and performance in the 20s and 60s, and their recursion in the 1990s

According to Gunther Berghaus (2005), scholar in art and performance, challenges to the humanist foundations and conventions of nineteenth century performance are best understood as being linked to the 'crisis of modernity', brought on by increasing urbanization and capitalist industrialization, advances in knowledge, new scientific discoveries and technological inventions, such as the invention of the X-ray, at the beginning of the twentieth century.[36] This crisis, accompanied by such a confluence of new ideas, shook the strength of beliefs, values and attitudes established in the nineteenth century, established around prosperity, individualism, and universal liberation. Especially challenging these, Darwin's *On the Origins of Species* (1859) reassessed the position of the human species in the world, Freud's papers on the unconsciousness unsettled the stable concept of the ego, and quantum physics especially destabilized the materialist-positivist understanding of the world.[37] The nineteenth century function of art through which artists sought to make universal and timeless claims to a homogeneous audience could accordingly no longer correspond to the increasingly industrialized European world-view by the turn of the twentieth century.[38]

Especially key to avant-garde performance practices at the turn of the twentieth century was the questioning of the position of technology in art. Avant-garde art and performance movements such as the Futurists, rejected the conventions of nineteenth century theatrical presentation, and thus, the domination of texts and the centrality of the

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[36] Berghaus, Gunter. *Theatre, Performance, and the Historical Avant-Garde*. New York: Palgrave MacMillan, 2005: p. 26.
Berghaus conceives modernity as the period between the sixteenth century that reached a peak with the Industrial Revolution and the establishment of capitalism as the determining force in society (p. 24).

[37] Berghaus, 2005: pp. 26-35

[38] For example, Baugh (2005) explains that the invention of the X-ray (1895) designated another reality of the human body beneath its surface, which led to an aversion from representational realism and triggered the need to a search for other ways of expression of reality, such as cubist perspectives in art. Baugh, Christopher. *Theater, Performance and Technology. The Development of Scenography in the Twentieth Century*. New York: Palgrave Macmillan, 2005: pp. 37-40.

human body in the valuation of art works.[39] They re-imagined the hierarchical ordering between the human and technological, and between animate and inanimate elements on stage, so as to think about the role technologies of staging, including even costuming, in a different light, beyond mere servants of the actor, theatrical text, or the dancer. New attention was given to the visual effects created by technology, and technology was also being staged in a more central position within the artwork - in these ways, the possibility of considering technology as a performing element was being rehearsed. From theatre experiments of this period, I want to pay special attention at this point to the counter-conventional provocations of stage designer Adolphe Appia, who developed an innovative theory on lighting and stage design, and the Russian and Soviet theatre director Vsevolod Meyerhold, known for his provocative experiments and unconventional stage design within modern theatre. In Appia's work, the role of theatre lighting stood central and his theories on design have made a great contribution to modern perceptions of the relationship between the performance of space and lighting in theatrical presentation. Meyerhold's work is significant in the sense that he attempted to realize a responsive relationship between the human actor and kinetic stage design. I suggest both of these figures parallel experiments in counter-conventional dance practices, which challenge the hierarchy of perceptual importance in different ways.

Purposively destabilizing conventions of lighting design, Appia's approach to stage lighting in the early twentieth century aimed to emphasize and integrate lighting design elements as equivalent to another level of creative development, rather than as technological supplementation. Appia rejected the received understanding and function of lighting as mere illumination for the stage and/or the painted scenery. Rather, he understood lighting as an expressive component of staging, one, which could "continuously change, blend, and harmonize throughout the entire time sequence of the production."[40] Appia made special distinctions between diffused light, which refers to light used for illumination purposes and 'living light' which he understood as intense light used to cast shadows by using beams of particular focus. Hence for Appia, light could become a performative element in the performance.

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[39] It is necessary to make the point that these rejections took place in various forms, such as inviting the audience to take part in the development of the art work as art historian Soke Dinkla (1996) explains in 'From Participation to Interaction. Toward the Origins of Interactive Art' in Leeson, Hershman, Lynn. *Clicking In:Hot Links to a Digital Culture*. Seattle: Bay Press, 1996: pp. 279-300. Moreover, avant-garde artists, as Berghaus (2005) writes, held a preference for unrepeatable performances based on improvisation rather than the execution of a fixed theatre text. Interesting as they are, I do not focus on these developments because they are not crucially relevant for the arguments of this thesis.

[40] Baugh, 2005: p. 105.

Paralleling Appia's thinking, in dance, the experiments of Loïe Fuller, one of the most influential dancers of the (early) twentieth century, need to be mentioned. Fuller, who was a major inspiration for the Futurists, became known through her stage performances in Paris, which put together innovative lighting, stage technology, and costumes. Mostly known via her 'Serpentine Dances', Fuller created costumes made out of lengthy cloth, and experimented with projecting images of light on to these, while supplementing this with swirling arm movements. Through this combination of performing elements she achieved "mesmerizing effects."[41] While cultural theorist Ted Merwin (1998) writes that Fuller used technology "to heighten the psychological effects of her art",[42] Evert conceives of her experiments differently, suggesting that Fuller's "specially constructed garments made of rod and voluminous lengths of material" transformed her body into non-human shapes and made the body "virtually 'disappear'."[43] Considering the fact that Fuller was not classically trained in ballet or any other formal dance technique, but began her career in vaudeville, and in the circus, Fuller may have indeed been most invested in the creation of spectacular visual effects from the inherent capacities of the light projections themselves. Regardless of which is the case, the performance of light projections in both Appia and Fuller's work conceptually prefigures experiments in digital dance in the 1960s and 1990s.

Still in the context of the early twentieth century, it is also relevant to a conceptual appreciation of staged digital dance's precursory experiments that the notion of movement became extremely important to many modern artists' theories and practices at this time.[44] In theatre, the radical attribution of movement to inanimate objects and sets signified a challenge to the passivity of inhuman elements and landscapes over which human(ist) narratives and conquests unfolded. Meyerhold's stage design in *The Magnanimous Cuckold* (1922) is an exemplary instance of such a challenging kinetic stage design. In this artwork, Meyerhold aimed to integrate stage design into the artistic experience of the work at another level, so that the stage itself became a more central element in the presentation of performance, and a responsive relationship between the human actor and the kinetic

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[41] Sinsky, Caroline. 'Loie Fuller'. http://modernism.research.yale.edu/wiki/index.php/Loie_Fuller. Accessed on 18.04.2012.

[42] Merwin, Ted. 'Loie Fuller's Influence on F. T. Marinetti's Futurist Dance'. *Dance Chronicle,* vol. 21, no. 1 (1998): p.74.

[43] Evert, 2002: p. 36

[44] Baugh points to Albert Einstein's theory of relativity, which overturned Newtonian laws of motion and led to new perceptions of movement as well as time and space, as a major influence on the changing attitudes towards movement. *heater, Performance and Technology. The Development of Scenography in the Twentieth Century*. New York: Palgrave Macmillan, 2005: p. 9.

stage design could be experienced by the audience. Several parts of his set were designed to move in ways that responded to actors' movements, almost as if commenting on the actor's gestures. To be clear, this was not literally the case - the stage's parts were operated manually, possibly by Meyerhold himself, and only *appeared* to be technically responsive to the actor.[45] But the design presented the audience nevertheless with the *perception* of this performative inter-relation. This implementation of moveable stage design in *The Magnanimous Cuckold* is an extremely compelling development for my argument, because it disrupted the convention of discrete and hierarchically focused distinctions between human and technological elements on stage, and aimed to capture both as agential elements onstage, rather than relegating the stage to the role of framing human movement. The fact that the technology at the time could not actually achieve this technically, but only aimed at this equal agency and responsivity as a perceptual *effect,* makes Meyerhold's work even more of a pre-digital precursor to some of the staged digital dance experiments that I theorize in terms of technological performance and interperformance in chapters four and five.

Extrapolating laterally from Baugh's conceptualization of dominant versus counter-conventional performance practices, Oskar Schlemmer's and the Futurists's innovative costume designs for dance productions deserve special mention for the challenge they present to conventional hierarchies of reception of the performing body. In fact both Schlemmer's and the Futurists's works are extremely radical in terms of the staging of the artworks. Mostly known for his work at the Dessau Bauhaus, Schlemmer held an unconventional understanding of the relationship between the dancer and costumes. He perceived the human body as a relation of geometric shapes, such as cylinders, circles, and triangles. These geometric shapes formed the basis of Schlemmer's sense of abstraction and established the starting point in his costumes, for instance in *Triadic Ballet* (1922), a choreography that portrayed three dancers in abstract geometrical costumes.[46] According to scholars of scenography, McKinney and Butterworth (2009), Schlemmer "considered costume to be the wearer of actor/dancer (and not the conventional way around)."[47] Indeed, in *Triadic Ballet*, first the costumes were created, and then, the dance

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[45] McKinney, Joslin, Butterworth, Philip. *The Cambridge Introduction to Scenography.* Cambridge: Cambridge University Press, 2009: p. 138

[46] McKinney and Butterworth, 2009: p.27

[47] McKinney and Butterworth, 2009: p.25

movement was invented.[48] In other words, Schlemmer's approach to costume was unconventional because his starting point was not the anatomy of the human body at all, but geometrical shapes - abstractions first that informed the treatment of the choreographed body in turn. Schlemmer's approach in this way reverses the hierarchical ordering between the human body and costume established in the nineteenth century as well as the hierarchical mode of production explained in the following section.

Unlike Schlemmer's abstract costumes, the costumes designed by the Futurists were dictated by the aesthetics of the machine. Being inspired by the dynamism and energy associated with technology, the Futurist imagination conceived the actions of the performer in terms of mechanized movement. In addition, the Futurists' admiration for technology and the machine led to the envisioning of the human as robots or conjunctions of flesh and metal. Performance scholar Steve Dixon (2003) describes the Futurist's mechanical ballets, such as Franco Casavola's *Machine of 3000* (Machina del 3000, 1924), which featured dancers in "robotic, tubular metallic costumes" as exemplary instances of machinic aesthetics.[49] Through such works, the Futurists' experiments can be understood to question the role of costumes as supportive devices, while enhancing the physicality of the dancing body through interests *other than* the organic body. This twist established the starting point for the creation of costumes.[50] Although such experiments are still seen as innovative and challenging to performance conventions (in the theatrical tradition), it can also be seen that such works did not on the whole destabilize the central position of the actor totally. Arguably, more radical provocations were being made at this time in Futurist's interruptions of dance conventions.

Interestingly, whereas scenography scholars Baugh and McKinney and Butterworth consider the experiments of Schlemmer and the Futurists as key and radical precursors to conceptual innovations in scenography, dance historian Evert's study emphasizes that Futurist experiments with dance were not always received positively by dancers and choreographers. Relying on Evert's work, I argue that the rejection of such experiments by the dance field have perpetuated a rejection and fear of technologies within later dance cultures. To this extent, the legacy of this rejection, I suggest, haunts the literature of digital

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[48] Anderson, Jack. 'Dance: Triadic Ballet, a la Bauhaus'. *New York Times*, 3 October, 1985. http://www.nytimes.com/1985/10/03/arts/dance-triadic-ballet-a-la-bauhaus.html, Accessed on 18.04.2011

[49] Dixon, Steve. 'Futurism E-visited'. *Body, Space, Technology Journal*, vol 3, no 2 (2003). http://people.brunel.ac.uk/bst/vol0302/index.html, Accessed on 14.04.2011

[50] Futurist painter Giacomo Balla's scenographic exploration in *Feu D'artifice* (1917) went as far as to replace human dancers with "transparent conical and rectangular structures, brightly painted, and illuminated from within." Berghaus, 2005: p. 115.

dance also. I explain the legacy of the historical embrace (and rejection) of such experiments in dance and technology at the start of the twentieth century in chapter three in more detail when I discuss the literature of digital dance. For now it is sufficient to state that it is only in the last three decades of the twentieth century that we have seen strong artistic re-investment in the de-hierarchization of the human performing body.

Here then, the cultural, political and technological shocks of the 1960s combine in a different way to interrupt the perpetuation of the hierarchy of perceptual importance in performance. Changes to theatrical staging in this period onwards have been covered in the writing of Hans-Thies Lehmann (1999, 2006) in his work on postdramatic theatre. In Lehmann's view, the central position of the text in theatrical presentations from this moment onwards has been fundamentally destabilized, which is the most important development for theatre understood in the wake of this moment.[51] In the postdramatic mode of production, such as in the work of the internationally acclaimed Wooster Group (based in New York) and Jan Fabre (based in Belgium), the theater text is only one possible component that may be used in the creation of a performance; equal attention or emphasis might be given to body, space, time, and media, in any combinatory relation.[52] Because these aspects have become leveled, or of equal, or unpredictable, or especially non-binary importance, this movement of postdramatic production therefore instantiates a non-hierarchical relationship between the text and all other components of the performance. Baugh similarly recognizes the significance of postdramatic theatre's reconceptualization of human-centered performance conventions.

What is most important to draw from this postdramatic consciousness, that I argue invades both theatre and dance conceptually at this time, is that our understanding of scenography gains a new meaning from precisely this leveling of performance elements. Whereas the origins of the term is associated with scenic painting and architectural perspective, authors such as Baugh (2005) and Butterworth and McKinney (2009) underline that since the 1960s scenography is being appreciated as a component of the performance proper. This understanding of scenography destabilizes and renders irrelevant the older artistic hierarchies of creative production and aesthetic reception:

> The concept and practice of scenography does not promote existing hierarchies of roles and functions in the creation of theatre, dance, or performance. Scenography and its production sit uneasily within the existing functions of writer, director, choreographer, designer, and performer because

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[51] Hans-Thies Lehmann. *Postdramatic Theater*. New York: Routledge, 2006.

[52] Lehmann describes text, space, time, body, and media as the aspects of postdramatic theatre.

> each, or any combination, of these roles is capable of producing scenography in new ways that will not accept restriction implicitly imposed by such singular identities.[53]

All of this culminates in postdramatic performance practices in which the human is leveled out to appear alongside other technical elements. The conceptual challenges posed to theatre's hierarchical, human-centered conventions, most recently by postdramatic theatre and Lehmann's articulation of these, coincide with de-hierarchicalized approaches to technology, space, time and energy that I am observing in digital dance in this thesis. In both postdramatic theatre and staged digital dance, it is the centrality of the text/actor, and in dance the dominating attention to the human body, that is being challenged so strongly in the production and presentation of these performances. What seems anomalous about this fact however, is that while postdramatic theatre makers and theorists are quite conscious of the provocations that postdramatic theatre pose to theatre conventions and heritages, the literature on staged digital dance has seemed to lag behind in a persistently humanist orientation to performance. I will show this with reference to the recent literature on digital dance in chapter three. Furthermore, while Baugh and McKinney and Butterworth have an agenda in raising the status of scenography, it is important to note that this agenda on its own does not necessarily lead to fundamentally altered conceptions of technology per se. For my own work in contrast, we additionally need to draw out this question of what it means for the status of *technological performance* to be 'raised' *as a question* and recognized as such.

More commonly this question of technological performance is elided by the concept of new media aesthetics in art and performance, through which (usually) phenomenological accounts of technologized experience (of the human) are considered central to artistic and theoretical inquiry. Indeed there is much excellent scholarship along these lines, as performance practice and theory shifts from modernist regimes of thinking and feeling through computerization, digitalization, and virtualization.[54] The integration of computer-based technologies into all ranges of art works from the 1960s onwards not only presents new capacities through which to view performance and to create aesthetics effects, but also to rethink performance itself, and to remodel the professional roles and

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[53] McKinney and Butterworth, 2009: p. 5.
According to these authors, the works of the scenographer Josef Svodoba (1920-2002) has made a significant contribution to the meaning of scenography as a performative element in the artwork, alongside the human.

[54] See for example Hansen, Mark. *Bodies in Code*. *Interfaces with Digital Media*. New York: Routledge, 2006 and Munster, Anna. *Materializing new media. Embodiment in information aesthetics.* United Sates: Dartmouth College Press, 2006.

relations of production teams. These changes which date from the 60s but which have now taken hold in yet another way in the 1990s with the global expansion of art and networked digital media technologies, offer up new ways to combine the de-hierarchized elements of theatre - text, body, space, time, and media. Going back to my comments on the raised importance of the scenography, it is possible to argue that scenography, very broadly defined, shifts to take on "performer" roles in the artwork here. Indeed Baugh underlines this point, explaining that:

> The ability that more recent computer technologies have of being able to program precisely controllable light, sound, and scene has done much to enable scenography to explore its own vocabulary and, through the duration of movement, to become a performer within the performance.[55]

What is notable in this quote is not only the changed value of scenography, but the changed degree to which these newer (computer-based) technologies involved in the production and reception of an artwork are actually deemed to contribute to an artistic performance. Baugh stops at considering the consequences of this however. What does it mean that now computerized scenographies, broadly defined, can be deemed 'performers' alongside and in relation to human bodies? He does not say.

While I will deal with the question more fully in chapter four and five, it is relevant at the end of this chapter to consider a few final and key artworks which stand as conceptual precursors to staged digital dance's very specific investments in the dialogue and entanglement of dancing bodies and technologies. Such efforts at entanglement happened in many different ways in the 1960s and just as in the 1920s, their challenges to dance conventions were not often always considered aesthetically "successful". Especially prominent experiments with dance and technology at this time includes *Nine Evenings: Theatre and Engineering* (1966), which brought together engineers of the Bell Laboratories and ten postmodern choreographers and, secondly, *Variations V* (1965) which was created by the choreographer Merce Cunningham and the composer John Cage. Both artworks generally received negative attention by dance's public at this time.[56] Evert points out that *Variations V* (1965), which used wireless transmitters as a precursor of digital dance, was seen to transform the dancer into a mere sound supplier or a transmitter of sound. *Variations V* integrated dance with an environment that would react to the dancer's movements by means of photoelectric cells used for the registration of

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[55] Baugh, 2005: p. 212.

[56] See the DVD *9 Evenings: theatre and engineering*. Dir. Barbro Schultz Lundestam, 1997 and Miller, E. Leta. 'Cage, Cunningham, and Collaborators: The Odyssey of Variations V'. *The Music Quarterly*. 85(3), Fall (2001): pp. 545-567

movements within the space and microphones for the registration of sound. The dancers' movements in space were 'sensed' by this technical system and generated the 'soundscapes' of the artwork. Also in Evert's view, *Variations V* made the dancer fully dependent upon the technology, which in fact was not Cunningham's artistic intention at all; the choreographer was invested quite contrarily in enabling the dancer to become independent of the music, rather than constrained by it. Without intending to, Cunningham was seen instead to be countering the hierarchy of perceptual attention in shifting the position of the dancer in relation to music/sound via the mediation of wireless transmitters, an experiment, which at this particular cultural moment was deemed aesthetically unsuccessful by the audience.

Another important choreographer of this period invested in the decentralization of the human and the integration of technology is the American choreographer Alwin Nikolais. Nikolais explored the potential of light projections in dance between the 1950s and 1990s. Although Nikolais experimented with analogue rather than digital technologies, interesting for the arguments of this thesis is the strong role of inanimate elements in Nikolais's choreographies and the concept of staging of what he called 'decentralization'. Unlike many other dance presentation practices in which setting is presented as background for choreography, in Nikolais's choreographies, inanimate elements are not:

> Assigned the usual supportive role, wherein they are used to decorate a pre-formed drama. He makes them in themselves the script and the actors. In the very being of color, the growth of light, the breathing of shape, the shimmer of sound, art moves art, sculpture mounts sculpture and the action of drama unfolds.[57]

For Nikolais, decentralization in choreography implies the removal of any structure that might convey a particular meaning or center, such as a purposive linear development, a storyline, or focusing on characters.[58] But it also implies a shift in the human's central position in the dance. According to performance and fine arts scholar Barbara Nickolich, Alwin Nikolais:

> (...) sees man as a minute, though important, mechanism in the universe. Sometimes man has a major relationship to other elements; other times the relationship is a minor one in which he is obscured by the mechanistic workings of the universe. He is not dominant.[59]

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[57] Grauert, E, Ruth. 'The dance theatre of Alwin Nikolais'. *Bearnstow Journal*, http://bearnstowjournal.org/1963_souvenir_booklet.htm. Accessed on 18.02.2012.

[58] Nickolich, Barbara. 'The Nikolais Dance Theatre's Uses of Light'. *The Drama Review: TDR,* vol. 17, no. 2, Visual Performance Issue (1973): pp. 80-91.

[59] Nickolich, 1973: p. 81.

This results in a decentred notion of dramatic presentation that goes well beyond the humanist positioning of man at the centre of that drama and so also re-orders the conventional nineteenth century hierarchical relationship between humans and technology in performance practice.

Despite these counter-practices, which question the central position of the body or which introduce different roles for technology, and despite Baugh's attention to the issues that such practices raise concerning the question of technology, I am aware that little has been written on the actual performativity of technology itself in dance, or of the relationship between human and technological performances inside of singular choreographies. This is strange given that dance has always incorporated technology, even when purporting to ignore this – treating it as a peripheral component. More recently, questions concerning the use of technology in dance have become more fore-grounded since the mid-1990s, with the establishment of digital dance. During this period there has been an increase in the production and consumption of artworks that integrate technology and much greater enthusiasm, the reaching of a tipping point even, for such seemingly counter-conventional practice. In these recent digital dance practices, the visual effects created by interactive technologies especially, and the relationships set up between the human dancer and such technological elements and effect, seem to take such an important role that we are asked, even compelled into thinking about the role of technology in digital dance practice differently. Furthermore, if it is indeed the case, as I will argue in chapter three, that the hierarchy of perceptual importance is still quite dominant within dance as a cultural practice, then enthusiasm for staged digital dance stands out precisely in terms of these practices' investment in destabilizing the persistent hierarchy of perceptual importance. The next chapter will detail closely how this destabilization of the hierarchy of perceptual importance actually plays out in the very specific cultural practices of staged digital dance - its processes of creative development, production, and critical reception - using the case study of *Apparition.*

1.5 Conclusion

In this chapter, I have shown the operation of an artistic hierarchy in theatre, and then, in dance. For this, I have first examined the work of Baugh on the development of the role of technology in theatre in the nineteenth century and, then, where applicable, I have elaborated on the development of the role of technology in dance. This has been useful in underlining how the role of technology in theatre and in dance is considered as an assisting device to support the human performer onstage and/or the flow of the dramaturgy. It has also enabled me to point to a human-centered mode of address with regards to the staging of choreography as well as the reception thereof.

The consequence of a human-centric staging of dance, I have argued, has led to the establishment of certain cultural practices of dance (meaning patterns that are constantly repeated), which also operates on a hierarchical manner. In such practices, the choreography 'proper' is created and the supporting elements, such as lighting and costume, are added later when the choreography is more or less finalized. I have shown how such cultural practice of creation positions technology as a non-performing element onstage; it denunciates the perceptual aesthetic impact on the choreography and the relationship between the human and technology of any kind to a great degree. Moreover, I have shown how the hierarchy of perceptual importance is still dominant within current works on the cultural practices of dance and also theater.

To underline the rigor of the changes offered by staged digital dance to the nineteenth century hierarchical mode of creation and reception, in the next chapter, I take a close look at how the integration of interactive technology challenges some of the artistic and procedural hierarchies within the cultural practices of dance. By doing so, I show how staged digital dance destabilizes the hierarchy of perceptual importance within creation and reception by examining major shifts in roles and relations in its practice, which I demonstrate via the case study *Apparition.*

CHAPTER 2.

Shifts in roles and relationships within the cultural practice of digital dance

2.0 Introduction

In the previous chapter I have described the concept of the hierarchy of perceptual importance between human and technology in theatrical performance, and opened up the possibility of viewing developments in dance through this concept first elaborated by Baugh. It is indeed the case that choreographies in which technology is integrated as a supporting component of a performance - to augment the physicality of the human performer or to cohere a conventional narrative together - have proliferated in the dance field. This type of choreography, I explained, results in a particular mode of address and conventions of perception for the audience, in which the aesthetic effects enabled by the technology paradoxically render the presence of technological performance invisible, and channel the audience's focus to the human performer onstage. I also illustrated how this is the case both at the level of creation and reception. This institutionalized notion of hierarchies of artistic expertise tends to downplay the value of the aesthetic effects created by the technology, reducing aesthetic appreciation of the technological performances, and the relationship between human and technology, to a minimal level for the perception of the audience.

Yet, as I explained via the opening scene of *Glow* in the introduction of this thesis, staged digital dance practices have emerged to present to audiences quite a different mode of address concerning the role played by the interactive system within the choreography. In staged digital dance, the interactive system is often featured on the stage, through projected visual images, throughout the entire choreography. These real-time generated visuals are hyper-exposed technological elements according to the perception of the audience, belaying an interactive aesthetic at the center of the artwork. This equal or leveled prominence of human and technological effect generated by the engagement of the human dancer and the interactive system has significant impacts upon the aesthetic perception of the work of dance as a whole. In addition, the choreography of staged digital dance often conceptually or narratively elaborates upon this relationship set up between the human performer and the output of the interactive system. Hence, staged digital dance portrays a significant increase of choreographic and viewer attention to the role and workings of the interactive system, the exposure of the aesthetic effects of technology, and experimentation in the technical and conceptual relationship between human and technology, all within the choreography itself.

In this chapter, I argue that this dual character of staged digital dance (as composite of human and technological elements), and the different integration of the role of technology within its choreography, generates certain shifts in the cultural practices of dance. More specifically, I examine how staged digital dance alters the cultural practice of creation and perception of dance. At the level of creation, it is important to recognize changes in the roles and relations among the artistic (human) agents involved in creating works that result from this prominence given to the interactive system and its aesthetics within the choreography. I demonstrate these changes via 'thick interviews'[1] with *Apparitions*'s dancers Desireé Kongerød and Robert Tannion who were also the choreographers in this artwork. At the level of reception it is necessary to consider the perception of audiences, which I capture in the ephemeral documentation and reviews surrounding the case studies examined in this thesis—*Apparition* (2004), *Glow* (2006), *16[R]evolutions* (2006). By attending to these texts by reviewers and critics invested in dance performance, I am working under the provision that such present and informed parties are indeed key contributors to the discourse on digital dance. From the perspective of this thesis, examining changes at the level of production and reception together in this way is useful in grasping a sense of how staged digital dance problematizes human-centered conventions and habits within the art form of dance.

Section 2.1 introduces *Apparition*. Section 2.2. discusses the level of creation and the mode of working required in staged digital dance with the aim to show how technology takes on a central role as a performing element and dance partner within the choreography. Section 2.3 presents the reviews of the selected case studies to demonstrate how the staging of the choreography leads to different perceptions of the role of technology. This chapter ends by underlining that the notion of performance needs to be extended to the actions executed by the technology within the context of staged digital dance.

[1] This is an ethnographic awareness of the value of interviews and participant description for generating scholarly knowledge that I take from Clifford James in *The Interpretation of Culture* (1973).

2.1 The making of *Apparition*

Apparition (premiere in Linz/Austria in 2004) is an example of staged digital dance created by the Vienna based media artist and composer Klaus Obermaier in a choreographic collaboration with the two dancers that also perform in the work, Robert Tannion and Desireé Kongerød. Obermaier also collaborated with interaction designers and programmers Christopher Lindinger and Peter Brandl from the Ars Electronica Futurelab on the work's technological components, and the system for motion-tracking and analysis was provided by Hirokazu Kato from Japan.[2] *Apparition* is centered on a camera-based motion-tracking system that uses complex computer vision algorithms to extract the performer's moving outline/shape from the background. In this way, the system is capable of constantly updating information for body projections as well as qualitative calculations of dancer's motion dynamics. The information derived from these calculations produces real-time generation of visuals, projected back onto the body and/ or as large-scale background projections that react to the performers' movements.

The starting point of *Apparition* is moving body projections facilitated by the interactive system developed for this piece. The system allows real-time responses to the gestures of the dancer in the form of abstract lines, shapes, and text, to mention a few programmed outputs. The choreographic concepts raised as questions by *Apparition* as a work, according to its makers, include: "What is choreography like when your partner is software? When virtual and real images share the same space? When everything moving on stage is independent and interactive at the same time?"[3] Answers to these questions tend in other words to be inseparable from the work's aesthetic appreciation and efficacy.

The length of *Apparition* is approximately sixty minutes without an interval. The stage is empty in the sense that there are no décor or physical objects placed on stage. The technical equipment that 'sense' the dancers' movements such as motion-tracking videos and infrared lights remain hidden from the audience's vision; for example, some infrared lights are located behind the stage (see appendix 3, stage plan of *Apparition*). The physical dancers are dressed in simple skin-colored costumes. The performance consists of seven scenes in which Obermaier experiments with different opportunities offered by interactive media, progressing from simple to more complex scenes. Moreover, the scenes

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[2] http://www.exile.at/apparition/background.html Accessed on 09.03.2012

[3] http://www.exile.at/apparition/background.html. Accessed on 09.03.2012.

are divided so that certain scenes portray interaction between the physical dancers and the interactive system whereas other scenes portray no interaction between the two different performing elements.[4]

[4] Skype interview with Robert Tannion. 17.02.2010

2.2 Changes in cultural practices of dance: creation

A. Technically distributed authorship

Staged digital dance's choreography problematizes established conventions and processes of creative development in dance. The incorporation and role of the interactive system especially destabilizes the artistic authority of the choreographer and distributes authorship in an artistic, technical, and de-hierarchical sense, among the parties involved in the creation of the artwork. Such changes are reinforced in the greater role and responsibility of technical 'agents', that is, the media designer and the interactive system itself, as well as in the dancer's heightened, necessary investment in cultivating functional literacy and intimacy with the technological system, as I will detail further in this chapter. Perhaps the most significant change for dance as a cultural practice however, resulting from digital dance works' prominent role given to technology in the overall aesthetics of the artwork, is the introduction of the media designer as a co-creator of the choreography. Where previously a choreographer developed a work with and without dancers, the dynamics of creative production are radically triangulated by this new, central collaboration of media designer and choreographer. Rubidge (2004) explains that such close collaboration with a media designer is necessary because digital dance performances exploit highly complex interactive motion-tracking systems, which require expertise generally outside the scope of a choreographer.[5]

The media designer takes up his/her new role in the creation of the choreography from the very start of the process of digital dance making. This is the key difference of digital dance: not just the introduction of this role, but such an elevated artistic status for the media designer compared to the conventional "support" status accorded to other technical professionals, such as the lighting designer. Indeed while the lighting designer tends to retain the conventionally low(er) artistic status of a 'supporting' technician, dealing with only the more complete versions of the choreography, the new role of media designer inside the creative development of staged digital dance is afforded far more artistic and technical influence and power in the creation of the choreography itself. This introduction of the media designer as a co-creator accordingly requires a shift in the position of the choreographer: unconventionally, the choreographer's creative authority is partially shared

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[5] Rubidge, Sarah. 'Dance Criticism in the Light of Digital Dance'. Keynote paper at Taipei National University of the Arts. Seminar on Dance Criticism and Interdisciplinary Practice. 2004, http://www.sensedigital.co.uk/writing/CritIntDiscTaiw.pdf Accessed on 02.02.2011.

with or given over to the media designer in order to make best aesthetic use of their knowledge of the technology. [6]

Richard Povall, co-founder of dance company half/angel, elaborates on the issue of the distribution of authority in digital dance. Povall (2001) argues that the emergence of digital dance was possible within the context of a larger new "paradigm of collaboration."[7] For Povall, the relatively new emergent practice of digital dance fundamentally changes the distribution of power structures and roles both within the creation of an artwork.[8] As early as 1993, Povall argued that digital dance performances require the choreographer to relinquish the omnipotent role he or she enjoys in non-digital technology based choreographic practices, in favor of a more egalitarian, collaborative relationship primarily with a computer programmer.[9] This new paradigm, according to Povall, stands in direct contrast to what he calls the maker/performer paradigm, which he uses to name performances in which technology does not play a key role in the creation and reception of the artwork, and in which other technical support professionals, such as the lighting or sound technician, bring their separate, predetermined skills and contributions to the table only as and when the choreographer requires them to do so.[10] By contrast, the media designer's involvement, acknowledged as a collaborating role, sets up a non-conventional relationship of codependent creative working between the choreographer and designer of staged digital dance.

Kongerød, dancer and choreographer in *Apparition,* conceptualizes this changed working process in the term "parallel development." According to Kongerød:

> We [dancers, choreographers, and media designers] would all look at what one party was doing and give feedback after which the media artists (Peter

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[6] It should be mentioned that the challenge to the authority of the choreographer is not a new phenomenon. Pioneers of post-modern dance, for example, have challenged the authority of the choreographer and the established rules of choreographic strategies in the early 1960s. However, the understanding of the choreographer as unique creator of a dance work is still a dominant understanding in the world of dance. Hence, the arguments in this chapter are based on this commonly understood role of the choreographer as a creative authority.

[7] Povall, Richard. 'A Little Technology is a Dangerous Thing' in Dils, Ann and Ann Cooper Albright (eds). *Moving History/Dancing Cultures. Dance History Reader.* United States of America: Wesleyan University Press, 2001: pp. 456-457.

[8] Collaboration between engineers and technicians in dance is not a phenomenon introduced by digital dance. Already in the 1960s, collaborations between choreographers and technician/engineers existed. Examples of collaboration in the 1960s are *Variations V* (Merce Cunningham and John Cage, 1965), and *9 Evenings: Theatre and Engineering* (1966), which I have explained in chapter one.

[9] Povall, Richard. 'The Last Garden: Explorations in Interactive Performance Methods'*. Leonardo Music Journa*l, vol 3, (1993): p. 27

[10] Povall, 2001: pp. 456-457

> or Klaus) would change something in the programming of the software. Then Rob and I would go back in the studio and adjust our physical movements again. And then Peter or Klaus would take a look at the physical movements that we had created. So it was a very parallel development.[11]

In this respect, for Kongerød, *Apparition* is unlike:

> An ordinary dance show where you could potentially do the choreography and then think about what sort of costumes do we want or what sort of lights do we want. The physical movements and visual images had to be created in parallel for *Apparition* to actually work.[12]

According to this revised relationality within the creative development process, a hierarchical mode of working between the different parties involved becomes nearly impossible in staged digital dance, due to the fact that it is the correspondence between the physical movements of the human performer, the processing of data by the interactive system, and the visually projected movements of the system's output, that establishes the aesthetic difference of its choreography. Now the choreography entails combinations of categorically different aesthetic elements and components that perform. But what does it take on behalf of the choreographer and the human dancer, to interlace human and technology as such paralleled and leveled aesthetically performing elements of the work? What kinds of adjustments are necessary among these performing elements? Finally, how does this change or challenge dance as a cultural practice?

B. Additional technical knowledge required from the choreographer and dancer

Dance as a cultural practice is also transformed by staged digital dance to the degree that this increase in prominence of the role of technology in the creation of the choreography requires not just the choreographer but also, obviously, the dancers to obtain an intimate knowledge of the interactive system. Whereas in choreographic practices in which technology functions as a supporting element, a basic awareness of the *effects* of technological elements is sufficient, staged digital dance requires a more detailed and intuitive understanding of the mechanics and logics of the technical system from the choreographer and dancer. The extent to which the choreographer and dancer cultivate the aesthetic effects able to be created by the interactive system through intimate knowledge of its workings become much larger than before.

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[11] Skype interview with Desiree Kongerød. 10.02.2010

[12] Skype interview with Desiree Kongerød. 10.02.2010

The implications of this change in the degree of the choreographer and dancer's understanding of the technology can be illustrated via the additional training required from him or her. Birringer (2008) states that the appropriately rich understanding of the operations of the interactive technology required for digital dance work, requires the arrangement of additional training for the choreographer and dancer. This training with the system usually takes place before the actual rehearsals of the performance commence.[13] Training may take the form of workshops or informal gatherings in which the media designer demonstrates the operations of the interactive system to the choreographer and dancer, giving them a chance to view, review and re-engage with the system and its effects before the full choreography has been finalized and locked down.

In the case of *Apparition,* the dancers and the media designers met for a two-week workshop in Linz before they started the actual rehearsal process. This was necessary because it was important for the media designers to understand the choreographic concept that the dancers aimed to achieve. In the same manner, the dancers needed to understand at this pre-rehearsal stage the way the technical system operates as well as the aesthetic possibilities that it offers. Rob Tannion explains from this experience that dancers need to get to know the strengths and weaknesses of the technical system just as they need to get acquainted with the strengths and weaknesses of human dancers. The interactive system, then, is an additional player with its own unforeseen capacities and potentials:

> More than anything I needed to know how the interactive system works so that the choreography could become a real trio between Desiree, myself, and the interactive system. For example, in order to work with Desiree I need to know how Desiree moves, how heavy she is and so forth. In the same way, I needed to know how the system moves in order to be able to interact with it in the best way.[14]

Tannion explains that as a dancer he also needed to have a strong understanding of the "parameters that could be programmed (such as gravity, the elasticity of the images created) in terms of coding. And I needed to have some understanding of the spatial set-up of the system because it informed my movements."[15] Indeed, the understanding of the potentials and limitations of technology is important because these shape the choreography to a greater extent than ever before. Most often, adjustments need to be

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[13] Birringer, 2008: p. 133

[14] Skype interview with Robert Tannion. 17.02.2010

[15] Skype interview with Robert Tannion. 17.02.2010

made form the perspective of the dancer with regards to the spatial organization of physical movements, the speed of physical movements in the choreography, and the technical virtuosity of physical movements. Such adjustments shape the choreography but they can also be considered as restrictions on the physicality of the human dancers, which constitutes a point of discussion among the makers and authors writing about digital dance.

C. Adjustments via restrictions on spatiality, temporality, and technical virtuosity

Restrictions on spatial organizations are made due to the conditions imposed by the video's vision that is tracking the dancer's motion. Close attention to digital dance stage planning helps us to better comprehend how the specific spatial restrictions imposed on the choreography by the interactive system become written into the performance, and, therefore, the aesthetic appreciation of a work. See for example the stage plan of the case study *Apparition* in appendix 3. The stage plan of *Apparition* shows two projectors placed at the back of the stage, set up for rear projection. In addition to these two projectors, another projector is placed in front of the stage. The infrared camera that tracks motion is also positioned at the front of the stage, aligned with the front projector.

This positioning of the video camera and the projector was necessary because certain scenes in *Apparition* make use of 'body projections' (projections on to the body of the dancer) at the same time that similarly technically processed images are being projected on to the backdrop.[16] The body projections and the backdrop projections at these moments are furthermore differently programmed visuals. For the body projections to be precise, the projector needed to be positioned in the same line of capture as the video camera. It should be made clear that the projector is not a factor for spatial restrictions on physical movement. Whereas projectors that are static and require the dance to remain on one spot in space, in *Apparition,* Obermaier developed a projector that would track movement and follow the body during its movement in space.[17] Rather, spatial restrictions come about due to the technically determined spatial dimensions of the 'boundary boxes' assigned to each dancer by *Apparition*'s interactive system and which take into account the V-shaped vision of capturing video cameras.

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[16] Skype interview with Robert Tannion. 17.02.2010

[17] Skype interview with Desiree Kongerød. 10.02.2010

The boundary box is a term coined by Obermaier and it is a simple way of outlining the technical qualities of the interactive software for the perspective of the media designer in relation to the dancers as input.[18] Each dancer has their own boundary box in *Apparition.* This means that from the perspective of the media designer, the tracked dancer is represented on the computer screen within a box, which determines and sets out the boundaries of each dancer's personal space. If the dancers are spatially quite separate or distant from each other, each dancer is represented by a clear and discrete boundary box on the designer's computer screen. But, if the dancers move closer together in space, their boundary boxes fuse so as to become one box. The aesthetic consequence of this is that when the dancers get closer together they need to be aware that both of their movements become one combined trigger for the projected images. This awareness is reflected in the choreographer's and dancers' scripted physical movements during these moments. Accordingly also, the dancers need to be very aware of their position in space in order to be able to play with the reactions of the interactive system in very specific ways - especially whether as singular or merged boundary boxes.[19]

As I explained in a preliminary way in the introduction of this thesis, the interactive systems based on first generation motion-tracking technology work with different types of sensors. Some of these include sensors attached to the body of the dancer, infrared cameras that detect the heat from the dancer, and video cameras that track the dancer's movements, which send the collected movement data to the computer. In the case of the latter video-based tracking, which is the case in *Apparition*, the choreographer and dancer need to take into account the fact that any video camera can only track movement in a V-shaped area of space, in accordance with its lens capacities.[20] The fact that the zone of capture of a video camera is V-shaped has particular impacts upon the spatial organization of the choreography, because the video cannot 'see' the dancer within any area that falls beyond its scope.[21] The dancer's movements will be detected best by the video when the dancer is upstage (the part of the stage that is furthest away from the audience seats), because this area lies within the broad end of the V-shaped space of vision of the video. But if the dancer is downstage (the part of the stage that is close to the

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[18] Skype interview with Robert Tannion. 17.02.2010

[19] Skype interview with Robert Tannion. 17.02.2010

[20] See appendix 3, the stage plan of *Apparition,* for a visual illustration of the V-shaped video vision.

[21] In *Apparition*, the area that falls outside the scope of the video was marked by tapes, which reminded the dancers where in space they would be 'traced' by the video and where they could 'escape' the video's vision and, therefore, not generate visual images.

audience seats), or dancing to the far end of the left or right stage (which are not in the scope of the narrow part of the V-shaped lens) they will not be picked up by the video.

This set of spatial constraints inevitably constructs a choreography in which the dancers rarely perform downstage, because the further downstage they go, the less perceivable they are for the front camera. However, I would like to make it clear that this claim does not entirely hold for *Apparition* in its entirety. The dancers Kongerød and Tannion explain that in *Apparition* they had a clear aim when starting the rehearsals: they were going to have some scenes with motion-tracking and the generation of real-time visual imagery and other scenes in which the human dancers and the interactive system would not interact at all.[22] For Obermaier, such decisions are necessary to take when creating an artistic work because one needs to determine a certain aesthetic boundary on the art piece. In his words:

> Like in nearly any performance (even conventional performances) there is a specific aesthetic frame. Without this frame, the piece would only create senseless output. The aesthetic frame makes communication with the audience possible, gives shape to the overall piece and provides a platform on which the performers are able to act and interact in a meaningful way.[23]

Hence, the output of the interactive system in staged digital dance works needs to be integrated in to a larger choreographic concept, in order to ward against the possibility that the choreography could function only as a showcase for the capacities of the interactive system, however 'aesthetic' their perception by an audience. As I will demonstrate in chapter four and five of this thesis, during staged digital dance's emergent phase, these so far theoretically under-defined relationships between technological and human components as part of the choreographic concept itself, takes form via specific kinds of human-technological correspondences and in accordance with key principles of dance composition. Given that the correspondence between the human body and the interactive system and its projected images are exposed as explicitly as possible in the mode of address of the artworks, the hyper-exposure of such relations between human and technological elements, and the opening of these to the perception of the audience to an unprecedented degree, greatly differs from the mode of address of more 'conventional' dance choreographies that operate within a hierarchy of perceptual importance.

In *Apparition,* in scenes in which the interactive system is on stand by, the dancers could move freely in space because they knew that they would not be tracked by the

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[22] Skype interview with Robert Tannion. 17.02.2010

[23] Obermaier, Klaus. E-mail contact. 23.05.2007

video. In other scenes where both dancers were onstage and where they were represented by two boundary boxes, the media designer would program in a 'preference' to one of the dancers onstage, for example focusing on Tannion, so that Tannion would be the only person onstage who was triggering the interactive system, while Kongerød's movements were not inputting any data at all. Accordingly, in such scenes, whereas Tannion was aware of the restrictions imposed on him by the interactive system, Kongerød did not need to take such restrictions into account and could make use of the entire dance space, creating different spatially organized movements again.[24]

A second important restriction of the interactive system on the physicality of the dancers concerns the temporality of the dancers movements. In *Apparition*, temporal restrictions were required in the scenes in which body projections were implemented. Kongerød explains that in such scenes, she and Tannion had to slow down the tempo of their physical movements, which was a point that they realized during the pre-rehearsal workshops when they were getting acquainted with the potentials and limitations of the interactive system, not before. "It turns out", Kongerød reports, "that no projector in the whole world can project images without a two second delay, which means that you had to move slow when these projections are on you so that it doesn't create a swill in the back."[25] In other words, in scenes in which the projections were projected on her body, Kongerød needed to move slower than normal so as to avoid any blurry or unclear images being outputted in the created aesthetics of the visual images.

Restrictions assigned by the interactive system also lead to what I would like to call a 'downgrading of technical virtuosity' by the dancers working with the system in mind. By downgrading of technical virtuosity, I am referring to the dancer's and choreographer's need to perform fewer physical movements [26] and/or physically less complex movements in comparison to a choreography created without interactive technology. Concerning this point, Kongerød informs us that:

> The only thing I could say about limitations is that in certain scenes in *Apparition*... you couldn't do all your massive jumps and other technically complex movements as a dancer. In certain scenes, you need to let the system do its 'bit' [meaning its technical performance].[27]

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[24] Skype interview with Robert Tannion. 17.02.2010

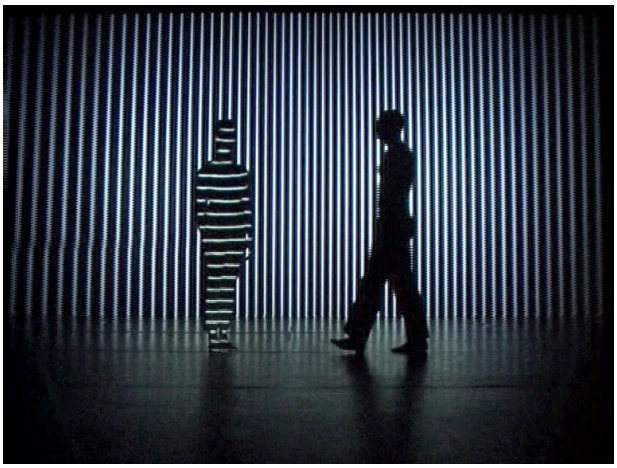
[25] Skype interview with Desiree Kongerød. 10.02.2010

[26] I deliberately use the term 'physical movements' here as opposed to 'technological movements' to mean the aesthetics effects created by technological performance. I elaborate on this point in chapter four.

[27] Skype interview with Desiree Kongerød. 10.02.2010

In line with Kongerød's articulation of dancer limitations here, which involves recognizing his partnership with the interactive system's technology, Tannion reports similarly that in *Apparition*:

> From a purely choreographical point of view, there are things in *Apparition* that I wouldn't use in a choreography created without interactive technologies. For example, we do some really simple movements in that section where Desiree and I "take over the light" from each other by means of exchanging places onstage and where images are projected on our bodies. Well, in this scene we are basically projection screens.[28] [Fig. 2.1, 2.2]



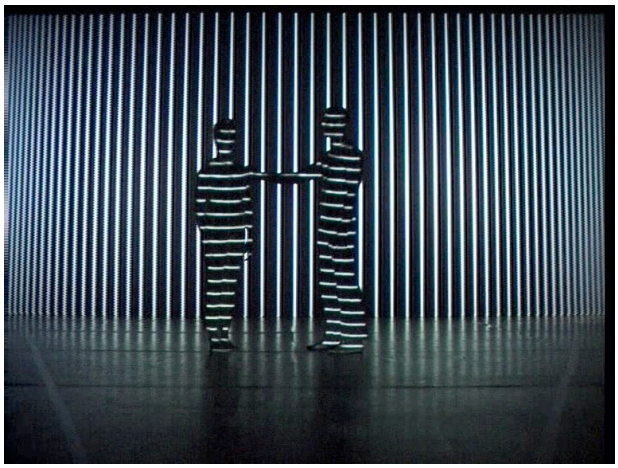


Fig. 2.1, 2.2 — Illustrating Tannion's comment regarding the dancers functioning as projection screens in certain scenes in *Apparition*. In Fig. 2.1, we see Tannion walking towards Kongerod, and "taking over the light" from her. Notice here that in this view, only Kongerod is 'seen' by the interactive system. In Fig. 2.1, Kongerod has 'preference' instead of Tannion, meaning the parameters of the system are programmed so as to only 'see' Kongerod whilst Tannion is not perceived by the interactive system at all. Both dancers are 'seen' by the interactive system in Fig. 2.2.

Moreover, during the rehearsal process, at times, Obermaier intervened in the physical sequence created by Kongerød and Tannion, commenting that the combination of the physical movements and the projected images did not work because there was:

> Too much movement. It [the physical movement phrase] had got to be simpler. In those cases, I simplified the physical movements in the choreography, which I normally wouldn't do as a dancer and choreographer. But when I did simplify my physical movements it [the aesthetics of scenes in which the interactive system was deployed] worked.[29]

This quote points out how the physical dancer needs to surrender some degree of technical virtuosity to the system, in order to be able to 'dance' with the visuals provided by

[28] Skype interview with Robert Tannion. 17.02.2010

[29] Skype interview with Robert Tannion. 17.02.2010

the interactive, and to create a technically and artistically complex expression through this partner-work instead.

D. Restrictions: limitation or liberation?

Despite these very reflexive appreciations of so-called 'limitations' in the approach of practitioners to staged digital dance performance, the spatial and temporal restrictions imposed by the interactive systems of staged digital dance has led some theorists to criticize the integration of interactive technologies into dance per se. Dance scholar Erin Manning (2006), for example, argues that as sophisticated as the use of interactive systems that 'map' gesture can be, such as the system employed in *Apparition*, the technological performances produced inevitably 'lack' or are incomparable to the complexity and wholeness of movement that the human body can produce by itself. She argues that such technologies need to abstract in a reductive way what a gesture is, to be able to map it by means of the interactive system. For her, such mappings of gesture "risk breaking movement into bits of assimilable data, of replicating the very conformity the computer software is seeking to get beyond."[30] This apparent rudimentariness of the technological elements compared to the human dancer, and the dancer's responsive reduction of their own physical movements sets up an aesthetic of "imposed stability" that "holds back the potential of a sensing body in movement's capacity for innovation."[31] Manning weighs in particularly on the fact that an interactive system responds best only to most fully actualized (visible and complete) movements, which often demands that dancers focus on accentuating the extremity of the body (for example, by prolonged, extended arm or leg movements) or on very obvious shifts and displacements of the whole body across space. In this way, the technology conditions what dancers can even bring to the choreography because the system prefers more fully actualized movements from dancers rather than small, subtle or indeed, ambivalent gestures:

> The complex analog body is reduced by the prosthetic system to a passive interactivity, forced to conform to a pre-established definition of what a body can do. The body must move for the software. Here's the paradox: moving for the software means learning to move the software. The choreography is determined by the software, which qualitatively limits what a body can do. Where technology was supposed to open the body to a wider relational potential, it actually reduces its capacity to move space-time. The dancer

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[30] Manning, Erin. 'Prosthetics Making Sense: Dancing the Technogenetic Body'. *Fibreculture*, issue 9, 2006, http://journal.fibreculture.org/issue9/issue9_manning.html. Accessed on 08.03.2012.

[31] Manning, 2006, http://journal.fibreculture.org/issue9/issue9_manning.html.

> learns to traverse space rather than creating it. The dancer is moved to interact with the software in a closed system of cause and effect.[32]

Manning's concerns about the cause and effects of simplified reactivity in a closed system appear differently in Martina Leeker's (2008) work. Scholar in theatre and media, Leeker argues that dance practices created with digital interactive technology reduce the dancer to mere data within a cybernetic system "controlled by electrical currents and circuits that designs this organism as a control device for integration in cybernetic feedback loops."[33] Hence, also for Leeker, who perhaps tellingly, also does not refer to any specific contemporary case study of digital dance, argues that in dance practices created with interactive technology, the human body's incorporation into a larger systemic loop loses individual agency to become part of a "feedback loop of discrete operations".[34]

That interactive technologies can be restrictive in certain aspects is undeniably true. Yet these criticisms of the marriage of dance and interactive technology, such as that produced by Manning, have difficulty standing up to close analysis. For one thing, to make such criticisms of spatial or physical restrictions requires understanding how specific interactive systems actually work within specific artworks at stake, because each artwork consists of a different technical set-up and aesthetic negotiation of the interactive system. In *Glow* for example, the choreography is based on movements on the floor (groundwork); infrared sensors are positioned on the floor of the stage that pickup the heat of dancer, but why would this technical and aesthetic emphasis upon groundwork be only a negative constraint? Manning, like Leeker, does not refer to a specific case study in her article. She is informed of how interactive systems map gesture in general, but then describes an unreferenced, possibly non-existent scene of some digital dance practice created with motion-tracking interactive technology that she uses to refer to as "typical of many of those situated at the nexus of dance and new technologies."[35] This emphasis upon typicality over actual cases is not of much use for the theorization of an emerging cultural practice.[36]

Further, both Manning and Leeker's critiques are addressed from a perspective that takes the human dancer as a starting point in the choreography. In other words, their views continue to valorize a conventional hierarchy of perceptual importance; they do not

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[32] Manning, 2006, http://journal.fibreculture.org/issue9/issue9_manning.html.

[33] Leeker, Martine. 'Interaction Computer Dance: the Resonance Paradigm' in Seifert, Uwe, Hyun Kim, Jin, Moore, Anthony (eds.). *Paradoxes of Interactivity*. London: Transaction Publishers, 2008: p. 262

[34] Leeker, 2008: p. 262.

[35] Manning, 2006, http://journal.fibreculture.org/issue9/issue9_manning.html.

[36] Manning, 2006, http://journal.fibreculture.org/issue9/issue9_manning.html.

acknowledge the fact that the interactive system may function as a performing element onstage in its own right. Finally, by focusing on the restrictions on the dancer, both authors seem to overlook the new potentials opened up by the integration of the interactive technology; namely, that technology may afford new understandings of dance and that these affordances become all the more clear if one looks at the interaction between the human dancer and technology in a non-hierarchical way.

Indeed, Manning's and Leeker's criticism of the restrictions of dancer physicality caused by the integration of interactive systems can be read and evaluated at this other level. I argue contrarily to Manning and Leeker that it is precisely by embracing and being aware of these unique adjustments and constraints - how the human performer adapts to a technological dance "partner" within staged digital dance practice created with first generation interactive technology that we can come to understand this "new" or newly visible partner's co-determining influence upon the choreography. In Tannion's words, working with the limitations of the interactive system leads in fact to "a deeper understanding of its possibilities, which result(s) in a richer performance."[37] For example, Tannion explains that his solo towards the end of *Apparition* only got better in terms of the aesthetics created as his understanding of how the system works deepened through the rehearsals.[38] [Fig. 2.3 and 2.4] This understanding transformed concepts of limitations into reflexively understood "advantages" by way of adjustments to preconceived ideas of humanist constraint.

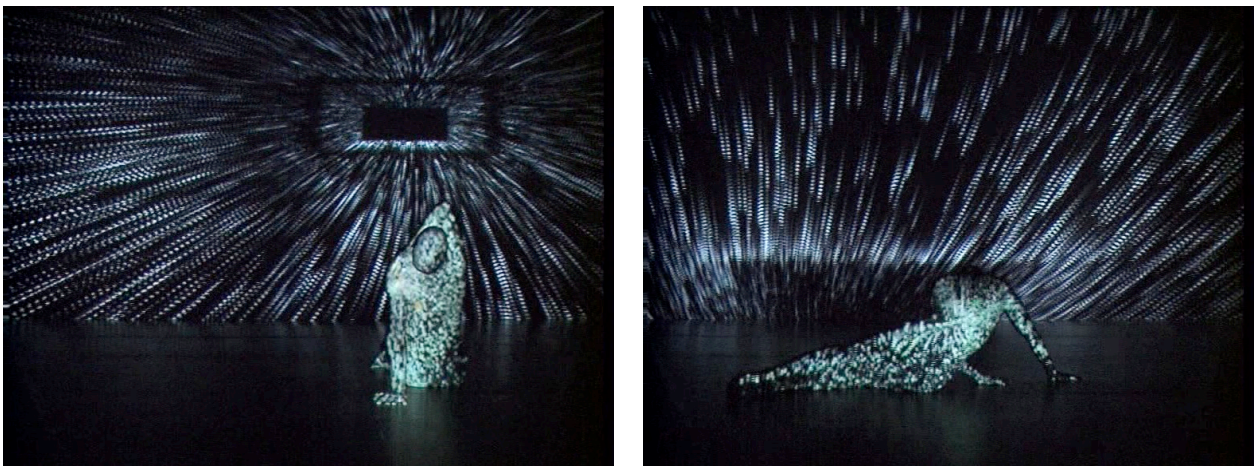

Fig. 2.3 and 2.4 — *Apparition* (2004)

[37] Skype interview with Robert Tannion. 17.02.2010

[38] Skype interview with Robert Tannion. 17.02.2010

Within this larger view, and taking an opposite stance to Manning, Obermaier for example argues that 'limitations' in a conceptual sense merely set out base conditions for any artistic strategy. According to Obermaier, "without any restrictions there would not be art at all. Each stage setting/set-up gives you limitations and creates new possibilities. That is why they are there! Even a second, third...performer is a restriction for the first one."[39] Also for Kongerød, limitations are what play an important role in the creation of any choreography. For her, "limits are what you put in any show with or without interactive technology. For example, if you create a duet, that's a limit. If you create a solo, that's also a limit." [40] Tannion reminds us that physical attributes of each dancer can also be considered a limitation in itself. He reports that he himself was a limit for the choreography in terms of (physical) flexibility and the type of movements that can or cannot be created due to this limitation. As he notes, "Desireé's body is very flexible, but my body is not", which was a limitation during the creation of the choreography because he could not perform certain movements that Kongerød could do with her body.[41] From this perspective, which is the point of view of this thesis, the different types of restrictions brought about by the interactive system are in fact integral to understanding how technology functions as a performing element in the choreography of staged digital dance, precisely as a new kind of dancer partner.

At this point it is appropriate to emphasize that the creation of a dynamic encounter between dancer and technology in aesthetically effective staged digital dance works does not only imply adjustments on behalf of the dancer and choreographer only. It also includes systemic adjustments and the regulation of the output of the technical system on the basis of the created physical movements by the human dancers, so as to create different kinds and degrees of correlations between the human dancer, the interactive system, and the system's projected images. In *Apparition*, Kongerød and Tannion deliberately emphasize that the creative development process involves the contributions of all partners in a collaborative sense. Tannion describes this process as being similar to the dynamics of a "seesaw."[42] Tannion's "seesaw" metaphor names the same approach to creative development that Kongerød refers to as "parallel movement", which I have explained at the beginning of this section. Briefly, such a process entails the creation of

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[39] Obermaier, Klaus. E-mail contact. 23.05.2007

[40] Skype interview with Desiree Kongerød. 10.02.2010

[41] Skype interview with Robert Tannion. 17.02.2010

[42] Skype interview with Robert Tannion. 17.02.2010

physical movements by the dancers and the set-up of the parameters of the interactive system by the media designers and their mutual collaboration, criticism, and feedback, which requires each party to re-adjust their creations accordingly. Beyond the project of naming such processes, what is important here is to understand the dynamics between the physical dancers, the media designers, and the reactions of the interactive system being in an ever-continuous flow of (multidirectional) relations. For the choreographer and also for the dancer, it is only through understanding the operations of the specific interactive system utilized—its potentials and limitations—in collaboration with the media designer, that the relationship between human and technological components can be developed into a strong performance within the choreography.

E. Looking beyond the human in staged digital dance

That the interactive system and the visual images that it creates is now experienced as a dance partner is not only an aspect of *Apparition's* creative development; this partnership also extends into the audience perception of the aesthetics of the created artwork. In *Apparition*, and other case studies examined in this thesis, technology is not perceived as an add-on element to the physical movements executed by the human dancers. Rather, the visual images created by the interactive system contribute to the aesthetic impact of this dance practice.

In the introduction of this thesis, I have explained that the aim of staged digital dance practices examined here is often explicitly described as a creative attempt to fully portray the depth and complexity of a relationship between the human performer and the technology - captured in the aesthetic effects created by the interactive system. In this sense, often, the transformed choreographic process of staged digital dance, and the narrative or conceptual aesthetic impact it has, co-relate *as* the work. The website of *Apparition* suggests that the aim of this specific art work is the creation of a type of choreography in which "your partner is software, (…) virtual and real images share the same space, (…) [and] everything moving on stage is independent and interactive at the same time."[43] *Glow* similarly is described as a "spectacular 27-minute duet for body and technology, an essay on the relationship of dance and cutting-edge software technology."[44] Troika Ranch's website describes *16 [R]evolutions* as the portrayal of a struggle between

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[43] http://www.exile.at/*Apparition*/ Accessed on 10.08.2010

[44] http://www.frieder-weiss.de/works/all/Glow.php Accessed on 12.01.2010

our animal and intellectual selves, a struggle made explicit through encounters with technology.[45] All three figure in their pitch in some way an interruption of the hierarchical mode of creative development. We can conclude then that the media designer as a co-creator in the artistic process for these works, signals larger changes in the aesthetic appreciation of the role of technology—from a supporting agent to a performing element, alongside the flesh dancers.

It is relevant for example that Kongerød refers to her experience of the interactive system in *Apparition* as a dance partner *despite* the lack of sensory input that she would normally get when dancing with a physical partner, such as feeling the energy of a body or sensing their smell. She emphasizes instead that "the technology was a third element as strong as Rob and I. The interactive system is a dance partner in the sense that it has an equally strong impact on the perception of the audience and the fact that you and it create something together."[46] This quote points to two things: that Kongerød feels engaged with the visuals provided by the interactive system in an active, performative sense, and that this engagement creates a visual and affecting impact upon the aesthetics of the choreography from the point-of-view of perception of the audience. It also shows that the integration of the visual aesthetics of the technology within the choreography create a specific mode of address for the audience in which the technology's contribution to the choreography as well as the relationship between human and technology are rendered visible, affecting and performative, which marks staged digital dance's difference to choreographies created within a hierarchy of perceptual importance. To recapitulate, such choreographies position the dancer at the center of attention and technology at its periphery in their mode of address to the audience.

Both Kongerød and Tannion refer to the inherent technical qualities of the interactive system to play a role in their experience of the system as a dance partner. For Tannion, the technical system was a dance partner because "it was responsive and it had clear physical qualities and definite limitations. It was very consistent in its reaction to me and my reaction to it."[47] Nevertheless, Tannion sees certain similarities between working with a human dancer and a motion-tracking interactive system in terms of unpredictability. He explains that "at certain moments glitches in the system occurred for several reasons. Those moments of failure were productive because they showed us new aesthetic options,

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[45] http://www.troikaranch.org/vid-16rev.html. Accessed on 22.10.2022

[46] Skype interview with Desiree Kongerød. 10.02.2010

[47] Skype interview with Robert Tannion. 17.02.2010

which were very interesting."[48]Also for Kongerød such moments of surprise were very productive, which made her think that the system "has its own life in the sense that it answers you potentially in ways other than you think it might do. And that makes you go on another journey [in terms of the aesthetics of the choreography]."[49]

But perhaps the most obvious moment that demonstrates the changing understanding of the technical system as a dance partner in staged digital dance are moments in which the technology would stop functioning (for various reasons) during the presentation of the artwork to the audience. Kongerød gives an example of such an incident:

> One time we were performing *Apparition* in Barcelona during which the technical system didn't work. We had to stop performing because the technology and us depend so much on each other that the show wouldn't be a show if the third element didn't appear. So we had to stop the show and start over again. As a person you can improvise yourself out of a mistake but when dancing with a computer you can't.[50]

This impossibility to improvise some way through the technical failure stands in contrast to the kind of glitch that occurs when improvising one's way through to the other side of a 'technical mistake' in a show in which technology is integrated as a supporting element. This example illustrates well how the role of technology is no longer a supporting device to polish the aesthetics of dance movements executed by the dancers. Rather, it is a performing element and a dancer partner as integral to the aesthetics of the choreography as the dancer's physical movements.

The changing perception of the interactive system as an integral part of the show signals another very important point besides the technical system's recognized status as dance partner. It shows that the integration of the technology in *Apparition* does not only showcase the capacities of the interactive technology but also becomes an integral part of the aesthetics of the artwork. Kongerød considers the function of the visual images provided by the interactive system as enhancing the "dramatic effect that we could create by having three different elements on stage as in Rob, the interactive system, and I."[51] The combination of three different performing elements onstage, continues Kongerød, created "something bigger than you as a physical dancer. The combination of technically

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[48] Skype interview with Robert Tannion. 17.02.2010

[49] Skype interview with Desiree Kongerød. 10.02.2010

[50] Skype interview with Desiree Kongerød. 10.02.2010

[51] Skype interview with Desiree Kongerød. 10.02.2010

generated visuals and physical dance movement created something stronger. In this sense, *Apparition* wasn't 'just' a dance piece."[52] What Kongerød means by this is that *Apparition* presented a dialogue to the audience in which, metaphorically speaking, the human dancers and the interactive system draw together to challenge conceptions of dance itself. Linking back to the previous sections discussion of dancers' necessary downgrading of virtuosic physical movements in staged digital dance, Tannion states that simple movements, such as walking or bending, were indeed "less interesting choreographically and physically if you saw them by themselves."[53] However, in terms of the overall aesthetic experience of *Apparition*, as the presentation of an aesthetics based on a performative duet between humans and an interactive system, Tannion realized that such limited physical movements together with real-time generated imagery were "interesting as a part of the whole picture."[54] This emerging comprehension of his work led Tannion to reflect upon what he understands as choreography. In fact, for Tannion, one of the major benefits of his dancing in *Apparition* is the fact that it "changed my perception of what I valued as choreography".[55]

This is a crucial point indeed. Kongerød and Tannion's investments in staged digital dance lead towards a problematization of the conventional meaning of choreography, which I have earlier explained in chapter one as the composition of physical human movements on the basis of time, space, and energy. The specific function of the integration of the visuals created by the interactive system in *Apparition*'s overall aesthetics articulates this challenge to this conventional and human-centered understanding of choreography. With this incorporation, the meaning of choreography shifts from the composition of human movement in time, space, and energy to the composition of human and *technological* movement in time, space, and energy. This marks staged digital dance's challenge to the hierarchy of perceptual importance explained in the previous chapter. It also signals that staged digital dance challenges the boundaries of the art form of dance by allowing non-human and technological elements to perform. This gives revised attention to non-human components as performing elements and considers the movements created by the two different types of performing elements as part of the choreography proper, regardless of their humanness or inhumanness. In

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[52] Skype interview with Desiree Kongerød. 10.02.2010

[53] Skype interview with Robert Tannion. 17.02.2010

[54] Skype interview with Robert Tannion. 17.02.2010

[55] Skype interview with Robert Tannion. 17.02.2010

other words, the aesthetics of the choreography, by means of integrating human and technological elements, is as rich, or perhaps even richer than choreographies in which the human establishes the center of attention within a hierarchy of perceptual importance.

Both at the level of creation and production then, the comprehension of the above changed creative development roles and processes in emergent practices of staged digital dance contribute to the creation of a particular mode of address, which presents technology as a performing element, alongside and in relation to the human dancer. Accordingly, the interrelation and interdependence between technology and the human dancer, which remains largely unnoticed in choreographies where technology functions to assist the human performer, is laid bare for the perception of the audience, inside of a larger aesthetic frame that has been choreographed accordingly. To this degree, and to the extent that processes of collaborative production are evident, staged digital dance presents a significant shift in the degree of the exposure of the technology enabling the work, the aesthetic *effects* created by the technology, and the degree of prioritization given to technology's relationship with the human performer. Further than this of course, this changed mode of address clearly expresses this artistic incorporation of the technology in to the choreography. The next section examines the presentation and reception of *Glow, Apparition,* and *16[R]evolutions,* by resort to critical art writing and dance press surrounding these works. Here I explain the mode of address of staged digital dance through these writers, taken as exemplary of audience perspective in this thesis.

2.3 Changes in cultural practices of dance: reception

The human-centered heritage and staging in dance that I have outlined in the introduction of this thesis is challenged by staged digital dance. There, I described how the virtual dancer has a kinesthetic impact on dance researcher Kent DeSpain's reception of *Biped*. Although non-human, the ghostly-generated non-human dancers produces in DeSpain a kind of connection, produced by the kinesthetic response between the human dancer, the virtual figures, and himself as the audience.[56] This experience has led DeSpain to question whether dance must "involve humans."[57]

Writing in the wake of *Biped* and in the context of proliferating practices of digital dance in the 1990s, critics and dance researchers attempt to answer some of these questions initially posed by DeSpain, via *Biped*, in their reception of *Glow, Apparition,* and *16[R]evolutions*. The review of April Green entitled 'The Lady and the Light' addressing *Glow,* for instance, proclaims that dance need not be restricted to humans. Green acknowledges that the art work's visual imagery provided by the interactive technology is one of multiplied performing elements onstage:

> There is only one person on the stage. (…) But she is, by virtue of the light, not really alone, and the projections' complimentary nature fill alternating roles (…) of partner, ensemble, dialogue.[58]

Similar, performatively belated attention to the actual creative role of technology features in the reviews of *Apparition.* In the review entitled 'Head-trip filled with wonder', Sangeetha Madhavan suggests that the visual imagery provided by the interactive system also dances. For him, the integral incorporation of interactive media in the dance performance requires one to consider the technological components and images as a "third partner along with the two dancers."[59] Sara Levin goes as far as to consider the

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[56] De Spain, 2000: p. 9

[57] De Spain, 2000: p. 6.

[58] Green, April. 'The Lady and the Light: Chunky Move's Glow at the Kitchen'. *The Brooklyn Rail*, March 2008.
http://www.brooklynrail.org/2008/03/dance/the-lady-and-the-light-chunky-moves-glow-at-the-kitchen
Accessed on 15.12.2009

[59] Madhavan, Sangeetha. 'Head-trip filled with wonder'. *The Business Times*, Singapore. 08.06. 2005. Available online at http://www.exile.at/apparition/ Accessed on 03.11.2009.

output of the technical system created by the software entitled Isadora[60] as a kind of character, alongside the human characters onstage in *16[R]evolutions*:

> Isadora, a reference to modern dance pioneer Isadora Duncan, generates digitized images of dancers on stage. Using a camera and software called EyesWeb, which instantaneously generates skeletal maps of the dancer's bodies, Isadora spits back projections of their silhouettes with hardly any delay. The images become more than a backdrop—they become a persona.[61]

This is quite a fascinating cultural turn for dance and its popular reception. Green's, Madhavan's, and Levin's reviews all capture and proclaim in their direct experience of the performance of these staged digital dance works the destabilization of the hierarchical mode of perception and a renegotiation of the relationship between the human and non-human elements in dance. Further, all grant the role of performer also to the technological elements of staged digital dance. Such reviews point to a shift in the dominantly human-centered mode of perception in dance, by which I refer to habits and expectations concerning what will be seen when going to see a dance piece. I have illustrated an example of this human-centered habitual perception framework in my general introduction via my own experience as a spectator in *Glow*. *Glow*, as I mentioned, was a work which announced to the dance culture in which I myself was involved, how unconventional and loaded with conceptual possibility it was to perceive technology as a dancing element onstage - but also how this experience leads to the realization that technology does not form a part of the audience's normative expectations of a dance performance. Indeed, to experience *Glow,* is (or was at that time) to realize how conditioned one's expectations of dance are, in terms of seeing human performers only, in line with inherited perceptual conventions of Western theatrical dance.

To better understand the impact of this shift of perception in habits and expectations in the reception of dance, let me elaborate on performance scholar Michael Kirby's work within this terrain. For Kirby, Western performance practices are inscribed with perceptual habits and expectations that continue to be influenced by the cultural institution of theater, its power and cultural force in history, and especially by the cultural formation of acting in that history. In his acclaimed essay 'On Acting and Not Acting' (1972), Kirby argues that as a result of these perceptual habits and expectations of Western theatrical presentation, a person appearing on the stage may be perceived as an actor simply due to the way the

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[60] I explain the characteristics of Isadora more fully in chapter four.

[61] Levin, G, Sara. '100, 000 years of evolution, live'. *The Villager*, January 2007 http://www.thevillager.com/villager_143/100yearsofevolution.html Accessed on 20.12.2009

theatrical context (set, costumes, lighting and so forth) frames them as such, regardless of whether or not they may or may not be 'doing acting'.[62] He describes this type of perception as "received acting" which happens in situations where someone is perceived as an actor only because of the context in which he or she appears:

> Extras, who do nothing but walk and stand in costume, are seen as "actors." Anyone merely walking across the stage containing a realistic setting might come to represent a person in that place—and, perhaps, time— without doing anything we could distinguish as acting.[63]

Hence, for Kirby, convention prescribes that the placement of any human onstage automatically transforms him or her into an active agent of the artistic production, specifically an actor; whereas props and costumes only enhance the credibility of the specific role that the actor appears to perform. In chapter one, via Baugh, I have explained the hierarchy of perceptual importance in terms of the inheritance of nineteenth century conventions of theatrical presentation. This default position of expecting the human as subject and agent of performance is also challenged in the work of performance scholars Nicholas Ridout (2006) and Alan Read (2008). All of these thinkers can be seen to critically go beyond Baugh's acute historical observation regarding the continuing influence of the hierarchy of perceptual importance in shaping our understanding of the role of animate and inanimate elements in theatre and performance.

Read considers Western theatrical practice itself as a "multiply finessed but deeply conservative humanist theatre collective," persistently re-affirming the identity of man as human.[64] Ridout also addresses the human-centric approach in Western theatre, arguing that the representation of non-humans onstage, including animals, points to an anomaly.[65] For Ridout, Western theatre has established specific conventions concerning what we

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[62] Kirby, Michael. 'On Acting and Not Acting'. *The Drama Review: TDR*, vol. 16, no.1, (1972): pp. 3-15.

[63] Kirby, 1972: p. 5.

[64] Read, Alan. *Theatre, intimacy & engagement: the last human venue.* Basingstoke: Palgrave Macmillan, 2008: p. 86

[65] Ridout, Nicholas. *Stage Fright, Animals and Other Theatrical Problems*. New York: Cambridge University Press, 2006.

expect to actually see on stage and that such conventions can be traced even to ancient theatre.[66]

> We know what to expect on stage. We expect to see actors. This needs saying: we do not even expect to see human beings, in all their diversity, but, as their representatives, a kind of group apart, more beautiful perhaps, more agile, more powerful and subtle of voice.[67]

As I will show in chapter three in more detail, Ridout's comments about the human-centered conventions of theatrical staging are also an un-reflexive aspect of the literature surrounding digital dance itself. In addition, the understanding of a human-centered theatrical staging can also be found in the literature in theatre and performance, which I illustrate via *Analyzing Performance* (2003) by Patrice Pavis. Pavis's writing exhibits this tendency to perpetuate the nineteenth century paradigm of human-centered production and perception. His perhaps unwitting accord with convention *in theory* only shows how prevalent such a human-centered standpoint is within the contemporary academic field of performance studies. According to Pavis, performance analysis:

> Should begin with the description of the actor; for the actor is the center of the mise-en-scene and tends to be a focal point drawing together the other elements of a production.[68]

For Pavis, mise-en-scene functions as a supporting device for the appropriate staging of dramatic literature and is of secondary prominence:

> The mise-en-scene should not be arbitrary but should serve the text and justify itself as a correct reading of the dramatic text. It is presupposed that text and stage are bound together, that they have been conceived in terms of each other: the text with a view to a future mise-en-scene, or at least a given acting style; the stage envisaging what the text suggest as to how it should be performed in space.[69]

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[66] In Ridout, the conventions in ancient tragic theatre as "ideal, male, political, and only human" succeeded the "pre-tragic theatre, material, feminine, infant and populated by the animal." (2006: p.117)
It should be added that in this study, Ridout examines marginal moments of 'failure' in Western theatre such as, stage fright, actor failure, embarrassment, and animal performance. He argues that such moments of discomfort in the actors and audience members can be productive because they reveal modern theatre's role as an economic enterprise in a capitalist system. Moreover, Ridout rightly notes that his argument on difficult encounters in modern theatre is not completely new. In fact, he finds inspiration in Heinrich von Kleist's early nineteenth century text *Über das Marionnettentheater* as a way to problematize the continuing operations of the apparatus of theatre as a mode of political communication within a system of capitalist leisure.

[67] Ridout, 2006: p. 97.

[68] Pavis, Patrice. *Analyzing Performance. Theater, Dance, and Film*. United States: University of Michigan Press, 2003: p. 55.

[69] Pavis, 2003: p. 204.

Such an understanding of performance analysis is based on a hierarchy in which the text and the actor designate the origin and focal point of artistic creation, while the mise-en-scene functions as a means to an end, that is, to provide an accurate realization of the theatre text. According to the logic of Pavis, the human actor here alone is being considered as the performing element; the notion of performance, meaning the display of capacities and skills in front of an audience, is assigned to being only a quality of the human, whilst technology provides the circumstances to facilitate the performance of the human actor. The performance itself or performance 'proper' in this conception excludes technology. Furthermore in Read's and Ridout's critiques of the human-centered paradigm of performance and theatre, the role of technology remains (largely) neglected, which especially stands out in the context of this thesis.

On the other hand, relative to these theorists' work that draw attention to what has institutionalized as humanist conventions, dance critics' views examined in this section demonstrate how such human-centered conventions in Western theatrical dance are now challenged. It is notable that the critics' reviews of staged digital dance are particularly invested in grappling with the relationship set up choreographically between the human and the digital imagery outputted by the interactive system. This relationship is explicitly likened to a duet in the review of Gareth Vile in relation to *Glow*:

> A single dancer, Kristie Ayre, performs in a white square, in a white costume, while the audience observes her from balconies. Her movements trigger responses in the lighting, generating patterns and shadows on the white stage: her solo rapidly becomes a duet between light and dancer.[70]

Hence, for Vile, such a possibility critically reframes a prior conception of dance that only understands technology as having a supporting role. He suggests an opening towards a new relationship between human and technology in terms of a duet.

What is also interesting in the reviews of the period surrounding staged digital dance created with first-generation interactive technologies, which I have explained in the introduction of this thesis, is that the majority of the reviews describe the correspondence between the movements of the human performer and the projected visual imagery in terms of degrees of positive organicity, despite obvious ontological differences between humans and technologies. Or in other words, works tend to be commended based on how fluidly the relationship between the human and technological seems to play out - how responsive each "system" seems to be to each. I explore the nuances of this more theoretically in

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[70] Vile, K, Gareth. 'Glow'. *Ballet Magazine*, June 2008, http://www.ballet.co.uk/magazines/yr_08/jun08/gk_rev_chunky_move_0608.htm Accessed on 15.12.2009

chapter four. Such (usually positive, praising) criticism implies that the adjustments in space, time, and energy that occur in such works *between* physical movements and the interactive system's outputted images - as programmed, adjusted, rehearsed and choreographed during the creative production period - is what determines the perception by the audience of an aesthetically rewarding engagement between them. Hillary Crampton, for example, writes that *Glow* portrays "a genuine interaction as if the two are engaged in an organic, symbiotic relationship."[71] Green similarly is taken with the fluid character of the duet between dancer and technology. In her words:

> The luminous projections belong to a tracking system that does not play back pre-rendered video, but instead responds to the dancer's movements to generate each new image (…), making the partnership noticeably and wonderfully organic.[72]

According to the website of the Venice Biennial, *Glow*'s aesthetics is so smooth and organic that it becomes difficult to detect whether the dancer or the light is leading the dance throughout the course of their partnership:

> Every movement is recorded and manipulated to refract the dance into a kaleidoscope of forms and images, to the point that one no longer understands whether it is the performer's movement that models the light, or whether the spotlights determine the forms and movements of her body.[73]

Of course, this is publicity text as much as it might be a critical description of artistic intent. Nevertheless this deconstruction of human-centered dance conventions in the public relations of such a prominent and influential high cultural space of artistic discourse signals the cultural arrival of *technological performance* in my view. Finally, Keith Watson writes that the technical system used in *Apparition* "allows the performer and the machine to interact in the way that real dancers do."[74] Watson suggests, alongside many others, an affirmative answer to DeSpain's question regarding whether the qualities and principles of dance - as movement in space, time and energy - can still be meaningful if they are extracted from the human body. While, arguably, this affirmative argument can still actually be very much in line with humanist attachments to human movement (or simplified nostalgia for this, merely projected on to technological components), I suggest that views

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[71] Crampton, Hillary. 'Glow'. *The Age*, 17.10.2007 http://www.theage.com.au/news/arts-reviews/glow/2007/10/17/1192300821989.html. Accessed on 18. 12. 2009

[72] Green, April. 'The Lady and the Light: Chunky Move's Glow at the Kitchen'.

[73] http://www.labiennale.org/en/dance/program/chunky-move.html?back=true Accessed on 05.05.2010

[74] Watson, Keith. 'Can you dance with a computer'? Metro, London. September 24, 2004. Available online at http://www.exile.at/apparition/ Accessed on 03.11.2011.

like Watson also leave open the critical possibility that kinesthetic relations set up between human and technological dancing agents can also send theory in the other direction, towards technics. I explore this argument more in chapter four.

While often not doing rigorous theory, and while we must be wary of the contexts in which such critical (and less critical) dance industry writing is being produced, to survey the reception of staged digital dance created with first generation interactive systems is to acknowledge that the audience embraces at this moment the visual imagery created by the interactive system and perceives these new players of interactive systems and outputted images in terms of the creation of aesthetically impactful choreographies that speak back to the dance field itself.

Statements of artistic achievement can be found in reviews on *Glow*. Green, for example, writes that the utilization of interactive technology in *Glow* "doesn't come off as gimmicky or icing on the cake—it is a truly intrinsic element of the dance, and helps it present its case."[75] Thus, Green perceives the projected images as an integral aspect of the dance rather than as an added external element, giving meaning to the overall development of its aesthetics. This implies accordingly that the notion of dance expands to include the movements by and technical modulations of the interactive system, which outputs the digital visual imagery.

In these ways, many dance reviews evaluate the examples of staged digital dance examined in this thesis as innovative examples or even 'signs' of the vitality of dance practice of its period. Stephanie Glickman, for example, claims that *Glow* "feels complete and is a great (and rare!) example of the possibilities for dance and new media collaboration."[76] According to this critic, whereas "collaborations in dance that mix the organic nature of the dancing body with the programs of a machine are often fraught and heavily weighted towards the technology side", the collaboration between Obarzanek and Weiss results in a choreography "with neither element overshadowing the other."[77] Published shortly after *Apparition*'s premiere in Linz, in an article entitled 'Ars Electronica Asks What Will be Next', Ed Ward underlines that *Apparition* "brought a storm of applause"

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[75] Green, April. 'The Lady and the Light: Chunky Move's Glow at the Kitchen'. http://www.brooklynrail.org/2008/03/dance/the-lady-and-the-light-chunky-moves-glow-at-the-kitchen

[76] Glickman, Stephanie. 'Glow. Chunky Move'. *The Australian Stage*, 17.10, 2007. http://www.australianstage.com.au/reviews/miaf/glow--chunky-move-782.html Accessed on 19.12.2009

[77] Glickman. 'Glow', http://www.australianstage.com.au/reviews/miaf/glow--chunky-move-782.html Accessed on 19.12.2009.

at the end of the performance.[78] And Thomas Kramar reports to have seen the future of dance in *Apparition,* which is "(at least) also physical."[79]According to Levin, the scenes, which portray real-time interaction between the human performers and the projected digital imagery are by far the highlight in *16 [R]evolutions*:

> The most enjoyable parts are when the performers dance with the technology as if it were a steady part of the landscape. (…) They simply allow the digital media to become an eerie, but intriguing character almost paralleling Mother Nature. One can't help but be moved by it.[80]

What is striking in the reviews and critical dance writing surrounding the emergence of staged digital dance created with first generation interactive technologies, is this rhetorically phenomenal welcoming into the field of staged digital dance in terms of new choreographic and conceptual possibilities for dance. In other words, the case studies of this thesis were not just perceived at this moment in terms of an excitement about new technologies per se. Immediately the sense here is that the hierarchical mode of perception, which positions the human at the center and the technology at the periphery of attention, is being consciously and productively unsettled for the audience of such works. Accordingly, this also points to a destabilization of the audience's established habits of watching, and framed expectations capacities, of humans as performers within this art form. I explore the consequence of this fact more in chapter five.

There is more to be said about critic's embraces of these works and their "arrival" at this social, technological and historical moment inside and outside of dance history. Focusing on translating such critical moments within the confines of the concerns of this chapter however, it is fair to conclude at least that the reviews of *Glow, Apparition*, and *16[R]evolutions* point to a destabilization of the hierarchy of perceptual importance. More interestingly, dance critics consider these artworks as a sneak preview into the future of dance as an art form. Crampton, for example, states that *Glow* "offers exciting new theatrical possibilities" as a result of a "fascinating marriage between dance and technology."[81] For Crampton, *Glow* is another step in the quest to "imagine and realize new possibilities of how dance might be made, viewed, and read" as a result of the crucial

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[78] Ward, Ed. 'Ars Electronicas Asks What Will be Next'. *The New York Times*, 08.09. 2004. http://www.nytimes.com/2004/09/08/arts/design/08linz.html Accessed on 15.12.2009

[79] Kramar, Thomas. 'The future is (at least also) physical*'. Die Presse Vienna*. 06.09.2004. Available online at: http://www.exile.at/apparition/. Accessed on 09.04.2012.

[80] Levin, G, Sara. '100, 000 years of evolution, live'. *The Villager*, January 2007 http://www.thevillager.com/villager_143/100yearsofevolution.html Accessed on 20.12.2009

[81] Crampton. 'Glow'. The Age, 17.10.2007. http://www.theage.com.au/news/arts-reviews/glow/2007/10/17/1192300821989.html

roles played by digital technologies in the choreography.[82] *Apparition*, too, is evaluated as an innovative form of choreography, which offers a "spellbinding glimpse into the brave new world of dance."[83] And Silvia Nagl comments that *Apparition* achieves a "sensuous symbiosis of humans and technology", creating "natures, which act between physical presence and virtual dissolution."[84] Hence, the critics seem to be in large agreement that an important development for the future of dance is its expansion to include the technological. In chapter five, I discuss the expansion of the domain of dance as a shift towards a post-human paradigm within this art form, which I argue is what is being captured here in this chapter, in critics' future-oriented perceptual embrace of the human-technology "duets" of staged digital dance.

In sum, the reviews demonstrate a destabilization of the hierarchy of perceptual importance within staged digital dance. They help to show how the technology is no longer a means to an end—to support the physical presence of the human onstage or the flow of the narrative. The visual images provided by the interactive system move away from the periphery of attention to become a performing element and dance partner in the choreography. In this respect, they underline the need to re-visit certain terms that so far have been strictly applied for the human and expand them to the domain of technology, the most important being the notion of performance.

Indeed, performance as a term is rarely applied to the domain of the technological within the field of dance. This is unfortunate because as I have tried to show throughout the course of this chapter, the aesthetic effects provided by the interactive system have a significant impact on the creation and perception of the choreography on the basis of what they do. In order to show the scant attention to technological performance, in the next chapter, I conduct a literature analysis by which I examine the concepts applied to understand the role of technology within studies in digital dance, concluding that the notion of technological performance is largely missing within them.

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[82] Crampton. 'Glow'. The Age, 17.10.2007. http://www.theage.com.au/news/arts-reviews/glow/2007/10/17/1192300821989.html

[83] Mackrell, Judith. 'Apparition'. The Guardian London, 18.09. 2004 Available online at http://www.exile.at/apparition/ Accessed on 03.11.2009.

[84] Nagl, Silvia. 'Apparition, the fascinating hallucination of Klaus Obermaier'. *Oberoesterreichische Nachrichten Linz*. 06.09.2004. Available online at http://www.exile.at/apparition/ Accessed on 09.04.2012.

2.4 Conclusion

In this chapter I have shown that the integration of interactive technology in staged digital dance presents a major challenge to the understanding of role of technologies as assisting devices in dance. To demonstrate this interruption caused by staged digital dance, I examined the changes in the cultural practices of dance within the levels of creation and reception. I showed that the incorporation of the interactive technology in staged digital dance differs from the conventional role of technology used in dance within the creation (in terms of the system's influence in the shaping of the choreography) and reception (in terms of the perception of the role of the projected visual imagery created by the interactive system) of the choreography.

On the basis of the examination of the creation and reception of the case studies *Glow*, *Apparition*, and *16 [R]evolutions*, I demonstrated that technology functions as a performing element onstage. The aesthetic effects offered by the interactive system, I showed, and the way they are integrated in the choreography have a major impact on the actualization and perception of the role of technologies, now as a dance partner. Accordingly, I concluded that staged digital dance necessitates extending the notion of performance to the actions taken by the interactive system within the creation and reception of the choreography.

Strikingly, despite the central role played by technology in staged digital dance, the frameworks applied in the literature of digital dance seem insufficient to account for the qualitatively different functions of technology in this artistic practice. Most often, these frameworks take the dancing body as their starting point while constraining the role of technology to a minimal level. The next chapter presents a literature review of digital dance with the aim to show how they extend the hierarchy of perceptual importance in one way or another.

CHAPTER 3.

Applied concepts in the literature on digital dance

3.0 Introduction

In the previous chapter, I have shown how staged digital dance unsettles the hierarchy of perceptual importance both at the level of creative development and at the level of reception of such choreographies. In this staged digital dance practices challenge conventions inherited from the nineteenth century that relegate the conception and role of technology to devices in support of the human performer on stage. Contrarily, staged digital dance captures technologies performing alongside human movement and responsively interrelates human and system capacities, leading to the perception of technology as a performing element and dance partner. I concluded that staged digital dance requires theorists attend to, and begin to analyze such dance technologies and roles as a type of inhuman performing element. If we look to the existing literature on staged digital dance emanating from dance and performance studies however, it still seems to be the case that the notion of performance, as the display of certain capacities of expression for an audience, is still being reserved for the human performer alone.

This chapter takes account of the present conceptual and theoretical approaches being applied to staged digital dance created with first-generation real-time interactive technologies from dance and performance studies. It aims to come to terms with how and why, even "in theory," limited attention is being given to the role of the interactive system and its impact on the perception of the choreography of staged digital dance practice. I need to deal here with a recurring theme in the literature of digital dance: the fear of the potential disembodiment of dance,[1] which is commonly perceived to be generated via the integration of technology in its practice.[2] I note that the fear itself extends well beyond the specific subfield of digital dance. As I have already mentioned when discussing conceptual precursors to stage digital dance from a larger history of performance in chapter one, the

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[1] With disembodiment I refer to the degradation of the corporality (or physicality) of the human dancer from the dance experience and concept. I consider certain degrees of disembodiment, varying from the machinization of the body to the erasure of the human body from the stage at its extreme end. In other words, I use disembodiment in two ways: as an experience from the perspective of the dancer and as a component of a socio-cultural discourse at the beginning of the 1990s, which I explain in section 3.2 of this chapter.

[2] Writings on the fear of disembodiment in digital dance can be found in Wechsler, Robert. 'Computers and Dance: Back to the future'. *Dance Research Journal,* vol 30, nr. 1 (Spring 1998): pp. 4-10 and in Povall, Richard. 'A Little Technology is a Dangerous Thing' in Dils, Ann and Ann Cooper Albright (eds). *Moving History/Dancing Cultures. Dance History Reader*. United States of America: Wesleyan University Press, 2001: pp. 456-457. For a discussion of the fear of disembodiment in the early twentieth century see Evert, Kerstin. Dance and Technology at the Turn of the Last and Present Centuries' in Dinkla, Soke, Leeker, Martina eds. *Dance and Technology. Moving towards Media Productions.* Berlin: Alexander Verlag, 2002: pp. 30-66.

choreographic incorporation of technologies in dance in the early twentieth century has generated different degrees of anxiety, or outright dismissal. Tensions between body and technology are, I argue here, only magnified by stage digital dance and still under-theorized in its literature. This chapter therefore aims to come to terms with the impact of legacy thinking from the early twentieth century dance discourse regarding anxiety around disembodiment in particular amidst heightened attention to technological aesthetics of various kinds, and the ways in which this anxiety is simplistically resolved through a conceptual reliance on technological optimism or utopianism on the one hand, and on the other hand, through a re-appraisal of the naturalness of the human body. The two quite contrary strategies are co-present (responding to the same apparent problem) in dance discourse and dance movements of the early twentieth century. These strategies furthermore, as I will come to show, bear striking similarities to the approaches of practitioner-theorists invested in creating and conceptualizing the human-technology relation in the literature of digital dance, and in creating and shaping a discourse for its practice. Therefore, understanding the social, cultural, and political context of the early and late twentieth century together, in particular the ways in which the discourses of disembodiment and virtuality have played out at both times, helps to better understand why the frameworks applied in digital dance exclude the notion of performance from the actions executed by technology in this artistic practice.

This chapter makes a critical assessment of the actual discourse of digital dance to come to terms with how staged digital dance theory still refrains from theorizing technological performance, how it remains human-centered, and how it otherwise addresses certain anxieties towards technologies through legacy thinking inherited from the early twentieth century dance. In section 3.1, I examine anxieties concerning the integration of technology in dance in the early twentieth century. In 3.2, I examine the historical context of the mid-1990s, during the establishment of digital dance in order to draw similarities and differences between this discourse and the discourse of the early twentieth century experiments that implemented technology. In section 3.3 I present the academic and professional literature on digital dance, its key authors and interdisciplinary concerns. I suggest in this section that the dual identity of the first-generation affiliates[3] (scholar/practitioners) in digital dance and the cultural backdrop in the mid-1990s has contributed to the tendency to prioritize the human body during the establishment of digital dance. I map the key strategies of practitioner-theorists in incorporating technology in to

[3] I explain this term in section 3.2 of this chapter.

theory itself, while keeping the human at the centre. These strategies include: A) emphasizing the “new liveliness” of real-time interactive technologies, seen as newly comparable to the liveliness of the dancing body; B) figuring the metaphysical extension of the dancing body drawing on the work of Merleau-Ponty; and C) envisioning body and technology as equivalently valuable but dissimilar elements “in dialogue.” In chapter four I go on to deal with alternative ways of thinking technology aside from A and B, and in chapter five I engage more deeply and theoretically with C, the more critically innovative route of conceptualization taken in both the practice and theory of digital dance.

3.1 Anxieties surrounding technological incorporations in the first and last decades of the twentieth century[4]

As dance historian Evert (2002) explains, artistic experiments that integrated dance and technology at the turn of the twentieth century, key instances of which I detailed in chapter one, aroused similar concerns for disembodiment, and doubts regarding the compatibility of the body and technology on stage. Similar doubts have haunted the reception of staged digital dance since its inception in the 1990s. In this section I want to elaborate upon how the conceptual precursors to staged digital dance, their theoretical figuring in dance theory, has constructed a legacy of thinking about dance experiments with technology in ways that in fact haunt the present literature of digital dance.

Evert argues that, at the turn of the twentieth century, two diametrically opposed modes of thought emerged to deal with this tension between body and technology - figured in the fear of disembodiment - towards either acceptance or rejection of new technologies within dance culture. (The 'new' technologies she refers to at that time were of course photography and film.) The two opposed modes of thought and the tension between them, Evert reports, were to remain relevant in dance until the end of this last century.[5] Interestingly, Evert writes that both modes of thought were in agreement about what was then seen as the characteristics of dance—dynamism, change, and transitoriness—which perfectly fit the spirit of the times at the beginning of the twentieth century. In chapter one, I have briefly explained the crucial changes that took place in social and cultural life in early twentieth century, resulting from the Industrial Revolution and new discoveries in science and technology. Dance, being the art of movement, fit well with the dynamic and motile context of social and cultural life in this era and it was in this way that it was "absorbed, taken up as motif and reflected in multiple ways by artists working in a diverse variety of genres, from theater to fine arts and literature."[6] As a result, dance stepped forward from its "obscure background position in the art hierarchy to take

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[4] Little scholarly work has been done on the integration of new technologies in dance at the beginning of the twentieth century with the exception of Gabriele Klein and Gabriele Brandstetter. However, these authors' works have not yet been translated into English. Therefore, in this section, I make use of Klein's and Brandstetter's text via the work of Kerstin Evert. Evert, Kerstin. Dance and Technology at the Turn of the Last and Present Centuries' in Dinkla, Soke, Leeker, Martina (eds). *Dance and Technology. Moving towards Media Productions.* Berlin: Alexander Verlag, 2002: pp. 30-62.

[5] Evert, 2002: p. 38

[6] Evert, 2002: p. 32

center stage: it becomes a symbol of modernism and a key medium for all arts that endeavor to reflect the new technical era as an epoch defined by movement."[7]

In this quote we begin to get a glimpse of the complex relation of dance and technology. Louis Lumière for example made films of the dancer Loïe Fuller, who I discussed in chapter one, experimenting with light projections on her wide skirts in the Serpentine Dance. And just as dance was this ideal object of film (and later video) in the works of moving image artists, film was also becoming the modern new medium of reference for dance. It is notable that the the ballet *Relâche* by the Ballets Suédois in 1924 was shown as an intermission during the film *Entr'acte* (directed by René Clair). Film editing techniques also had an influence on the movement style and dramaturgical development during the creation of choreography in general.[8] For example, according to Evert, the staging of staccato-like movements in *L'aprés Midi d'un Faun* (1912) and *Jeux* (1913) by dancer and choreographer Vaslav Nijinsky was one of many movement works illustrating this trend.[9]

This coming together of dance and technology at the end of the nineteenth century was either embraced with optimism, or anxiously questioned or rejected as dangerous for the art form. In the first mode of thought, dance is considered an innovative point of reference for technologically enamored theatrical and artistic conceptions, reflecting on life in a big city in the increasingly mechanized society of the early twentieth century. Evert observes the optimistic visions on dance and technology within early avant-garde experiments, in which the body is approached as a machine - there is focus in these works on the mechanics of the body and in extreme examples a questioning of whether the human body could be replaced with machines.[10] Schlemmer's sketches for sculptural costumes, which I discussed in chapter one pointed directly to "abstract, mathematical, and stereometric concepts of the body, reflecting the mechanization of bodily movement to fit technical processes."[11] The Futurists' will to merge man and machine, considered "antecedents of the notion of the cyborg" parallels director and scenographer Edward

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[7] Gabriele Brandstetter quoted in Evert, 2002: pp. 32-34.

[8] Evert (2002) explains that choreography and film in this era were characterized by a "stroboscopic interruption principle, revealing that film editing techniques and principles of montage and collage also exert their influence on the dramaturgy and choreographic style of dance productions." (p. 36).

[9] Evert notes that Charlie Chaplin's mechanical, choppy movements portrayed in the film *Modern Times* (1936) can also be viewed under the light of the influence of mechanics on human movement.

[10] Evert, 2002: pp.32-33

[11] Evert, 2002: p. 34

Gordon Craig's notion of the Über-Marionette, which aimed to "replace the fallible human body with the mechanical marionette."[12]

Very much beyond the realm of art, but infiltrating back in to artistic production, a capitalized science and industrial culture was also gaining an interest at this historical moment in concepts of human performance and physical movement, which were now being assembled and scientifically examined.[13] The human body, as dance scholar Felicia McCarren (2003) explains, is here confronting the height of the mechanical industrial era, being subjected to machinic principles, such as the Taylorist principles of efficiency, and human performance becomes understood in terms of measurable productivity.[14] For the first time, human performance was being equated with quantifiable physical outputs. In Anson Rabinbach's (1992) historical comprehension of these late nineteenth century changes, human and non-human performance are especially reduced to energy, which led to scientific experiments on fatigue and the metaphor of "the human motor."[15] In chapter five, I return to the principles of efficiency and human performance to discuss them in detail and also examine human and technological performance from the perspective of agency. Here, it is important just to note that the early twentieth century was dominated by the idea that humans were subjects of machinic principles, which was reflected in the avant-garde art works of this era.

At the same time however, as Evert points out, there were strong countervailing tendencies to resist such technological approaches to the body as a machine in theatrical and artistic work of the period. Besides the optimism of many technophilic artists, many other dancer/choreographers had quite different investments in the dynamics of movement considered to be the essential elements in dance. Captured especially in the work of dancers such as Isadora Duncan and Ruth Saint-Dennis, the movement called 'free dance' or later 'expressive dance' remained committed to the notion of the naturalness of

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[12] Evert, 2002: p. 34

[13] It should be noted that the association of dance with physicality was already a phenomenon of the late eighteenth and early nineteenth century. Foster (1996) explains that dance lost its connection to a generalized physical sociability in the eighteenth century due to scientific inquiry. Now the dancing body was to show what a body can do in terms of physical skills; its job became manifesting the erect, vertical line's presence in bodily posture. By the mid-nineteenth century, the body was disciplined and it "largely did as it was told." *Choreography and Narrative. Ballet's Staging of Story and Desire*. Indiana: Indiana University Press, 1996: p. 258. In sum, already in the eighteenth century, the body is treated like a complex machine.

[14] McCarren, Felicia. *Dancing Machines. Choreographies of the age of mechanical reproduction*. Stanford: Stanford University Press, 2003

[15] Rabinbach, Anson. *The Human Motor. Energy, Fatigue, and the Origins of Modernity*. California: University of California Press, 1992.

the human body precisely in order to explore these new movement aesthetics of the period. For example, in Duncan's approach, the naturalness of breathing was taken as a point of departure for the creation of the choreography, rather than the execution of certain technical and virtuosic movements required from ballet. According to Evert, Duncan was conscious of constructing a countermovement against the artificiality and strict physical discipline of ballet and in free dance, the dancing body was considered an "instrument of redemption from growing mechanization" and, therefore, a critical development against the "unnatural" movement patterns of humans (and machines) caused by mechanization in general.[16]

To acknowledge and track the two opposed modes of thought in dance concerning the integration of technology is to be aware of how the notion of disembodiment and the incompatibility between body and technology has been a long running theme and rich debate within the art form of dance since the beginning of the twentieth century. Moreover, these debates are anything but settled and they still hold a place in the discourse on dance today. Media art scholar Soke Dinkla (2002) emphasizes this point that in dance the compatibility between the natural body and technology is still unresolved:

> While media art has by now managed to stake out its own territory in the field of fine arts, in the area of the performing arts, the question still persists as to what extent the aesthetic qualities of dance and the technology mutually influence each other.[17]

Furthermore, Dinkla argues, what is interesting about the 1990s version of this debate is that aesthetic repertoires in dance, particularly, have up until now been able to exclude technology's impact on our images of the body more consistently than other art forms. Dinkla argues even that "especially in Europe, dance's self-image since the 1980s has been based on offering a counter-model to a mechanized world."[18] Close attention to the recent literature addressing staged digital dance makes it clear that these century-long debates and tendencies towards technophobia/philia have not abated. Furthermore, close reading of the work of many prominent practitioners and writers on digital dance reveals subtle, continued investments in dance as a site of conservation for humanist ideals.

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[16] Evert, 2002: pp. 34-36.

[17] Dinkla, Soke. 'Towards a rhetoric and didactics of digital dance' in Soke Dinkla Soke, Martina Leeker (eds). *Dance and Technology. Moving towards Media Productions.* Berlin: Alexander Verlag, 2002: p.14

[18] Dinkla, 2002: p.14.

3.2 The conceptual foundations of digital dance: counterbalancing virtual disembodiment in the 1990s

To be able to understand the humanist influences in staged digital dance's literature, it is important to realize the conditions that played a role in the context of the 1990s during the establishment of this art practice. The unpacking of the context of the 1990s enables to better comprehend the aims and artistic visions in the initial stages of this art form, which, as I show below, were very specific and goal-oriented against the backdrop of media art of the 1990s.

Digital dance is a contemporary practice that is still being produced, reviewed, theorized and historicized. My attention here to its existing literature is therefore understood as both a survey of, and critical contribution to, a discourse that will assuredly further develop and shift. Sarah Rubidge, author and practitioner in digital dance, who has contributed to the writing of its history in England, emphasizes that digital dance as a practice has evolved non-uniformly and in separate international scenes, over the last three decades. It has also involved the creative and intellectual input of many different kinds of artists, including choreographers, new media artists, creative technicians and composers.[19] During the research of this chapter I have spent the majority of my time in dialogue with internationally renowned practitioners and scholars of staged digital dance working especially in England, whose work appears in many of the international theoretical texts on this subject, as well as written documentation.

Initially, digital dance as practice comes out of attempts to collaborate across disciplines and to cultivate conversations towards this. In England, Rubidge locates the establishment of digital dance in the dance film initiatives taken by the television director Terry Braun, who enthusiastically encouraged interest in the use of new media among choreographers during the early 1990s.[20] Braun realized during this time that it was still very much the case that choreographers did not have access to digital technologies and that choreographers and new media artists hardly ever met to discuss their art practice. Consequently, Braun decided to organize structured gatherings and workshops to explore

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[19] Sarah Rubidge. Personal interview. Chichester, 10.02.2009
Rubidge explains that parallel to the developments in England, digital dance also began to flourish in the United States, in particular in Arizona State University (ASU). Yet, at that time, she and other choreographers involved in digital dance were not fully informed about these developments, for the simple fact communication infrastructure did not allow it.

[20] Sarah Rubidge. Personal interview. Chichester, 10.02.2009

how new media could be combined with dance, by bringing together choreographers and new media programmers.[21] Rubidge notes that the preliminary examples of digital dance came out of these series of events that took place under the name of 'Digital Dancing.' Moreover, these gatherings led to the establishment of a core group or community of digital dance, which, Rubidge asserts since the first meeting in 1993, "gradually grew and grew."[22] At the moment of writing this, the domain of digital dance still represents a small but prominent area of research in dance in England, following the field's expansion since the mid-1990s.

It is important to note in this formation of the discourse that the majority of writers who have cultivated the field of digital dance, and who have made the most prominent contributions to the establishment and development of digital dance in practice and theory at an international level, possess what can be called a "dual identity." They are not only cited academic scholars but also active practitioners in the field of digital dance, many working concurrently (or in the first instance) as choreographers. It is this double or dual identity with which most authors describe, analyze, and comment on either their own artistic practice or the artistic work of their peers in the literature of digital dance, which I argue has consequences for the kinds of theory that is produced. Alongside their academic and practical work, these individuals have also established an online community and diverse online archive of dance performances that integrate interactive technologies (among others) and which has helped shape what today has come to be commonly known as the archive of digital dance.[23]

Based on my research in to the formation of digital dance discourse, I propose that of the *first-generation* practitioner/theorists of digital dance in England[24] prominently Sarah

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[21] Rubidge describes the first gathering as a public event, held at Queen Elizabeth Hall in London where Braun, together with dancer Mark Baldwin, demonstrated the software Lifeforms in 1992. Five other event/ workshops followed the first to which certain choreographers, such as Siobhan Davis, Johannes Birringer, Sue McLennan, Susan Kozel, Gretchen Schiller, and Sarah Rubidge participated.

[22] Sarah Rubidge. Personal interview. Chichester, 10-02-2009

[23] The first virtual community is 'Dance and technology zone', an internet-based community where artists, who are particularly interested in using new media and information technologies in the creation and performance of dance, dance theater and related live performance works, can share their experiences and works with each other. Currently, the 'dance-tech' network, led by Marlon Barrios Solano has replaced the 'dance and technology zone'. The website can be found at: http://www.dance-tech.net/

[23] The term first-generation affiliates raises the question whether a second-generation affiliate in digital dance have emerged. In my opinion, since the year 2000, a second-generation is emerging in digital dance such as, Maria Chatzichristodoulou and Rachel Zerihan. Most second-generation affiliates, however, also work as practitioner and scholars within the field of digital dance.

[24] This is not an exclusive list, but a selection of major figures that are of importance for the field of digital dance.

Rubidge,[25] Susan Kozel,[26] Gretchen Schiller,[27] Susan Broadhurst,[28] Carol Brown,[29] and Johannes Birringer[30] have contributed greatly to the development of the discourse. Other prominent international practitioner-theorists who have contributed significantly to the field

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[25] Sarah Rubidge is a choreographer, digital installation artist, and dance scholar. In her artistic practice, she explores the relationship between choreographic practices and digital technologies, with a specific focus on interactive media. Her PhD thesis *Identity in flux: A Choreographic and Theoretical Enquiry into the Open Dance Work*" (2000) examined the relationship between the contextual framework of the 'open work' and dance practices with digital interactive technologies and she has been publishing since on critical choreography, technological poetics, dance and installation. In her current work, she collaborates with interdisciplinary artists, exploring the notion of sensation and affect. She makes dance works for professional performers but also installation works that allow audience participation. Some examples of her work includes *Streamlines* (2012), *Eros-Eris* (2007), *Fugitive Moment*s (2006), *Sensous Geographies* (2003). For more information on her artistic and scholarly practice, see her website: www.sensedigital.co.uk

[26] Susan Kozel has a background in dance and in philosophy. She combines artistic practice with scholarship, interlacing dance and digital technologies as the director of Mesh Performance Practices. Her collaborative performances and installations include the *Technologies of Inner Spaces* series (2005-2009) *whisper[s*] 2002-2005 (with Thecla Schiphorst) and *trajets* 2000-2007 (with Gretchen Schiller). For more on Kozel's artistic and scholarly work: http://medea.mah.se/2010/10/susan-kozel-professor-of-new-media/

[27] Gretchen Schiller is a choreographer, screendance artist, and researcher. Examples of her choreographic work include *Body LIbrary* (2011), *La Traverse* (2010), *Circulari* (2008). Her scholarly work addresses kinetics, dance movement and image science relating to interactive choreographic dance works. More information on her research and artistic practice can be found at: www.gretchen-schiller.org

[28] Susan Broadhurst is a writer and performance practitioner in the School of Arts, Brunel University, London. Her research interests include: performance theory, critical and literary theory, continental philosophy, neuroaesthetics and the aesthetic potential of digitized technology for performance (e.g artificial intelligence, motion capture, 3D modelling and animation, and biotechnology) and aging and the arts. She is the author and editor of many books on digital dance; she has also created artworks which take the integration of artistic practice and digital technology as starting point. Details of Broadhurst's publications and artistic practice can be found at: http://www.brunel.ac.uk/arts/theatre/staff/sue-broadhurst

[29] Johannes Birringer is a scholar, choreographer, media artist, and artistic director of AlienNation Co., a multimedia ensemble that has collaborated on numerous site-specific and cross-cultural performance and installation projects, as well as the DAP-Lab. Currently, he works at Brunel University. Recent artworks include: *UKIYO II* (2010)*, Ming Yi* (2009), *Auf der anderen Seite des Spiegels* (2009). More information on his practice and research into digital scenographies and worlds can be found at: http://www.brunel.ac.uk/arts/theatre/staff/johannes-birringer

[30] Carol Brown is a dance scholar and the choreographer of Carol Brown Dances. In her work she focuses on the relationship between bodies and spaces. Among her recent dance works are: *Seed* (2011), and *Maybe a man and a woman* (2011). Her recent research addresses 'Design, digital gestures and the in[ter]ference of meaning', *International Journal Performing Arts and Digital Media,* vol 7, 2011. For more information, visit: http://www.carolbrowndances.com/

include: John Mitchell,[31] Mark Coniglio,[32] Armando Meniccaci,[33] Robert Wechsler,[34] and Scott deLaHunta.[35] Most of these individuals are still active as practitioners and as scholars in the field of digital dance.[36] Furthermore, digital dance theorists are a reasonably close-knit international community of practitioners working in close dialogue, or theoretical proximity to each other whose work continues to reverberate very strongly and spill as influence in to other networks and geographies and more recent works. The reason it is important to acknowledge the dual identity of these individuals is not to bracket 'artists' from 'objective research claims' per se but instead to recognize that their background in dance and choreography seems to have especially shaped a certain artistic inattention to technological aspects of digital dance during the establishment of digital dance. This is a strange acknowledgement to make but it becomes apparent upon close reading of the way technologies are conceived in the literature of digital dance, which I address in section 3.3.

Information generated from my own research interviews with two members of the first-generation practitioners, Sarah Rubidge and Susan Kozel, reveals that first-generation practitioners of digital dance understood themselves to be consciously striving to counterbalance the art form's own anxieties around human-computer incompatibilities and

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[31]John Mitchell is an interactive performance designer, composer, and researcher using technology for expanding sensory and creative experiences in the arts and education. During his career, Mitchell has mainly focused on exploring the use of computer interactivity in dance and movement performance. More information on Mitchell can be found on: https://webapp4.asu.edu/directory/person/44621

[32] Mark Coniglio has a background in music. While not being a dancer he is placed in the list of first-generation members of digital dance because of his involvement in digital dance since the mid '90s via the performances of Troika Ranch, and his development of Isadora, a software created especially for the needs of choreographers working in the field of digital dance. I discuss Isadora in the next chapter.

[33] Armando Menicacci is a musicologist and dance researcher, following several years of dance study. He is the director of Mediadanse at Paris VIII Dance Department laboratory, focusing on the relationship between research, creation and pedagogy in dance and digital media. Menicacci is involved in generative dance scoring, such as in his under-score project. For more information on Menicacci's artistic and scholarly work, visit: http://www.digitalcultures.org/Symp/Armando.htm

[34] Robert Wechsler is a choreographer and researcher. He is one of the founders of Palindrome, a dance company committed to exploring the integration of dance and digital technology, in particular using interactive media. Recent artworks include: *Flower. Wine. Moon. Me*. (2011), *Das Oklahoma Project* (2008). Wecshler publishes on digital dance and has written a practical guide for artists working in this area. For more information and research by Wechsler see: http://www.palindrome.de.

[35]Scott delaHunta currently works together with the choreographer Wayne McGregor/Random Dance Company, undertaking research on dance and cognitive science. A list of publications for this project can be found on: http://www.choreocog.net/papers.html. DelaHunta also works as dramaturge in the field of digital dance, and was the dramaturge on *Apparition* (2006), which is one of the case studies examined in this thesis.

[36] Currently a majority of England-based first-generation digital dance affiliates are gathered at the Centre for Contemporary and Digital Performance department at Brunel University in London. The Dance Department of Arizona State University is another important institution for education in dance and digital technologies.

the notion of disembodiment. Both practitioners understand themselves to be invested in this counterbalancing at both their artistic and theoretical level.

The notion of disembodiment especially dominated the discourse about art and technology in the early 1990s, and there were in fact observable schisms in the way disembodiment was understood as a kind of body politics drawing lines between artistic projects incorporating new technologies, separating off some from others. In new media art for example, utopian investments in cyberspace, VR and statelessness contrast greatly against the kinds of anxieties regarding the mainstreaming of the web and the increasingly virtualization of social life in dance. In *Materializing New Media,* Anna Munster (2006) describes 'virtuality' as one of the key themes that dominated the culture of information and its aesthetics in the 1980s to the 1990s. The virtual, Munster writes, "more than any other quality associated with digital technologies...promised to leave the body and its "meat" behind, as minds, data, and wires join together in an ecstatic fusion across the infinite matrix of cyberspace."[37] Munster explains that during the 1990s, Virtual Reality technologies became one of the most frequently used technologies in digital research and development, promising "bubble worlds of techno-utopian enclosure and escape."[38] From Hollywood depictions of virtual reality, countless theme park rides in Disney, to practical applications in medical and military simulation platforms, VR as both techno-cultural future and present technology promised captured various out-of-body experiences. Munster's writing shows how VR technologies in fact set the grounds for the discourse of disembodiment in the 1990s. Steve Woolgar (2002) notes that much of the discourse on the effects of digital technologies on society was guided by a polarization between narrow suspicion and uncritical enthusiasm at this time around these inventions - the utopia and dystopia of humanity merged with machine worlds.[39]

The optimism for VR was also, of course, not new; there are yet again parallels to point to between the discourse on disembodiment between the 1990s and the late nineteenth century. In the words of Ian Boal, historian of society and technology, many "seers" of late modernity at the turn of the century "foretold a future of boundless prosthetics, enhancements to human powers, among them powers of communication -

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[37] Munster, Anna. *Materializing new media. Embodiment in information aesthetics.* United Sates: Dartmouth College Press, 2006: p. 86.

[38] Munster, 2006: p. 89

[39] Woolgar, Steve, 'Five Rules for Virtual Reality' in Woolgar, Steve (ed). *Virtual Society? Technology, Cyberspace, Reality*. Oxford: Oxford University Press, 2002: pp. 3-4.

modes of amplification, replication, and extension."[40] At the same time, while there are strong parallels between the socio-cultural context in the late nineteenth century and 1990s with regards to the belief and optimism in technology and a resistance to virtualization that goes against this, there are also major differences between these two eras.

Firstly, the tendency towards optimism or anxiety tends at this moment to be taking place as a negotiation between different art forms: early experiments in new media art, signifying the techno-optimist pole, and digital dance as a counter-movement to the disembodied aesthetics in new media art practices outside of dance. Furthermore, it is possible to argue that the question of whether or not technologies 'should' be integrated in dance has become no longer so relevant. Rather, the question appears more whether or not the integration of technologies in this art form can be at the service of the innovation of dance as an art form, and furthermore, whether and how it is possible to establish criteria for appraising this. For many dance artists whose assumptions of dance as art form have been inherited from the nineteenth century, these questions require a certain reflexive reappraisal of ideals such as sensuality and embodiment, but without necessarily going in the direction of valorizing "disembodiment" either.

These critical nuances become clear upon noting digital dance's incorporation of technology was perceived by practitioner theorists themselves as a kind of technologized countermovement against the aesthetic and rhetorical obsession with disembodied, placeless, increasingly un-real and 'virtual aesthetics' in new media art outside of dance. Susan Kozel, for example, explains this trajectory of her work from the early 1990s, until a couple of years ago, was "informed by a reaction against certain assumptions regarding the digital and the machinic."[41] She describes these "assumptions" as harsh aesthetics and the rhetoric of disembodiment, which she claims to have witnessed in many artworks in the field of visual arts at the beginning of the '90s. For Kozel, new media art works being produced by non-dance artists demonstrated "such a militarism, such masculinity (…) and

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[40] Boal, Ian. 'A Flow of Monsters' in Brook, James, Boal, Ian (eds). *Resisting the Virtual. The Culture and Politics of Information*. San Francisco: City Light, 1995: p. 5
In his historical tracing of aspirational precursors to this image of 'disembodiment', Ian Boal has shown that, associated with their belief in technical progress, nineteenth century thought was already very much interested in extending the human into virtual dimensions. In this article Boal considers two other eras in which the optimism on technology revived. The first is after the Second World War under the banner of cybernetics. The second is in the 1980s as the computer allowed the bourgeoisie to "fall in love once again with the future." (p.7)

[41] Susan Kozel. Personal interview. London, 20.02.2009

corporate hardness, which centered upon the rhetoric of 'leaving the body behind."[42] She explains that such assumptions and rhetoric created in her—and other dance artists— a "desire to explore how technology doesn't have to take us to acceleration, harshness, and rationality. Technology can also be used to explore the affect, the corporeal (…), and the blurry."[43] Hence, digital dance becomes this counter movement against the disembodied rhetorics and aesthetics dominant in new media art at the beginning of the 1990s.

Rubidge similarly situates her investment in digital dance as a counter to (visual) new media art experiments, arguing that the aesthetics of imagery in most new media art in the early 1990s were "merely computer-graphic and having no texture."[44] She too refers to the notion of disembodiment as a kind of hype that dominated the practices of the visual arts created with digital technologies in contradistinction to the works and concerns (and artistic knowledges) of dance artists working with new technologies. According to Rubidge, the disembodiment hype implied that with digital technologies, "you could get rid of the messy stuff of the body and download yourself into a computer."[45] Similar to Kozel, Rubidge also designates the disembodied aesthetics applied in the visual arts as the main reason why she and other choreographer and dancers got so involved in digital dance. For Rubidge, the motivation to counterbalance the digital discourses of disembodiment seemed quite logical, because the participants of the preliminary workshops organized by Braun came from dance and, thus, a somatic movement background.[46] Hence, the primacy of the dancing body and the kinesthetic qualities of dance seem to establish the most important element in the artistic practices of the first-generation practitioners of digital dance, regardless of the extent of the incorporation of digital technology in its creation and presentation.

From the very inception of digital dance therefore, practitioner-theorists were committed to cultivating the concept of the integrity of the dancing body inside of technologized experience. Finding some balance between the physical aspects of dance and aesthetic effects created by digital technology in the choreography, however, remained an ongoing challenge for many choreographers. Braun was particularly aware of

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[42] Susan Kozel. Personal interview. London, 20.02.2009

[43] Susan Kozel. Personal interview. London, 20.02.2009

[44] Sarah Rubidge. Personal interview. Chichester, 10.02.2009

[45] Sarah Rubidge. Personal interview. Chichester, 10.02.2009

[46] Nevertheless, besides a general interest in sensual aesthetics, Rubidge emphasizes that there was no strictly unified reason for a choreographer to incorporate new media in their practice. Rather, the integration and function of new media in choreography depended on the specific interest of the choreographer.

the fact that choreographers can be overwhelmed by unfamiliar technologies, while also realizing a concurrent danger - that choreographers could set themselves in the position of being mere image-providers for the new media artists-programmers in his workshops. To deal with these factors, in the preliminary meetings, Braun established workshop conditions in such a way that the workshops were to be 'dance-led' rather than 'new-media led', meaning, that choreographers would have more dominant roles during decision-making and especially in the realm of artistic choices.[47] Dance as the art form, in other words, was the starting point and outcome of experimentation. According to Rubidge, allowing the choreographers to lead the workshops during the preliminary gatherings was beneficial because choreographers could push the aesthetic agenda in a different way than the "non-sensual aesthetics applied in new media art of that time."[48] Drawing upon the practitioner observations and theoretical work of Rubidge and Kozel in particular then, it can be concluded that the first-generation practitioners of digital dance— both in the aesthetics of their work and in their writings, indeed between these two modes of practice —were very much invested in counterbalancing the notion of disembodiment resulting from the integration of digital technologies in dance, and in discovering ways to make digital technologies and the dancing body compatible for art production.

Through such staged digital dance experiments, exploring more productive collaborations between aesthetics and technics, tolerating tensions between body and technology, and counterbalancing the establishment "sense" of the incompatibility of body and technology was not an easy task. Robert Wechsler (1998), choreographer and writer in the field of digital dance asserts that the world of dance remains dubious about the incorporation of technology within this art form. For Wechsler, dancer's continued resistance to technologies is unsurprising. For many dancers computers signal a "denial of the essential element of dance," by which he means "the expression of primitive and sensual aspects of human existence."[49] The following quote from Kozel demonstrates that dualistic takes on the tension between human and computer is still a discussed topic in the year 2007. As Kozel writes:

> At the end of the 1990s I hoped I would no longer have to maintain a profile (…) as "the body police", one of a group of voices to call repeatedly for

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[47] Sarah Rubidge. Personal interview. Chichester, 10.02.2009.

[48] Sarah Rubidge. Personal interview. Chichester, 10.02.2009.
It should be added that Rubidge recognizes that embodiment is currently an acknowledged and frequently explored theme in new media art.

[49] Wechsler, Robert. 'Computers and dance: Back to the future'. *Dance Research Journal*. Vol 30, nr. 1 (Spring 1998): p.9

> attention to be paid to the presence of the body in our computer systems (…). I hoped that the era of celebrating the abandonment of the body by and within virtual reality was over. Unfortunately, flesh still struggles in the face of the machine, or oozes onto it, as these constructions of materiality continue to taunt one another.[50]

Hence, the fear of disembodiment is still present, explicitly or implicitly, as a dominating issue or concern across the numerous articles and books written on digital dance. Richard Povall's article 'A little technology is a dangerous thing' from 2001 implores dancers to break through their resistance to technologies and to go beyond assumptions of the incompatibility of body and technology:

> So, please, let's once and for all discard the notion that advanced technologies and dance are incompatible. Let's by all means question their use, their appropriateness to a particular piece, their dominance and overbearing nature. Let's demand that technologies be sensitive to and understanding of the body (rather than the other way around). But let us also consider these technologies as the mature tools that they are begging to be —simply part of a technical and artistic panoply that might be used in the making of any performance. [51]

Povall's quote suggests we see the integration of digital technology in dance - occurring in staged digital dance most prominently - as the contemporary development of the art form. In chapter one, I have shown how the art form of dance has consistently incorporated newest technologies during its development, making use of their technological and aesthetic potential to suit its own ends in terms of content and form, but always downplayed these incorporations. In this regard, Povall's argument emphasizes progress in the development of dance as art form, at this point marked specifically by digital technologies and their now more visible incorporation an artistic component.

At the same time, Wechsler's, Kozel's and Povall's arguments point out how in the world of dance the integration of technology is associated with a fear of losing the 'essence' of dance; namely, the priorization of the human body. They indicate that a tension between body and technology exists in the discourse of digital dance, which the first-generation practitioner-theorists have tried to counterbalance by means of their practice. In the next section, I examine in detail the ways the first-generation practitioner/theorists of digital dance have dealt with the criticism towards technology as a potential threat to embodiment as well as the incompatibility between human and technology in the writings on digital dance.

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[50] Kozel, Susan. *Closer. Performance, Technologies, Phenomenology*. Massachusetts: MIT press, 2007: p. xvii

[51] Povall, 2001: p. 458

3.3 Human-centered concepts in digital dance literature

I have begun to introduce the discursive work and context of first generation practitioner-theorists invested in cultivating digital dance. It is additionally relevant that digital dance theorist-practitioners were "relative newcomers"[52] to the field of art, science and technology, and they entered a domain of inquiry and an artistic era that was already saturated with tension surrounding the inevitable convergence of body and technology. I have suggested that first-generation digital dance theorist-practitioners theoretically framed and justified their practice within and beyond the dance world, by counterbalancing notions of the non-compatibility of technology; by demonstrating, especially through their workshop practices and performance outcomes, that the incorporation of technology could function at the service of corporeality; and especially by distinguishing their work and their sense of inquiry from the aesthetics of disembodiment which dominated media art (in parallel) during the early 1990s.

Here, I go in to great detail regarding these discursive contributions to staged digital dance by these mostly "dual identity" practitioners, by close reading their work in to three observable tendencies of approaches. First generation practitioner-theorists working with real-time interactive technologies operating with motion-capture software - have tend to choose one of three (or a combination of these) approaches to theorize the incorporation of technology in their theoretical works. Specifically, digital dance created with real-time interactive technologies operating with motion-capture software has been theorized and actualized into a discourse, in terms of A) emphasizing the "new liveliness" of real-time interactive technologies, seen as newly comparable to the liveliness of the dancing body; B) metaphysical extension of the dancing body drawing on the work of Merleau-Ponty and C) envisioning body and technology as equivalently valuable but dissimilar elements "in dialogue." Note that these are not exclusive categories; rather, they represent major tendencies that interrelate and sometimes double up inside of texts. But in any case, understanding the drives and theoretical influences related to each discursive and imaginative strategy helps us to come to terms with how technology (and the human) is being figured as a whole. I come to show that within each of the theoretical tendencies, it is possible to observe that the human body occupies a central point in the literature of digital dance while technology remains of secondary importance. In each, the body tends

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[52] Rubidge, 2001: p. 37

to be hierarchically prioritized over the technological system, and further, the notion of performance is not applied to the actions taken by technology.

A. From frozen to live media

In much of digital dance theory, non-linear technological "liveliness"[53] is used to sense and signal the heralding of an emergent new form of dance practice. A key argument here in the work of the first-generation members of digital dance is the potential or even inherent compatibility of the newly real-time features of interactive technology with that of the live presence of the human performer. By examining the arguments made for the compatibility of the human performer's live presence and real-time features of interactive media, it is possible to notice how writers present interactive technology as being more in line with the performance capacities of the human, and thus, compatible with the human body. It is also interesting to note how such a theoretical position - so formative for the discipline of digital dance - can often tend to transfer or 'project' an organic sense of "liveliness" to the technological components of the dance, which leads to an anthropomorphization of technology, meaning, the attribution of human characteristics to technology.

The difference between real-time interactive technology, specifically, and recording media, is figured as a crucial starting point in theorist's arguments for the compatibility of real-time interactive systems and live presence. David Saltz (2001) argues that recording media—which he calls linear media—have never found an essential place in the performing arts, simply because recording media enable performance creators to avoid encountering risks.[54] For Saltz, the thrill of the "live" is to see an event unfold, with all the risk that it entails. Saltz's focus here on "encountering risks" invokes the capacity for the unscripted human error, such as the performer losing his/her balance during a certain movement, or the music entering during a wrong part of the scene, based on the wrong cue of the stage director, to mention a few. This notion of risk in Saltz appears at first glance to be a kind of preference for human fallibility itself, for performances prone to error.

Saltz elaborates further that each presentation of a certain theatre play is unique also because the human performer never performs his/her role the exact same way twice; instead his role-play entails tiny differences and variability. It is a new event. Linear media,

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[53] I would like to point out that with technological liveness, I am not referring to the liveness debate as it presented by Philip Auslander in *Liveness* (1999).

[54] Saltz, David. 'Live Media: Interactive Technology and Theatre'. *Theatre Topics*, vol. 11, no. 2, (September 2001): pp. 107-127

on the other hand, by which he means recording media, cannot adapt to the changeability of the live performer, which Saltz demonstrates via a scene between a live actor and a prerecorded actor. He explains that unlike the live actor, the prerecorded image will be "unforgiving of any errors the live actor might make (for example missing a cue) and will never adapt to the variations in the rhythms or dynamics of the live actor's delivery."[55] According to Saltz writing in 2001, these conditions and possibilities of media interaction are now changing because interactive technologies (now) possess other characteristics that go beyond the capacities of linear (recording) media. Interactive media "seem" live to a certain degree: through their emphasis upon present time and the event of interaction, and through their capacity to spontaneously react to the movements of the performer, sustaining the pleasure of live performance. For Saltz, this pleasure includes the possibility of encountering unpredictable events that cannot be erased later on, unlike the products of recording media. He thus concludes that interactive technologies mark a new era of the perception of technologies utilized in the performing arts.

Saltz goes further to claim that interactive media signify an end of the period of "frozen media" (by which he means linear recording technologies) and signal a new era of "live media." While frozen media maintain an ontological difference between the recorded nature of technology and its live presence, for Saltz, in the new era of live media, the incompatibility between spontaneous and instantaneous bodies and programmed technologies virtually disappears. Subsequently, Saltz takes a strong theoretical leap to claim that interactive media becomes a "species of live performance."[56] Saltz is valuable to my work in setting up a sense of appreciation of the potential performativity of technology, but the proximity of his discourse to an anthropomorphic or at least organic register, refrains from a more cogent evaluation of the inorganic and non- "live" seeming actions taken by technology as performance.

Mark Coniglio, creator of the motion-tracking software Isadora, and co-founder of the dance company Troika Ranch shares similar views with Saltz. He too associates the intrinsic features of interactive technology with the liveliness of the presence of the human performer.[57] For Coniglio, motion-tracking software carries the capacity to overcome the antithetical status between recording media, which reproduce the exact same content each time, and the immediacy of performance, which entails the possibility of

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[55] Saltz, 2001: p. 109.

[56] Saltz, 2001: p. 127

[57] Coniglio, Mark. 'The Importance of Being Interactive' in Carver, Gavin, Beardon, Colin. *New Visions in Performance. The impact of digital technologies*. United Kingdom: Taylor and Francis Group, 2005: pp. 5-13

unpredictable events or mistakes. In his article 'The importance of being interactive' (2005), Coniglio argues that the reproducibility of digital but non-interactive technology is precisely what makes them inappropriate for use in a live performance:

> Digital media is wonderful because it can be endlessly duplicated and/or presented without fear of the tiniest change or degradation. But, it is this very quality (the media's 'deadness') that is antithetical to the fluid and ever changing nature of live performance. Each time a work is performed, any number of factors can significantly change how it is realized in that moment —perhaps most significant being the interplay between the skill and temperament of the performers and the attitude and engagement of the audience. The downfall of digitally recorded media is that it dampens this essential fluidity by preventing the performers from changing the character of the material from moment to moment.[58]

As this quote shows, Coniglio's arguments are similar to the views of Saltz, who describes real-time interactive technology as live and recording technology as frozen media. He, too, excludes the notion of performance in relation to the actions executed by the interactive system. More radically than Saltz, the website of Troika Ranch, and thus, Coniglio openly claims that interactive media can have the same "sense of liveliness as the human performers it accompanies," without really conceptually elaborating upon what he means by this equation of technological and human liveness.[59] Coniglio describes the demonstration of the compatibility of interactive media with liveliness of human performers as one of the main aims of his dance company, Troika Ranch. He writes that the artistic works of Troika Ranch similarly strive to "impose the chaos of the human body on the media in hope of bringing it to life."[60] In this regard, Coniglio's views on the compatibility of digital technology with performance take the human as model and, therefore, remain human-centered.[61]

Editor of *Digital Performance* (2002), Emanuele Quinz, and Wechsler (1997) develop similar arguments to Saltz's and Coniglio's by attending to the related concept of 'immediacy' as a kind of human capacity or expression. For Quinz (2002) interactive media are unique because, within a performance context, these technologies enable "art to find a

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[58] Coniglio, 2005: p. 6

[59] Coniglio quoted in Dixon: 2007: p. 197

[60] Coniglio quoted in Dixon, 2007: p. 197

[61] Farley's (2002) description of Troika Ranch's artistic vision can also be considered as a subtle example of the human-centric approaches of this company. In the words of Farley: "in believing technology to possess the same vivacity as the human bodies it accompanies on stage, the company brings media to life through its interaction with the dancers." Farley, 2002. Available on http://www.people.brunel.ac.uk/bst/home.html. Accessed on 10.09.2012.

form of immediacy again."[62] Wechsler praises the real-time responses of the newer technologies for their capacity to offer dance a "renewed spontaneity and liveliness as well as an expansion of the possibilities for expression in live performance."[63] Through this series of theoretical contributions, from Coniglio, Quinz, and Wechsler, we can see that interactive technology comes to be seen as being compatible with aspects that mark the live presence of the human performer, such as unpredictability, spontaneity, and changeability. But the ways in which they emphasize and figure on similitude between human and technological components remains indeed under-explored, to the effect of theorists tending to assign human qualities to technological materials and operations in rather projective or aspirational ways. This need not be the theoretical foundations of digital dance, I argue. In contrast to, or indeed to the side of these theorist's work, in chapter five, I argue that humans and technology are not "similar" because of shared tendencies, but instead that such tendencies can be put in to parallel through closer attention to the notion of performance and performance "measures", meaning their inhuman components especially within the practices of the cultural industry.

It is also very important for the purposes of my argument about, and close readings of, staged digital dance, to note that in Coniglio, the real-time feature of motion-tracking software leads to a specific emphasis upon the concept of 'improvisation' as what allows human and technology to supposedly converge without excessive attention to their difference. He argues that interactive technology's potential to react in real-time makes this type of technology most appropriate for improvisation, meaning movement in which the content is not set beforehand. He explains that, generally speaking, performances of his company, Troika Ranch, allow "a fairly broad range of improvisational latitude when performing."[64] According to Coniglio, the utilization of interactive technology for improvisation-based performances facilitates the performer to create original movement in the moment of the performance together with the original output of the technology. But how is the output of the technology "original" in such moments? For Coniglio, the understanding of original and spontaneous movement between human and performer adds another layer of liveliness to the experience of digital dance. Yet Coniglio's aesthetics

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[62] Quinz, Emanuele. 'Digital Performance' in Quinz Emanuele (ed.). *Digital Performance*. *Anomalie_Digital arts nr. 2*. Genoa: Press ATi, 2002: p.276.

[63] Wechsler, Robert. 'Computers and art: A dancer's perspective'. *IEEE Technology and Society Magazine*, Fall 1997: p. 12

[64] Coniglio, 2005: p. 5

of improvisation actually describes or informs little about what is technologically taking place - whether there is in fact non-human technical improvisation.

I argue that within the context of staged digital dance, at least in the case studies examined in this thesis, the argument celebrating human-technology improvisation does not actually hold so strongly. First, the choreography of staged digital dance is more often than not entirely proscribed or set down (through experimental modifications) during the creative development phase of production of the choreography, which (to a great extent) aims precisely to exclude any unprogrammed technological improvisations during the 'live' performance. In this sense, improvisation seems either to be exceptional in the performances of Troika Ranch, or insufficiently theorized within it. As I have explained in the previous chapter, in staged digital dance, by finalizing the choreography before the performance actually goes "live", the creators aim to reduce the unpredictability or spontaneity of the work to a minimum. Moreover, spontaneity and unpredictability do not really describe the extent to which the output of the technical system is already a programmed part of the choreography. These elements too are pre-organized and rehearsed during the creation of the choreography, which underlines how the meaning of choreography expands from the organization of human movement in energy, time, and space to the organization of human and technological movement in energy, time, and space. Improvisation between human and performer then, to be clear, tends to happen in production and not reception phases. The reception is instead a repetition of (set) moment that points back to the improvisatory stages, which were more often than not unwitnessed, and so are to a certain extent simulated by such a repetition.

I am suggesting then, through the arguments examined in this section, that while it is useful to compare and put into play certain comparisons between computational processes and physical aspects of the human body in the development of digital dance discourse, it becomes even more important when doing so to be wary of a theoretical situation in which the characteristics of the human body are taken as a role model for the features and behavior of technology. In other words, the relationship between human and technology risks here again being perpetually positioned within a hierarchy, with the human placed on top and the technology again reduced to being attended to as secondary, or supplementary to this emphasis. Instead of relying upon the concept of improvisation, I will suggest in chapter five that *interperformance* is a better concept to explore these notions of human and inhuman performativity, especially at the level of staged reception, where the improvisatory ideal just does not hold in describing actual practice.

B. Body incorporates the technology: Metaphysical Extension

Writings on digital dance that fall in to this category tend to draw upon the phenomenological tradition to, again, take the human body as the starting point for their conceptual work. To this extent those seeing the potential of interactive technologies in terms of incorporation and extension tend to be always-already in the position of cultivating an anthropocentric approach to digital dance, perhaps even more so than the emphasis on "liveliness" in the previous strand. Such a theoretical approach that I am categorizing as incorporative or extension-oriented, tends to also in this way perpetuate the hierarchy of perceptual importance in the literature on digital dance despite variations in the theoretical contributions of individual practitioners of this orientation. Two related concepts seem to play a particularly strong role in organizing this second orientation of practitioners: one is the concept of what Evert calls whole-body interface and, the other is the discourse of virtual embodiment.

Evert argues that the aim of digital dance artworks in the 1990s was to resolve the dichotomy between the 'natural' body and 'unnatural' technology. The concept of a "whole-body interface", which implies basically that the more parts of the body are involved in the interactive system, the more compatible the human and interactive system becomes, has been an inspiring concept cultivated towards this aim.[65] Evert argues that the rationale of the whole-body interface works well within the context of digital dance because, in comparison to other interactive interfaces of this time that restrict the engagement between the human and technology to a specific body part, such as the hand (in interactive virtual games for example), interactive systems utilized in digital dance require the engagement of the whole body. As Evert explains, a whole-body interface "appears to open up the possibility of letting the whole body share in its technical surroundings," with all of its senses including proprioception and touch.[66] As a result, the whole-body interface enables a strong case to be assembled for the compatibility of interactive technology and dance. It leads to the involvement of all of the senses, and, therefore, a whole-body interface values the sensuality of the dancing body and allow the dancer to feel fully "applied" to an understanding of it.

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[65] Evert, 2002: p. 44

[66] Evert, 2002: p. 44

It is interesting to note how this notion of the whole-body interface marks a difference between the conceptualization of artworks in the 1960s and artworks in the 1990s - and this in terms of the notion of control. According to Evert, the body also figured as one of the components of a system in the art works of the 1960s that experimented with primitive versions of interactive systems. These earlier art works were strongly influenced by cybernetic and general system theory (from information science research), which concentrated on the function and characteristics of energy and information conversion as well as upon self-regulating and feedback systems. Evert illustrates an example of interactive media and dance from the 1960s via choreographer Merce Cunningham and composer John Cage's *Variations V*, which I have briefly examined in chapter one. In this artwork, Evert explains, the dancers and their movements took on a musician or instrument function. Evert points out that the dancers of this performance became mere sound suppliers for the composition. This experience of the dancers was not what Cunningham had intended with the work, and very much undermined his artistic aim to liberate dance from (submission to) music.[67] In a way that the artist-choreographer did not predict, the actual dancing human bodies were governed by the technical system and the music, which is perhaps one of the reasons why Cunningham did not work again with a reactive constellation of sound and movement, according to Evert.

By comparison, and as a result of technological advances, which have also transformed imaginaries, art works that integrate interactive media in the 1990s have been seen in a more 'positive' sense as being able to "situate the body and technology in a system that is more clearly controlled and governed by humans."[68] Evert argues that in dance productions in the 1990s "instead of being subject to the dictates of machine-like movements, man controls technology and uses it to expand the reach of his own body and thus his dominance over space."[69] For Evert, due to the involvement of all of the senses, the practitioners of whole-body interface digital dance tend to experience performing and to construct theory that goes against the frequently feared disembodiment rhetoric,

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[67] Evert, 2001: p. 42

[68] Evert, 2002: p. 48

[69] Evert, 2002: p. 48
It should be added that in dance, the argument of the projection of embodiment in space is most often related with the extension of the kinesphere, a term driving from Laban movement analysis. Gretchen Schiller (2003) describes kinesphere as the movement space, or the space surrounding the body in stillness and in motion. Kinesphere includes the area to which the body can easily extend its limbs without stepping away from where it is supporting itself when standing on foot. Schiller's PhD dissertation "The Kinesfield: a study of movement-based interactive and choreographic art" (2003) is an elaborate discussion of the expansion of the kinesphere into kinesfield in digital dance practice.

supposedly inherent in new media, by citing the rootedness of perception in the physical (whole body interface). Evert's explanation of the difference in degrees of control, between the primitively interactive artworks in the 1960s and the more sophisticated components of works of the 1990s, helps us to understand how the argument of the whole-body interface functions to prevent criticisms that may results from the previously described cybernetic logic of input and output of the technical system. In the previous chapter, I have elaborated on a contemporary example of such critique made by Martina Leeker (2008), who argues that dance practice created with digital interactive technology reduce the dancer to mere data within a cybernetic system "controlled by electrical currents and circuits that designs this organism as a control device for integration in cybernetic feedback loops."[70] Hence, for Leeker, in dance practices created with interactive technology, the human body becomes a part of a technical system, which is in opposition to the perspective that the body controls or at least is not controlled by technology, in the argument of the whole-body interface.

The notion that the perception of dance as an art form is rooted in the physical domain is of course heavily influenced by phenomenological thought, especially the phenomenological theories of Maurice Merleau-Ponty. Through Merleau-Ponty, the dancing body is considered as the primary access to 'enter' the world of the aesthetic, and it is furthermore considered capable of incorporating the technology and, thereby, extending corporeality into the virtual dimension. Merleau-Ponty's work has in fact been a key theoretical tool, even more so when implicit, in the discourse of the whole-body-interface, and more broadly in the 1990s dance and recent new media arts discourses invested in celebrating the phenomenal body and its interaction with technologies in everyday life and the arts. In *Phenomenology of Perception* (1962), Merleau-Ponty writes that "the body is our general medium for having a world."[71] Stating that "to be a body is to be tied to the world", in his works, Merleau-Ponty attempts to reconcile the Cartesian body-mind split by focusing on the body as the fundamental basis for perception and experience.[72] In this regard, he writes that "I perceive in a total way with my whole being; I grasp a unique structure of a thing, a unique way of being, which speaks to all my senses

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[70] Leeker, 2008: p. 262

[71] Merleau-Ponty, Maurice. *Phenomenology of Perception.* New York: Routledge, 1962: p. 169.

[72] Merleau-Ponty, 1962: p.171.
Merleau-Ponty's notion of chiasm and reversibility, which he examines in his later works such as 'Eye and Mind' (1964) and the *Visible and Invisible* (1986) can be seen as other strategies to counterbalance the Cartesian object-subject divide. The main argument in these ideas is that there is a reciprocal relationship between the reflective and pre-reflective rather than an either/or relationship of rationality and irrationality. Merleau-Ponty calls this dynamic process hyper-reflection.

at once."[73] Since the phenomenal body is also considered as the central element to 'enter' the world in the art form of dance it is not surprising that Merleau-Ponty's phenomenology has found a prominent place in dance theory, given its painstaking and deeply poetic attention to reconciling the Cartesian body-mind split by focusing on the body as the fundamental basis for perception and experience. Moving one increment further on from the liberation-oriented conception of the whole-body interface, the notion that human control is extensive, assumes to offer the (theorizing) body absolute control of the technical system.

The phenomenological provision that perception is rooted always in physical embodied materiality also tends to pave the way in dance literature to a notion of technological incorporation. In this argument, the body is considered capable of incorporating the technological components of the choreography, and thereby, extending its corporeality into the virtual dimension and in this way, objects (including machines) can become prosthesis of the body, extending its embodiment in space. Merleau-Ponty illustrates this point with the example of the blind man's stick:

> The blind man's stick has ceased to be an object for him, and is no longer perceived for itself: its point has become an area of sensitivity extending the scope of active radius of touch, and providing a parallel to sight. […] To get used to a hat, car or stick is to be transplanted into them, or conversely, to convert them into the bulk of our own body.[74]

An example of this kind of thinking can be found in the work of Susan Broadhurst, first-generation digital dance theorist/practitioner, who writes:

> The body adapts and extends itself through external instruments. To have experience, to get used to an instrument, is to incorporate that instrument into the body. The experience of the corporeal schema is not fixed or delimited but extendable to the various tools and technologies, which may be embodied. Instruments appropriated by embodied experience become part of that altered body.[75]

By showing how the body incorporates technology, a phenomenological framework enables the practitioner-theorist to extend corporeality into the virtual domain via digital technologies. To this effect, a phenomenology-based perspective safeguards the primacy of the body in dance and offers an added reflexive appreciation of corporeality through the

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[73] Merleau-Ponty, Maurice. *Sense and Non-sense.* Evanston: Northwestern University Press, 1964: p. 50.

[74] Merleau-Ponty, 1962: p. 165.

[75] Broadhurst, Susan. 'Digital Practices: New Writings of the Body' in Broadhurst, Susan, Machon, Josephine (eds). *Sensualities/Textualities and Technologies. Writings of the Body in 21st Century Performance.* Palgrave Macmillan, 2009: p. 9

introduction of dimensions of virtual embodiment.[76] By virtual embodiment, I mean the body's capacity to project its embodiment onto spaces or surfaces that are technically exterior to itself. Such capacities of projected embodiment are very beautifully and painstakingly articulated in Merleau-Ponty's work on perception, in which the body is capable of projecting itself to other spaces in its encounters with objects in the world: "the body is a system of possible actions since when we point to an object, we refer to that object not as an object represented, but as a specific thing towards which we project ourselves."[77] In this way, the body appropriates the environment it inhabits.[78] It is this capacity of the body to project itself that makes it possible for authors in digital dance to suggest an extension of embodiment into virtual spaces in digital dance practice created with digital technologies. For them, what comes from staged digital dances investments in the human-technological encounter is that the body is able to extend itself into the virtual domain via digital technologies in the form of 'virtual embodiment'. For such practitioner-theorists, this offers an added value for the understanding of corporeality by introducing the dimension of virtual embodiment. Both of these approaches I argue tend to simplify and downplay practical and theoretical tensions between the performative contributions of the human and the technological in to the choreography in staged digital dance.

At this point, it might be useful to ask why exactly such an over-determining theorization is necessary. To a certain extent, it would be possible to argue that the emphasis on non-alienating, projected embodiment, the full-bodied human takeover of the technological system, accords very much with the investments and drives of embodied theorist practitioners in digital dance. In other words, a phenomenological framework helps to preserve corporeality as the primary element of dance, in the theoretical contributions of those intimate, in the first instance, with dance practice, conventions, and assumptions about dance ontologies. It is not difficult to see that phenomenology as a theoretical tool maintains a certain hierarchical ordering between the body, which marks the central or foundational point of such performance theory, and the technology, which is only through

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[76] Interestingly, the wide application of phenomenology in the literature of digital dance coincides with an interest in phenomenology in media theory. Evert singles out the study of Derrick de Kerckhove, an adherent of McLuhan's anthropomorphic understanding of technology as the extension of man, who argues that current technological developments are a way of "returning man, whose body has long been subject to distancing and alienation by virtue of the absolute dominance of the non-tactile sense of sight (…) back to a more corporeal existence, encompassing all of his senses." Similar to de Kerckhove's views but more recent and influential are *New Philosophy for New Media* (2004) and *Bodies in Code* (2006) by Mark Hansen.

[77] Merleau-Ponty quoted in Broadhurst and Machon, 2009: p. 9.

[78] A detailed account of 'projection' can be found in Mark Hansen's *Bodies in Code* (2006). Addressing the domain of new media art, Hansen updates Merleau-Ponty to the domain of new media art and calls the process of extending one's embodiment in new media art works as 'exfoliation'.

this model ever able to be understood as prosthesis or supplementary device “enabling” the expansion of the corporeality of the human. Accordingly, such a framework both opens up and makes possible, but also shuts down and simplifies, the discourse on technology itself, and on human-technology relations, in digital dance theory. It is therefore important to be aware of the consequences of such approaches - what they make possible and impossible.

Questions around the uptake of Merleau-Ponty’s concepts in digital dance begin to emerge when we pay closer attention to the kinds of enthusiasms that are enveloped by the use of Merleau-Ponty in digital dance literature. Broadhurst and Machon, for example, in an article from 2006, argue that digital dance practice demands a:

> New mode of analysis and interpretation which foregrounds and celebrates the inherent tensions between the physical and the virtual. This simultaneously both morphs and extends the performing body, thus engendering an altered corporeal experience.[79]

What is interesting about this quote is that it foregrounds “inherent tensions between the physical and the virtual” but works this straight in to a theory in which the performing body itself takes over as the now-extended concept of the digital dance work. Hence, phenomenological enthusiasm for digital dance points recursively back to the human, privileging the human body above the technology. Soke Dinkla’s (2002) work is also in line with these authors with regard to the primacy of the body in digital dance. She describes digital dance as a practice that views “digital technologies as an integral component of the artistic process and as conveyors of a new physical self-image. It is a question of how digital technologies allow the body in movement to create meaning.”[80] The assumption here seems to be that the technological components cannot, on their own, be perceived to mean something, outside of the dancer’s own theoretical embodied projection. This is very interesting, and repeated throughout the literature, in a way that I think is necessary to unpack.

Perhaps the most in-depth appropriation of Merleau-Ponty’s phenomenology is Susan Kozel’s *Closer. Performance, Technologies, Phenomenology* published in 2007. Trained in dance and philosophy, in this book Kozel draws together live performance, digital technologies, and phenomenological theory. By consciously updating the philosophy of Merleau-Ponty to digital dance, she examines encounters between humans and

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[79] Broadhurst, Susan, Machon, Josephine. *Performance and Technology. Practices of Virtual Embodiment and Interactivity.* Palgrave-McMillan: London, 2006: p.xvi.

[80] Dinkla, Soke. ‘Towards a rhetoric and didactics of digital dance’ in: in Soke Dinkla Soke, Martina Leeker (eds). *Dance and Technology. Moving towards Media Productions.* Berlin: Alexander Verlag, 2002: p. 20

interactive interfaces, responsive systems, and affective computing, to open up a series of speculations regarding "what can be discovered and created as we become closer to our computers and to others through them, when they become extensions of our ways of thinking, moving, and touching."[81]

Closer, strongly demonstrates the kinds of theoretical tendencies and insights that come with holding a dual identity as Kozel does, as a practitioner and researcher within the field of digital dance.[82] The case studies she discusses are at the same time embodied art works in which she has performed as dancer and/or which she has choreographed. Her background as this practitioner generates theoretical purpose in the need to reflect on dancers' subjective experience, which, again for Kozel, leads the theorist to opt for a phenomenological perspective upon research work. For Kozel, Merleau-Ponty's phenomenology offers quite literally a sense of method, based on a respect for lived experience and for listening to the insights generated by and necessary to a dual dance-theoretical approach. In her words:

> I needed a methodology to allow for a passion for philosophical concepts from the wider world to converge with innately philosophical concepts, and even critiques that were embedded in my body and surfaced through movement. I needed a methodology that not only would respect my highly subjective experiences, but (…) also for acknowledging the reality that all bodies exist with and through other bodies in social and political contexts. And I needed a methodology that operated through resonance rather than truth.[83]

Accordingly, Kozel situates the human body at the center in her study in which she considers confrontations with technology as a re-encountering of self and other by means of interactive computer systems.

This prominent place given to embodiment and virtual embodiment as the theoretical starting point in research on digital dance has continued throughout the first decade of the twenty-first century, and is observable for example in the numerous presentation titles of the 'Digital Resources and Humanities in the Arts' conference, organized by Brunel University in 2010, entitled 'Sensual Technologies: Collaborative

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[81] Cover quote in Kozel, 2007.

[82] It should be mentioned that Kozel also explores the work of Gilles Deleuze in this study. Yet, this author is not as prominent as Merleau-Ponty; rather, Kozel refers to Deleuze to compliment Merleau-Ponty's views. Moreover, she writes that it is a comfort to go back to Merleau-Ponty as she feels that Deleuze's work misses an important component. In relation to the work of Deleuze for example Kozel writes that "despite the intellectual excitement he generates (…), [Deleuze] always feels cold to me, as if I have entered a centrifuge or supercollider, that long tunnel underground where atoms are smashed into particles." (p. 267)

[83] Kozel, 2007: p. xvi

Practices of Interdisciplinarity'.[84] To this degree, it is possible to conclude that approaches to digital dance theory, cultivated in the mid-1990s, still hold sway over digital dance discourse as a whole. Within this contemporary history of a discourse, first-generation digital dance theorists have put significant effort in to counterbalancing the perceived risk of disembodiment in their encounter with the technological realm, and in overcoming - through, I argue, a certain symptomatic theoretical simplicity - the apparent incompatibility of body and technology in the literature of digital dance.

Phenomenology during this period provides a rather efficient solution to achieve this aim, which can be seen in its popular application as framework in the literature of digital dance. Yet, although phenomenology may be appropriate for the perceptual research and prioritization of the body, vis-à-vis digital technology, and retain a certain anxiety-alleviating attention to the body in theory, it inevitably implies a certain hierarchy in which the body is placed at the center of theory, and technology is placed at the periphery, as tools to assist the body's expansion into the virtual dimension. Such phenomenology-based frameworks are quite incapable of accounting for the role of technology as a performing element in examples of staged digital dance that are of concern for this thesis. Indeed as I have shown here, such frameworks extend the hierarchy of perceptual importance, and reduce the complexity of digital dance, rather than unsettle this hierarchy, as I believe these performances themselves in fact do.

C. Body and technology "in dialogue"?

Rubidge is among those who theorize digital dance in terms of a "dialogue" between the human body and the interactive system. The dialogue between human and technological components achieved in digital dance, Rubidge argues, generates a new understanding of dance because it leads to a major shift in the perception and conception of a familiar art form. She locates this new perception in digital dance in the creation of a kinetic and poetic world that is constructed from the human-technology encounter.[85] It is interesting that Rubidge argues that this dialogue between human performer and technology has been best signaled and enabled especially with the emergence of, and

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[84] For example, 'Sensual cyborgs: sensation and cybernetic existentialism in posthuman performance arts' (by Steve Dixon), 'Sensual wearables. The sound of character' (by Michele Danjoux), and 'Aural Flesh. Sonified biosignals as sensual sound technology' (by Daniel Ploeger). The program of DRHA conference can be accessed via: http://drha2010.org.uk/index.php/programme/

[85] Rubidge, Sarah. 'Dance Criticism in the Light of Digital Dance'. Keynote paper at Taipei National University of the Arts. Seminar on Dance Criticism and Interdsiciplinary Practice, 2004: http://www.sensedigital.co.uk/writing/CritIntDiscTaiw.pdf Accessed on 10.09.2009

advances in, the motion-tracking software of the late 1990s onwards.[86] She bases this argument on the fact that while early digital dance practices of the 1960s were able to showcase and exhibit the new capabilities of rudimentary technologies of this type, the software that has been developed and implemented in digital dance practice in the late 1990s, such as in the art works of the dance companies Palindrome and Troika Ranch, show much more strongly that a "dialogue" between body and technology is now possible. Her focus on technical advances in software used in Palindrome and Troika Ranch leads her to claim that:

> The mechanics of the media that both [dance companies] have been developing to facilitate the creation of interactive performances (…) are becoming sophisticated enough to allow it to become a genuine partner in the process of making their work. Finally, an understanding of the dialogue between performance and the increasingly complex new technologies they design specifically for use as a partner in their performance events is becoming such that the medium is ceasing to be a controlling taskmaster.[87]

What does this notion of genuine partner mean? I want to both entertain and problematize this concept of a "genuine partner" or partnership of dancer and technology, by indeed thinking the two together, in parallel, while refraining from anthropomorphizing the technological component.[88] I am recognizing here that Rubidge comes closer to the argument of this thesis - to explain the role of technology as a performing element in staged digital dance - while her insights lead to a certain limit point of speculative observation, due partly perhaps to the dependence of digital dance discourse, still at this time, on phenomenological approaches.

Rubidge emphasizes that the technical developments of motion-tracking software are enabling a certain realization of "dialogue" between human and technology. She refrains however from examining choreographic strategies that are being tailored at this

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[86] Rubidge, 2001: p. 39

[87] Rubidge, 2001: p. 39

[88] First-generation scholar and practitioner Carol Brown also recognizes that the technological system may function as a dance partner in 'Learning to Dance with Angelfish: Choreographic. Encounters Between Virtuality and Reality' (2006). This article takes as a starting point Brown's experience in the *The Changing Room*, an artwork that explores the interdependence of real and virtual spaces in contemporary choreography. Elsewhere, Brown explains that *The Changing Room* began life as *Spawn*, a "research project into the making and inhabiting of an embodied interface for real time interaction between live dancers and a virtual object, an avatar" (Brown, 2005). However, rather than focusing on the dialogue between the dancers and the technical system, Brown describes the major contribution of *The Changing Room* as "the experience of re-learning embodiment through live interaction with a virtual dance partner" (2006, p. 85). Throughout her text she uses various terms to refer to these images, such as "virtual other" (p. 87), "kinetically modeled avatar" (p. 87), "sphery thing" (p. 90), "part extended architecture"(p.92), which shows inconsistency for the argument of the avatar as a dance partner. Hence, Brown does not explicitly acknowledge the agency of the avatar nor does she offer a conceptual model to understand the avatar as a performer.

time, to the creation of digital dance as human and technological performance *within* the choreography. Finally, it is important to make note of the fact that Rubidge stands out among the first generation digital dance theorists also because in her argument, she implies that "control" seems to be less technological, or human, but somehow shared, or I would argue, tendentious, between the human and technological components of such motion-tracking works. Once it is acknowledged that technology ceases being a controlling taskmaster, and that the human dancer is not perceived or theorized to be aiming for ultimate phenomenological extension or control either, fascinating new questions are raised regarding the analysis and critique of staged digital dance as a whole. Rubidge does not provide any answers, but I pick up this challenge in chapter four and five of this thesis.

Another author and practitioner who considers this perceived dialogue between the human and technology as the major change in practice that is heralded by digital dance, is Steve Dixon. Also for Dixon (2007), the advanced and sophisticated media hardware and motion-tracking software now available and exploited in digital dance practice has dramatically shifted the perception of dance.[89] Now, artworks in digital dance, Dixon argues, encapsulate a dialogue between the technology and the performer. He claims that in the early days of digital dance practice (by which he means the beginning of the 1990s) the communication between performer and technology was rather "rough" because the technologies did not have the capacity to enable a fluid relation. Over the years, however, "a genuinely sensitive and sophisticated interactive paradigm has gradually replaced a previously rough and reactive one."[90]

Hence for Dixon, current interactive technologies facilitate a more subtle conversation between performer and technology due to developments in the technology between the 1990s and the present. He describes the difference between previous and current interactive media in terms of a mutual process. In performances created with less advanced interactive technologies the performer engaging with the interactive system created a pattern, which Dixon describes as "I do this, and it will do that."[91] He concludes that current digital dance practice, in contrast, indicates a more integrative "we do this together" relationship between the dancer and the motion-tracking based interactive

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[89] Dixon, Steve. Digital Performance. *A History of New Media in Theatre, Dance, Performance Art, And Installation*. Massachusetts: MIT Press, 2007: pp. 200-207

[90] Dixon, 2007: p. 205

[91] Dixon, 2007: p. 205

technology.[92] Here we can see a certain deconstructed anthropomorphism, in the recognition of the performativity of the technology.[93] That is, Dixon acknowledges the contribution of interactive technology as an autonomous element in the creation of the choreography. It is possible to go further than this, and note that in Dixon's terminology "we" might merely indicate, rather than a residual anthropomorphic preference, only the fact that there is still no language for recognizing such an inhuman contribution to the work.

What is also striking in the literature of digital dance is how easily technological "progress" is used to stand in for a theory of "more ideal" dance-technology relations. Elsewhere in this passage, Dixon's selection of words to distinguish the communication between human dancer and technology in early examples of digital dance created with less advanced technology are telling. Dixon describes the early technologies as "rough" and "reactive," and distinguishes these from the later technologies utilized in digital dance practice, which he refers to as "fluid" and "interactive."[94] Here, a remark needs to be made.

As explained in the previous chapter, first-generation interactive technologies are often theorized as operating according to a "reactive" logic. In this respect, advances in the hardware or software of the technical components of the interactive system can only refer to improvements of the technical capacity of these components, such as the speed of computational processing or an increase in the amount of special effects provided by the software. Such advances cannot lead to a change in the operative logic of the technical system—unless one is addressing what Birringer calls second-generation interactive technologies. To remind ourselves, these are technologies that (ideally) possess semi-autonomy, such as Artificial Intelligence. While this is a common observation of the first generation theorists - that developments in software and hardware enable a more subtle engagement - I argue that the notion of "dialogue" (which I prefer in later sections to call

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[92] Dixon, 2007: p. 205

[93] It should be noted that I focus on first-generation interactive technologies operating with motion tracking software. There are examples of dance works that present a case for the performativity of the technological system, but these tend to be relatively isolated, exceptional examples, and involve other types of technologies. The virtual theater Alkamie, for example, consider their technological system, which they label as Cyborg, as a performative element in its own right. Yet, Alkamie focuses on what they call Real-time Animated Virtual Environments (RAVE). With RAVE, Alkamie aims to create "immersion" between the dancer and the virtual world created by the technological system. Yet RAVE does not react to the movements of the physical dancer in the way that the technological system analyzed in the case studies in this thesis does. Rather, the output of the technical system is controlled by another physical dancer (most often Curson, one of the members of Alkamie) or the so-called cyber-dancer. Moreover, the description of Cyborg is very much human-centered as it makes an analogy between the human performer's qualities with that of Cyborg, such as consciousness, body, mind, and skin. For more information, see: http://www.alkamie.co.uk/#-2441

[94] Dixon, 2007: p. 205

"interperformance") between human and technology cannot be facilitated or indeed explained through advances in technology alone. Rather, the complexity of the inter-performance of the human and technological is largely facilitated by the choreographic strategies implemented during the creation of the work. In the next chapter, I outline two specific choreographic strategies in staged digital dance. I also elaborate upon the creation process of staged digital dance that requires adjustments both from the human dancer (in terms of spatial positioning and quality of movement) and from the technology (in terms of creating the technical procedures of visual aesthetics that correspond to the needs of the choreography and the dramaturgy), and which I first mentioned in chapter two. What becomes apparent in this next chapter is the degree to which staged digital dance offers a distribution of control between human dancer and technology. In other words, in staged digital dance, human and technology are both acting upon the choreography, but not necessarily simultaneously.

At this point it is important to mention a third author among those of the digital dance theorists who have argued for a demonstrably communicative process between dancer and technology, Johannes Birringer. Differently from Rubidge and Dixon, Birringer's arguments rest upon new media discourses of "interactivity." In his book *Performance, Technology and Science* (2008), Birringer examines various art forms created with different interactive media as components of an 'interactive paradigm' and locates staged digital dance created with motion-tracking software within this cross-art form milieu of practices.[95] Despite this emphasis on interactivity, in Birringer's book, the notion of interactivity seems to function as a metaphor rather than an analytical framework to explain the "dialogue" between human dancer and the interactive system. Nevertheless, Birringer makes interesting claims on the relationship between dancer and technology through his appropriation of interactivity, which he understands as a "spatial and architectural concept for performance."[96] His attention to spatiality leads him to consider the interactive system as an environment or artificial ecosystem. Accordingly, performances created with interactive systems become a "dynamically evolving dialectic between an artificial ecosystem and human agents."[97] He concludes that the human performer and the interactive environment can no longer be understood as unrelated entities.

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[95] Birringer, Johannes. *Performance, Technology&Science*. New York: PAJ publications, 2008: p. 119

[96] Birringer, 2008: p. 112

[97] Birringer, 2008: p. 119

By including the interactive system in his understanding of choreography, Birringer is able to point to the construction of an interactive environment created by the interactive system as an element of the presented artwork. This enables a broader understanding of "movement" as it relates to dance practices created with first-generation interactive technologies. From this point, Birringer argues, the meaning of movement expands to include both the actions of the physical dancer and the actions of the technical system. In addition, in dance practices created with first-generation interactive technology, movement "bridges the organic and inorganic forms, it evolves as a coupling with technically expanded virtual domains."[98] As a result, Birringer argues that the understanding of a dialogic communication between human and technology affect the perception of the choreography as a whole. He holds that in digital dance, the arrangement of movement in choreographies "has nothing to do with the synthetic engineering of steps and movement phrases, or with copying the motion of figure animation, but everything with the overall physical behavior of the system."[99]

By acknowledging that the technical system as a whole becomes integrated within the experience of the choreography in digital dance, Birringer's views draw much closer to the argument of this thesis, which holds that technology functions as a performing element during the creation and perception of the choreography in staged digital dance. Yet, Birringer does not go so far to acknowledge the movements provided by technology as performance, nor does he consider technology as a performing element in his arguments. Furthermore, Birringer does not explain how the interaction between human and technology takes place and how this interaction affects the focus of the choreography. In chapter five, I examine the interaction that takes place between human and the visual effects created by the interactive system as an interplay of two different types of performances, which I label as interperformance.

Apart from Birringer's work, and despite the wide use of first-generation interactive systems in the practice of digital dance, interactivity as a concept is a rarely explored or used as an applied theoretical framework in the literature of digital dance. An exception is Dixon (2007), who offers one model of interactivity created to address the general field of digital performance (which for him also encompasses digital dance). The goal of Dixon's model is to provide a framework to identify certain modes and levels of interactivity within the field of digital performance, in terms of "how much" interactivity they offer the human

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[98] Birringer, 2008: p. 121

[99] Birringer, 2008: p. 121

performer.[100] I will explore Dixon's model in detail in chapter five where I discuss the notion of interactivity and agency in relation to interperformance. For now, it is sufficient to explain that Dixon's model, in line with the phenomenological trends mapped in this chapter, also privileges notions of the empowerment, embodiment, and agency of the human participant, at the expense of more productive criteria that might aide us to evaluate modes and levels of interactivity between the two, or with any greater detailed attention to technological elements.[101] In other words, by prioritizing and even ranking desired degrees of human control over the technical system, Dixon's model also takes the human body as starting point in his model of interactivity, even when he does not explicitly appropriate a phenomenological framework. This approach too, while supposedly placing interactivity at the center of analysis, is based nevertheless on a hierarchical ordering between the human body and technology.

In sum, through the frameworks I have tracked in the literature of digital dance which address first-generation interactive technologies, especially the three conceptual/ theoretical strategies used to construct newly existing relationships between dancer and technology, I have shown how although some authors go further than others in acknowledging and thinking through the relationship between dancer and technology, they generally reduce the role of technology to something that needs to be incorporated, extended, or whole-body controlled by the performer, and assume this is necessary in order for aesthetic achievements at the choreographic level. By working from such phenomenological foundations, and from equally human-centered discourses of interactivity, such first generation digital dance theories have either excluded or reduced the possibility that technology may function as performer. Despite their aims to illustrate a kind of relation or "dialogue" between human and technology, these approaches either do not provide a model to explain that dialogue, or they seem to prioritize the human in this engagement. For this reason, they cannot account for the role of technology as a central and performing element in staged digital dance.

Perhaps, then, we need to look outside of dance theory for this attention to technological players. I want to propose in the next chapter the salience of an alternative

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[100] Dixon, 2007: pp. 559-599

[101] Rubidge (2001) notes that the utilization of interactive media in staged digital dance seems to contradict the purpose of interactivity, which is, generally speaking, to enable a dialogue between the user/participant and a computer. She also asks what is gained from creating performances that portray a pre-rehearsed interaction between human dancer and specified effects created by the interactive system. Questions such as these are important because they designate that different understanding of interactivity may exist amongst different art practices. Rubidge, Sarah. 'Action, Reaction, Interaction'. *Dance Theatre Journal,* vol 17, no 2 (2001): pp. 37-42.

methodology from the domain of “techno-performance research,” especially the analytical tools offered up by the work of Jon McKenzie, in *Perform—or else*. *From Discipline to Performance* (2001) which enables theory to pay attention to actions of technologies and technological components as performance. Examining this discourse of technological performance via McKenzie, I will provide a systematic view in to how it might be possible to actually evaluate the actions executed by technology as performance in its own right. Applying McKenzie’s reading of technological performance to staged digital dance in this way allows me to make way for analysis in the gap where existing scholarly studies in digital dance fall short.

3.4 Conclusion

This chapter has demonstrated that the acknowledgement of the role of technology as performance and dance partner is largely missing from current theoretical and conceptual applications in digital dance. Whether implicitly or explicitly—during the first generation of digital dance (theory), predominately phenomenological frameworks applied in the literature of digital dance have seemed to prioritize overcoming perceived oppositions, resistances, and incompatibilities between dancing bodies and digital interactive technologies in dance. This chapter showed that, even where this incompatibility or border has been theoretically and perceptually presented as bridged or broken down by advanced technologies in "genuinely" interactive performances, such judgments of choreographic success tend to sustain a human-centered appreciation of performance, and a hierarchy of perceptual importance. I have also provided academic, industry and techno-cultural explanations for this scant attention for the role of technology in the literature on digital dance during the 1990s and early 2000s.

What I have highlighted is an insufficiency in existing studies of digital dance concerning the performance of technology and its function as performer. For this reason, in the next chapter, this thesis develops a framework to understand and evaluate technological performance in digital dance. Based on Jon McKenzie's *Perform—or else*. (2001), this framework takes as starting point technological performance as understood in the domain of techno-performance research and applies it to staged digital dance. The created framework allows the evaluation of the actions executed by technology on the basis of their function and effectiveness within the context of staged digital dance. In doing so, the next chapter demonstrates how the meaning of performance expands to include the technical within the context of staged digital dance.

CHAPTER 4.

Technological performance in staged digital dance

4.0 Introduction

In the previous chapter I have shown a persistent human-centeredness and theoretical simplifications in the literature of digital dance that results in a constant refrain in theory to apply the notion of performance to technology. As a result, conceptual approaches to digital dance in the existing discourse seem extremely limited in their capacity to take an account of the actual role of technology as a performing element alongside the human dancer. This chapter aims to fill the gap on technological performance by drawing upon work that offers an alternative analytical approach to the dominant phenomenological tradition, and which are extremely useful to evaluate the role and contribution of technology to staged digital dance. What seems also required is a framework that is able to bracket the persistently human-centered investments of dancer-theorists writing in this field. I argue that despite the fact that most scholarly work of digital dance have perpetuated this investment in phenomenology in order to often (not always) simplify and reduce complexity, tension and difference in the relationship between dancing bodies and technological components, this need not be the case. If we can see such acts of incorporation, projection, and celebrative human-centeredness as signs of digital dance's challenge to dance conventions, it is also possible to theorize from other view points. If we do not take the human body as the starting point or centrally installed "value" of digital dance we open up the possibility of acknowledging the technology and its aesthetic effects as a performing element. It is for this reason that I am cultivating in this chapter theoretical tools from outside of dance research - in order to develop an analytical framework that can account for the actions of the technology as performance.

Jon McKenzie is one theorist already doing this. McKenzie's reading of performance in *Perform or Else. From Discipline to Performance* (2001) stands out in the discourse of performance studies in its efforts to provide a productive model for the evaluation of the actions executed by non-human interactive systems that make up contemporary choreographed works.[1] The starting point of *Perform or Else* is McKenzie's highly productive re-framing of the concept of performance itself in a much more comparative view beyond the arts; "performance" as a term in fact refers to many different things within many different contexts. For McKenzie, performance emerges as a key term of research in the contemporary period across three quite different and specific domains: performance studies, performance management, and techno-performance research (for

[1] McKenzie, Jon. *Perform or Else. From Discipline to Performance*. London and New York: Routledge, 2001.

the latter, he gives the examples of rocket science, computer science). By posing the question of what the meaning of performance infers or achieves across contexts, and how it operates within each domain, McKenzie concludes that each field has developed a particular definition and "evaluative" criteria of performance. This emphasis on evaluation within the very definition of performance - wherever the concept appears - is actually quite important to register, and a key insight that grounds the work of this chapter: evaluation is inherent to (technological) performance. Furthermore, because the meaning and the evaluative criteria of performance differ greatly within each field, McKenzie considers each field as a different paradigm of performance, each tied to quite different concepts of value.[2] Performance studies uses the notion of performance to study "cultural performance," that is, the symbolic structures of human bodies, activities, and behavior within embodied practices as well as the transformation of these structures through discourses and practices of resistance and mutation. Performance management uses the notion of performance to study "organizational performance", incorporating strategies that aim to maximize the organization's output while minimizing its input. Finally, "techno-performance" research utilizes concepts of performance that attend to the behaviors and properties that technologies demonstrate during the execution of a given task in a specific context. For the purposes of this chapter, it is useful to spend some time with this third trajectory of technological performance and its methods. To consider technological performance through this framing allows for the injection of productively counter-intuitive, technologically attuned thinking in to digital dance's theory.

In McKenzie's outline, the evaluation of technological performance takes place via a two-step process, which requires examining the quantitative (measurable) and qualitative (having perceivable impact within a certain context) dimensions of technological performance. These two criteria are related on a continuum, because the operation of the technical aspects of technological performance has an influence on outcomes at the qualitative level or dimension. Interestingly, McKenzie points out that the criteria used to evaluate technological performance within the domain of techno-performance research are not fixed. There is no "set" of criteria to refer to theoretically, in advance of specific studies. Rather, criteria need to be re-designed on the basis of the conditions of the context at stake. Hence, the evaluation of technological performance depends on how effectively a technology carries out its given task within a given context.

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[2] McKenzie, 2001: p.53

With this flexibility to re-arrange the evaluative criteria of technological performance according to different contexts comes the possibility of applying the concept - as understood in techno-performance research - to the domain of staged digital dance. I suggest with the work of this chapter that it is possible to create a certain framework of performance evaluation, based on the quantitative and qualitative dimension of technological performance, according to criteria that suit the art form. In this respect, the translation of technological performance to the domain of digital dance seems to offer a beneficial framework to explain the role of technology as a performing element and to help further destabilize the hierarchy of perceptual importance. Such a framework therefore also makes it possible to fill the gap where existing studies on digital dance fall short, offering an innovative perspective to explain the actions of technology as performance. Compared to the phenomenological investment in technology as prosthesis, techno performance theory conceptualizes technological performativity in the interactive system's responsive creation of projected visual images, which are productive part of the choreography itself. This means that the choreography goes beyond being limited to just human physical movements, and includes the movements and impacts of the projected images provided by the interactive system, upon the choreography. I go in to more detail about this relationship in the next chapter. This chapter deals with this new emergent recognition of technological components.

Section 4.1 offers a detailed description of technological performance and its evaluation within techno-performance research as presented by McKenzie. Section 4.2 translates the theory and understanding of technological performance within techno-performance research to the context of digital dance. By doing so, this section creates a possible theoretical framework tailored to the evaluation of technological performance in staged digital dance. To ensure its suitability, I use this developed theory of technological performance in a close reading of the case study *Glow* in two parts in section 4.3. The first part elaborates on the quantitative dimension of technological performance, focusing in particular on the operations of the interactive software in *Glow*. The second part evaluates technological performance from a qualitative dimension, which takes the projected visual images created by the system as its starting point. Section 4.4 discusses the added value of the created framework of technological performance for the domain of digital dance.

4.1 From quantity to quality: The effectiveness of technological performance

To consider the concept of performance in the field of techno-performance research, McKenzie argues, is to recognize a paradox. On the one hand, it seems that definitions and meanings of performance show the most changeability within this domain. On the other hand, despite numerous utilizations of the concept, any explicit definition of technological performance is lacking within this field. In order to demonstrate this paradox, McKenzie gives a close reading of sections from an article about the "beauty" of the "performance" of water-soluble polymers, published by the American Chemical Society.[3] He first pinpoints the various uses of performance to refer to different things in this text, such as: 'performance of polymeric flocculent in wastewater systems', 'performance of primary clarifier' and 'secondary sedimentation basin performance'.[4] Next, he shows that, despite the various applications of the concept or notion of performance, the meaning of performance remains undefined throughout the entire article. This leads him to ask, "What is meant by technological performance in techno-performance research, and why is it so rarely defined?"[5] By examining numerous other examples regarding the various applications of performance as a term, McKenzie concludes that perhaps the definition of performance in techno-performance research has no underlying meaning unless it is used in a very specific context, such as in the example of the performance of polymeric flocculent in wastewater systems.

McKenzie finds further support for these observations, regarding the non-fixity of the meaning of performance, in the work of two computer science researchers, Borovits and Neumann. These authors claim that, in computer sciences, performance "has no existence per se."[6] Similarly to McKenzie, they stress the importance of the context for the understanding and attribution of meaning to concepts of technological performance. They too emphasize that the definition of performance "must refer to a specific application. (…) Computer performance cannot be discussed but in the context of a defined application or

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[3] Rey, P.A, Varsanik, R.G , 'Water Solubale Polymers: Beauty with Performance' (1986) *American Chemical Society*, published in McKenzie, 2001: p. 96

[4] McKenzie, 2001: p. 96.

[5] McKenzie, 2001: p. 97.

[6] Borovits and Neumann quoted in McKenzie, 2001: p. 97

group of applications."[7] In addition, these authors conclude that although technological performance is closely associated with quantitative aspects of technology such as, 'efficiency,' 'capacity,' or 'volume of a system,' within computer studies, what is meant by technological performance is the computer's "effectiveness in a given task."[8] This opens technological performance up to qualitative as well as quantitative analysis.

But what does this "effectiveness" of technological performance refer to exactly? And according to which criteria should technological performance be evaluated? McKenzie explains that in techno-performance research, the effectiveness of technological performance refers to the evaluation of two dimensions. The first is the quantitative dimension, which is evaluated during a particular phase called 'performance measurement'. The second is the qualitative dimension, which is assessed during a phase called 'performance analysis'. In performance measurement, engineers begin with a certain hypothesis on the basis of which they set up the quantifiable capacities of a technology, such as the speed at which a computer calculates data. The results of this type of measurement are those commonly found in owner's manuals of consumer items. In this respect, performance measurement can perhaps be considered as the measurement of technical features or capacities that lie 'within' the machine. Next, the engineers' specific hypothesis is tested in the lab during a developmental stage. At this stage, it is possible to adjust, develop, and reprogram certain aspects of the technology that do not seem to offer up its maximum efficiency. Finally, following on from these first two stages in the process of measuring a technology's performance, the technology is then assessed in an artificial surrounding, such as the lab, where testing is carried out in a 'real field' most like the environment and set of tasks for which the technology is designed to perform.[9]

McKenzie explains that the evaluation of technological performance in the real field marks a shift to performance analysis. Performance analysis differs from performance measurement in one aspect: "while performance measurement determines whether a technology is currently performing to criteria, performance evaluation interprets this measurement within a wider context of interests and actions."[10] Recognizing that the production, distribution, and consumption of technology entails socio-cultural, financial,

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[7] Borovits and Neumann quoted in McKenzie, 2001: p. 97

[8] Borovits and Neumann quoted in McKenzie, 2001: p. 97

[9] McKenzie, 2001: pp. 107-111

[10] McKenzie, 2001: p. 108

and political interests, the evaluation of technological performance cannot be determined based on its quantitative features alone. Rather, in performance analysis, technological performance is evaluated on the basis of qualitative factors, which includes "determining whether the infrastructure is meeting the community's objectives."[11] This does not imply that the quantitative dimension is irrelevant for the analysis of technological performance. On the contrary, the two dimensions are wholly linked; the quantitative (measurable) dimension of technological performance is what makes the qualitative (perceivable/ broader interpretable) dimension possible.[12]

From this we can recognize that in the field of techno-performance research, the assessment of the effectiveness of technological performance implies a shift from quantity to quality. In terms of its effectiveness the performance of a technology, when taken as the sum of quantitative and qualitative conditions, is not a pre-given feature that lies 'in' the machine. Rather, technological performance is evaluated on the basis of what a particular technology *does* (quantitative dimension) within the conditions of a certain context in which technology operates (qualitative dimension). In turn, the actions of technology—when assessed as successful according to the criteria of a certain context—are perceived as effective. Compared to the phenomenological perspective on technology as a prosthesis for the expansion of the human body in to external spaces, this approach to techno-performance allows us to focus on the performativity of technology; in digital dance, that the visual imagery provided by the technology becomes part of the choreography 'proper' and contributes to its development. This means that the understanding of choreography goes beyond being limited to just human physical movements, but also includes the organization of human and technological movements in energy, time, and space. I go in to more detail about the interrelationship between human and technological movements in chapter five where I will deal with the newly emerging recognition of the difference of digital dance from dance's own art form conventions.

Drawing from this argument, and the insights it generates, it is possible to propose that the establishment of a framework to evaluate technological performance must take the context in which a certain technology performs as its starting point. An especially illuminating (albeit seemingly lateral) comparison of the utilization of interactive technology

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[11] McKenzie, 2001: p. 108.

[12] However, the quantitative dimension of technological performance in most cases is not directly exposed to the perception of users. For example, when we work with a computer, we are not exposed to the technical operations that take place inside the computer. Rather, we perceive the operations of the computer through a certain interface.

within the context of home safety versus the use of the same technology in staged digital dance helps to underline the importance of contextual factors as far as the establishment of criteria for the assessment of technological performance is concerned.

Let us take a simple and fairly common application of an interactive system used for domestic safety purposes: motion-sensing lights that operate with ultrasonic sound waves or infrared light. These kinds of indoor and outdoor motion-sensing lights are of course consumer products that are very easily and cheaply available on the market.[13] And they are installed inside and outside the house differently, for different purposes. In the situations where motion-sensing lights are placed inside a house, when a person walks into a dark room the light detects a change in movement and automatically turns on the light. The aim of this type of indoor motion-sensing lights is to prevent domestic accidents, which can be caused by one's entry into a dark room. In terms of technicality, outdoor motion sensing lights operate in the same manner as indoor motion-sensing lights; however, they primarily function as a burglar alarm. The light—when it is triggered by the presence of a person—warns the property owner of an external presence within their territory. Hence, within the context of outdoor safety, the meaning of the light provided by the interactive system designates potential danger within the surroundings of one's house. In other words, it makes a difference to our sense of this technological performance whether it is staged inside or outside the house. This difference effects our sense of the effect of the technology's performance, even if the light itself is exactly the same, with the same quantitative technological capacities, such as luminance and reactivity.

Of course the qualitative experience in digital dance – the coming together of bodies and interactive systems- is of a different kind again to these two technological "performances" in the context of house safety. But what can we learn from the comparison? In the examples of staged digital dance examined in this thesis, most often, the choreography integrates interactive technology with the aim to portray a quite similar sense of a responsive exchange between the physical movements of the dancer and the activity of the interactive system. What is often framed as this "duet", I argue, is based on the making visible of a parallel, or differentiating correlation, between human and technological performance, based on certain guiding principles of dance composition, such as energy, time, and space. Looking back to the different instances of the meaning and perception of an accident (or accident avoidance) inside the home, and the perception of a burglary (or the avoidance of break-ins) outside the home, we can also understand that

[13] For instance motion-sensing lights can be purchased at Amazon.com. See: http://www.amazon.com/Sylvania-72178-Activated-Battery-Powered/dp/B001LJNS8U

the technological performance in both instances - the effectiveness of the technology that is at stake - is actually in both instances to do with timely and appropriate degrees of illumination. Timely illumination/reaction in the form of light becomes the (quite simple) evaluative criteria of technological performances in these inartistic performances of interactive technology. But the meaning and qualitative experience of the interactive technology within other contexts might be capable of being something quite different. In digital dance, for technological performance to be effectively in line with what is qualitatively intended by the choreographer (and media designer), signs and images created by the interactive system and the capacity of that system for instantaneous illumination will be a point of question, explored in the creation phase of the work. Once we transfer the same motion-tracking interactive system to digital dance, the instantaneity and luminance is still relevant – but the aesthetics can become much more complicated and sophisticated through experimentation precisely because of the qualitative dimensions of quantifiable capacities. In this sense, there is a blur: basic quantifiable attributes of the technology turn into qualitative visual aesthetics. In other words, what are considered impactful or effective or affecting correlations and correspondences between the technology and the physical movements of a human performer are actually cultivated from capacities that are inherent to or inbuilt within the quantitative dimension of the technology.

Of course, further complicating matters, the qualitative experience of technological performance is negotiated at two different moments or levels for staged digital dance, in the sense that both the creative team (choreographer and media designer) and then later the audience, will each be invested in evaluating the technological performance. Regardless of this doubling, what we can say at this point is that the evaluation of the effectiveness of technological performance in staged digital dance requires finding and cultivating appropriate and explicit, context-specific evaluative criteria. By context, I mean that of the individual dance work, both within and outside of its choreographed components (everything that gives a dance meaning - which includes what is on stage, but also historical references, performance traditions, frames, and so on). In relation to staged digital dance, taking the inter-related artistic *aims* of the examined case studies into account establishes a good starting point for the evaluation of technological performance, from its quantitative to its qualitative dimensions. The following section translates the quantitative and qualitative dimensions of technological performance as understood in techno-performance research to the domain of staged digital dance in order to create a framework to analyze technological performance within this artistic practice. To remind ourselves, the quantitative and qualitative dimension of technological performance quite

often overlap. Nevertheless, a distinction between the two dimensions is useful for the sake of analysis and in clarifying how technological performance differs at the technical and perceptual level of staged digital dance choreographies.

4.2 Establishing evaluative criteria of technological performance for digital dance

The common artistic inquiry of the digital dance practices examined in this thesis is most often described as the staging of a relationship between the human body and technology in the form of a partner-work and to portray technology in the role of dance partner. My entire thesis in fact unpacks what this notion of "partnership" actually implies, symptomatizes, and tries to come to terms with. I suggest that it is useful to see these digital dance practices as capturing a moment in dance when the (dominant) phenomenological tradition of dance theory and practice is coming to terms with thinking through to its own technological outside, at least in this very specific strand or trend of digital dance works that stage a human-technology duet. Looking back to the case study that I first introduced in the introduction, *Glow,* you will recall is described as a "spectacular 27-minute duet for body and technology, an essay on the relationship of dance and cutting-edge software technology."[14] The website of *Apparition* refers to the aim of this specific art work as the creation of a type of choreography in which "your partner is software, (…) when virtual and real images share the same space, (…) [and] when everything moving on stage is independent and interactive at the same time."[15] Troika Ranch's website transubstantiates the emphasis on technology in a phenomenological way, when describing *16 [R]evolutions* as the portrayal of a struggle between our animal and intellectual selves.[16] "Intellectual", here I suggest could be considered to refer to the rationalizing impetus of the technological. Accordingly, the scenes that address the struggle with our intellectual selves are portrayed via the responses of the interactive system to the movements of the human dancers. Or in other words, these scenes stage a correspondence between the physical dancers and the output of the technology (perceived in the form of projected images) in terms of a partner-work.

In dance, 'duet', partner-work, or partnering[17] is a general term used to describe the assistance and support (usually) given to one dancer by another. It should be noted that

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[14] http://www.frieder-weiss.de/works/all/Glow.php Accessed on 12.01.2010

[15] http://www.exile.at/*Apparition*/ Accessed on 10.08.2010

[16] http://www.troikaranch.org/vid-16rev.html. Accessed on 22.10.2022

[17] Duet, partner-work, and partnering are terms that are used interchangeably within the context of dance; they refer to a certain relationship between at least two dancers, which often includes shared energy, time, and space.

"duet" most often involves physical contact between the dancer but it may also be non-physical. [18]A detailed account of partner-work can be found in the work of Robert Greskovic, who describes partner-work in dance as an organic and smooth interaction between two different bodies. Partnering, according to Greskovic, requires "double work" because it necessitates training the coordination of one dancer with another through various means of support and manipulation that are quite besides training the coordination of one's own body.[19] Hence, the staging of a duet between two human performers entails specific additional skills from the human performers and the presentation of these skills themselves, which are non-reducible to the perception of the audience, through the choreography itself. This comprehension of partnerwork is in staged digital dance able to be transposed on to the human-interactive system relation. Staged digital dance implies making visible the "partner-work" (non-anthropomorphically speaking) between the actions taken by the human (i.e., physical movements created by the performer) and technology (i.e., the movements, transactions, responses and output of the interactive system, which in these works take the form of projections on a screen) for the perception of the audience.

Furthermore, expanding our literacy for this dynamic, it is important to note that there are several types of partner-work in dance, which require different skills from the human performer. In classical ballet, partnering is mainly known as 'pas-de-deux'. An example of skills required from this type of partner-work is for instance, the physical coordination of the female dancer for multiple pirouette turns and the coordination of the male dancer in supporting the female dancer during the demonstration of the pirouettes. In postmodern dance technique, partnering is often associated with contact improvisation. In contrast to the vertical and gravity-defying positions in classical ballet, partner-work in modern dance can be characterized by techniques of support within a horizontal axis, that is, movements that are not vertical and take place close to the ground or on the ground. Support can also take place during 'off-center' movements, meaning movements that require letting go of one's center of balance, such as falling and catching. In modern dance, partner-work can take place between two dancers of the same gender. Most importantly, in modern dance, a strict distinction between the supporting dancer (male) and

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[18] It should be noted that this is a rather narrow definition of duet and partnerwork that is serving the purpose in this chapter of showing how *Glow*'s choreography makes visible the relationship between dancer and the visual images created by the technology, thereby challenging the hierarchy of perceptual importance. Much more elaborate attention to duet and partner work can be found in Blom, Lynn Ann and Chaplin, L. Tarin *The Intimate Act of Choreography* (1982), however such attention is beyond the concerns of this thesis.

[19] Greskovic, Robert. 'Partnering' in Jeanne-Cohen, Selma (ed). *International dictionary of dance* (vol 5). New York: Oxford University Press, 2004: p. 101

the supported dancer (female) disappears: a performative engagement occurs between both dancers, which decrease clear distinctions of supporting/supported roles. Both dancers are expected to give and take support in various ways and in various moments, which result in a dialogue onstage. I locate the engagement in the duet between human and technology in staged digital dance within the latter example, that is, as a continuous shift of roles of leading and following between two performatively engaged entities.

Despite the differences in the skills and the created artistic effects, all of these different partnering techniques share criteria for the determination of what counts as successful partner-work. According to Tobi Tobias, in ballet "what characterizes a successful partnership is perhaps what marks any fortunate partnership: mutual sympathy and a good sense of timing."[20] The website of Contact Quarterly describes the two most important conditions to achieve a smooth partnering in modern dance as trust and communication between partners and shared timing and dynamics between them.[21] Since physical bodies are positioned in space, to be able to dance, spatial navigation is also a necessary skill and artistic element. Following the logic of the definitions above, the composition of a duet between two physical dancers can be described as the specific organization of energy, time, and space in a parallel, or reciprocal relationship. Partner-work thus implies the portrayal of a correlation between the movements of two (or more) dancers in terms of shared energy, timing, and space. Indeed, in *A Primer for Choreographers: An Introduction to Modern Dance Composition* (1967, 1974), choreographer and scholar Lois Ellfeldt describes energy, time, and space as the three major elements[22] with which a choreographer engages during the composition of the

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[20] Tobias quoted in Hammond, Noll, Sandra. 'Pas-de-deux' in: Cohen, Jeanne Selma (ed). *International dictionary of dance* (vol 5). Oxford: Oxford University Press, 2004: p. 108

[21] http://www.contactquarterly.com/cq/webtext/resource.html Accessed on 14.04.2010

[22] It should be noted that the definition of choreography as the organization of human movement in energy, time, and space has been challenged within the field of dance. I have explained this in footnote 25 in chapter one.

choreography.[23] Stating that "the very word 'dance' denotes motion", Ellfeldt explains that like other movements, dance— whatever purpose it fulfills— exists simultaneously in time and space and it involves the use of energy. [24]

Ellfeldt breaks down the composition of movement in to three different categories, which she labels: intensity (gradations in the execution of movement), accent (movements that require greater or lesser force), and quality (the way the energy is used, i.e, swinging, percussive, sustained, vibratory, suspension) of movement. According to Ellfeldt, different energy categories arouse different feelings in the dancer and in the spectator.[25] Ellfeldt describes the use of space within the choreography in terms of the potential of dimension (the size of the dancer's movements) and potential of position (level and direction of movement) of movement.[26] Moreover, the dancer's actions affect the space, either visually (i.e., the body's position and movement in space can create lines or circles for the perception of the audience) or connotationally (i.e., if the dancer's body is in a curve, then, the dancer creates a hollow space in front of the body). In the same way, the dancer's movements in time create tempo (speed of movement) and rhythm (the pattern of regular or irregular pulses, measured as movement in time).

Ellfeldt's guide to choreographic composition addresses choreographers working with human performers. But what happens when technology replaces one of the two physical dancers in this concept of the duet, such as in the staged digital dance works at issue in this thesis? How can we translate a physical duet into a duet between physical

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[23] It should be noted that there are more recent, elaborate studies on dance analysis than Ellfeldt's that address dance composition within modern and postmodern dance such as, Blom, Lynn Ann and Chaplin, L. Tarin. *The Intimate Act of Choreography* University of Pittsburgh Press, 1982 and Smith-Autard, Jacqueline. *Dance Composition. A practical guide to creative success in dance making*. 5th ed. London: A&C Black publishers, 2004. Moreover, Ellfeldt's companion of dance composition resembles Laban Movement Analysis, which is a language for interpreting, describing, visualizing and notating all ways of human movement, developed by Rudolf von Laban at the beginning of the 20th century. At present, Labanotation is a standardized system for analyzing and notating human motion. Yet, for the purposes of this chapter, Ellfeldt's study of dance composition via the components of energy, time, and space form sufficiently does the work of showing the destabilization of a hierarchy of perceptual importance via correlations between the movements of the human dancer and the visual images created by technical system in these terms (energy, space, and time).

[24] Ellfeldt, Lois. *A Primer for Choreographers: an Introduction to Modern Dance Composition*. London: Dance Books Ltd, 1974: p. 2. It should be noted that here, I chose to concentrate on the correlation between the movements of the human dancer and the output of the technological system in terms of the deconstruction of a hierarchy of perceptual importance, which shifts the focus from close readings and analysis of the work's execution. In future work where I will transform parts of this thesis into publications, I intend to deepen the analysis of the case studies by means of engaging closer with elements of dance composition.

[25] Ellfedt rightly notes that the exact meanings associated with change in movement intensity are impossible to identify.

[26] Ellfeldt, 1974: pp. 8-9

and non-human, virtual movements in terms of energy, time, and space? And how can the correlation between the movements of the human performer and the responsive, aesthetic effects created by the technology be evaluated more critically, and explicitly, in terms of the quantitative and qualitative dimension of technological performance?

Concerning the quantitative level of technological performance, I suggest that it is possible first to locate the correlation between technological and human performance in the translation of external physical stimuli into quantifiable numerical data primarily by means of the interactive software. During this translation, the software establishes specific correlations between the physical input and digital output. Hence, on a quantitative level, technological performance requires an examination of the operations of the interactive software, even if the software cannot function without the rest of the interactive system. In other words, from a quantitative aspect, technological performance asks us to come to terms with how interactive technology works on the level of the design of the interactive software, made possible through its interface.

As I have observed in previous chapters, this evaluation of the quantitative dimension of technological performance has not yet been "staged" in studies on digital dance. In chapter two, I argued that an understanding of quantitative performance is necessary for the choreographer and the dancer because they need to understand the logic and operation of the interactive system to be able to perform as effectively as possible within the choreography. They rely in fact primarily upon a new figure, the media designer, who takes on much of the responsibility for this quantitative aspect of technological performance. While it is the media designer who has the most knowledge on the interactive software and it is s/he who designs it, quantitative performance managed by the labor, perspective, and unique knowledge of the media designer always feeds back, in a translated loop, to be incorporated in to the perspective of the choreographer and also the dancer. During the exhibition of the choreography to the audience, only the media designer has access to the quantitative performance of technology; they keep the technical performance of the interactive software in check and inspect whether it operates according to plan. At the same time the impact and achievements of this quantitative performance work has strong correlations to qualitative intentions and effects.

Again we deal with a doubling, or even tripling of the question of evaluation here, in the qualitative comprehension of technological performance, when we consider that the audience neither has access to the interactive software nor is exposed to its technical quantitative operations. The exclusion of the audience from the operations of the quantitative features of the interactive system has drawn the attention of Scott deLahunta,

writer and researcher in the field of digital dance. In year 2000, DeLahunta was wondering whether the calculative dimension of technology should be made “visible” to the audience as part of the aesthetics of the choreography.[27] For instance, this could be done by projecting the contents of the actual technical interface (seen by the media designer) onstage, instead of or alongside abstract and figurative “aesthetic” visual imagery generated through its workings. However, such an approach has not yet been taken by a choreographer to the knowledge of this researcher. Transparent exhibitions of the technical performance of technology do not seem to be a desired aesthetic choice of the choreographers working in digital dance. Moreover, most audience members do not have (equal amount of) such specific technical knowledge of motion-tracking based interactive systems to understand how exactly each different interface of this kind is being modified and aesthetically adapted in and for staged digital dance works before their eyes. Therefore, it is doubtful whether the audience would appreciate the aesthetics of the quantitative dimension of the interactive software as seen on the interface of the software.

Nevertheless, in terms of analysis, it is necessary to develop methods to examine the quantitative dimension as an essential component of technological performance as I have defined this. This is because, as I have explained, the quantitative dimension contributes significantly to the shaping of the qualitative dimension of technological performance both within the domain of techno-performance research, and at the moment of the qualitative reception of “live” works. Acknowledging this to some extent, authors writing about digital dance in the field have produced much work outlining the importance of the technical developments of interactive software for the creation of a “mutual dialogue between dancer and technology.” I differently interpret and reframe this emphasis on motion-tracking based human-computer “dialogue” in this chapter mostly to come to terms with what are in fact quite complex relationships between the quantitative (technical) and qualitative (perceptual) aspect of technological performance.

Dixon (2007), for example, claims that the advanced and sophisticated media hardware and software now available and exploited within digital dance performances has dramatically shifted the perception of digital dance.[28] As I have detailed in the previous

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[27] DeLahunta, Scott. “Invisibility/corporality.” http://writing-research.nl/?q=comment/reply/178, Accessed on 26.12.2010 This URL no longer exists. It now appears at: http://archee.qc.ca/ar.php?page=article&section=texte2&note=ok&no=380&surligne=oui&mot=&PHPSESSID=0f495cd44ceae25bbb3e8a50eaba0be5. Accessed on 04.05.2012. A version of this paper can also be found in Quinz, Emanuele. ‘Digital Performance’ in Quinz Emanuele ed. *Digital Performance*. *Anomalie_Digital arts nr. 2*. Genoa: Press ATi, 2002.

[28] Dixon, 2007: pp. 200-207.

chapter, according to Dixon, in the early years of digital dance practice (by which he means the beginning of the 1990s), the communication between human performer and technology was rather 'rough', because the technology then used did not have the capacity to enable a fluid conversation.[29] For Dixon, in those early experiments in digital dance, the dialogue between performer and technology resembled a conversation between two people who could understand each other's language to some extent, but were forced to artificially slow down to compensate for gaps in understanding. Over the years, however, in his words, "a genuinely sensitive and sophisticated interactive paradigm has gradually replaced a previously rough and reactive one."[30] I take from Dixon a sense that the quantitative dimension shapes the qualitative dimension of technological performance to a degree that has not been well theorized or understood inside of dance theory itself.

So what would an analysis of the qualitative dimension of technological performance imply within the context of staged digital dance? I suggest that on a qualitative level, technological performances compel us to analyze the correlation between the processes and outputs of the interactive system, and the physical movements of the human performer at a qualitative level that is informed by and non-bracketable from the quantitative, all of this coalescing at the level of audience perception. I also approach the qualitative dimension of technological performance (especially including the aesthetics of the projected images of the staged digital dance works covered here) as part of an 'aesthetic of correlation', that is being staged in staged digital dance, through two choreographic strategies in particular.

As I have already stressed, evaluation of the qualitative dimension of technological performance takes place at two different moments in the context of staged digital dance. During the creation of the choreography it is primarily the choreographer, media designer, and to a lesser degree the dancer who decide upon the aesthetics of correlation between the human and technological performance. During the reception the evaluation of the effectiveness of technological performance is made by the audience, a somewhat more informed version of the judgments of which I have drawn from the perspective of dance reviewers in this thesis. In conclusion, it is possible to translate the quantitative and qualitative dimension of technological performance as understood within the domain of techno-performance research to staged digital dance, in order to create a framework for

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[29] Sarah Rubidge makes a similar claim in the article 'Action, Reaction, Interaction' (2001), which I have explained in the previous chapter.

[30] Dixon, 2007: p. 205

the analysis of technological performance inside of dance theory. In the following section, I develop this framework in detail and go on to apply it to an evaluation of the quantitative and qualitative dimensions of technological performance in *Glow*.

4.3 Analyzing technological performance in digital dance

A. Quantification of technological performance

Quantified aspects of technological performance occur in the behavior and functioning of the interactive software, which translates the qualitative movements of the dancer into quantifiable data. Robb Lovell, software designer working in the field of digital dance, explains the translation of qualitative input to quantitative output via an eight-step process.[31] These eight steps are: action, sensing, processing, translation, control, generation, manipulation, and rendering,[32] which together capture the process by which the software establishes a correlation between input and output. The parameters that guide the correlation between input and output are designed via the interface of the interactive software. In computer science parameter refers to "a reference or value that is passed to a function, procedure, subroutine, command, or program."[33] Parameters consist of values that can be programmed in different ways within the possibilities of the software. They determine the behavior of the output, such as the size of a pattern, the shade of a color, and the speed with which projected images move.

Quite a number of different interactive software programs are being used in the making of digital dance. Custom-designed applications include Isadora (designed by Mark Coniglio) and Eyecon (designed by Frieder Weiss), which stand alongside existing software programs not originally designed for dance-related purposes, such as Max/MSP. Because Eyecon[34] and Isadora[35] have been utilized in the case studies examined in this thesis and have been uniquely designed for staged digital dance, I elaborate in this section on how these two interactive software packages in particular actually work. Both software programs establish a correlation between body and technology by means of different

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[31] Lovell, Robb, 'Video Based Sensing in Interactive Performance Spaces' in Dinkla Soke, Martina Leeker (eds.) *Dance and Technology. Moving towards Media Productions*. Berlin, Alexander Verlag, 2002: pp. 196-200

[32] Lovell explains that in certain cases some of the eight steps can be left out for the execution of a certain operation.

[33] http://www.thefreedictionary.com/parameter, Accessed on 04-08-2011.

[34] As a matter of fact, in *Glow*, Weiss used the interactive software Kalypso, which is a version of Eyecon

[35] Isadora is a commercial product designed by Mark Coniglio, which can be purchased at the website of Troika Ranch.

interfaces. The implied user of such software are most often media designers working in the field of dance, music, or animation, visual art, vj'ing, and theatre.

Eyecon is primarily used to facilitate the creation of interactive performances and installations in which the motion of human bodies triggers or controls various other media, such as music, sounds, photos, films, and lighting.[36] It operates on the basis of a video feed from the performance or installation area. The rendering of the video signal by the computer results in an image in the main window of the program. From this point on, it is possible to draw 'lines,' 'fields' or other elements over the video picture. In this way, Eyecon can turn any qualitative input into quantifiable measures and outputs. As designer and media artist Weiss explains:

> If you have drawn a field, Eyecon can measure the amount of motion that occurs within it. Additional features let you track the position of persons within the performance area, measure their height, width, overall size or the degree of left-right symmetry in their shape.[37]

Figure 4.1 (see below) is an example of an open window, showing Eyecon in action. This window shows how the programming of the interactive software establishes correlations between the input, such as physical movements of various kinds and qualities, and the output, for example, of visual imagery or sounds, of various patterns and speed.[38]

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[36] http://frieder-weiss.de/eyecon/index.html, Accessed on 14-12-2010

[37] http://frieder-weiss.de/eyecon/index.html, Accessed on 14-12-2010

[38] http://frieder-weiss.de/eyecon/index.html, Accessed on 14-12-2010

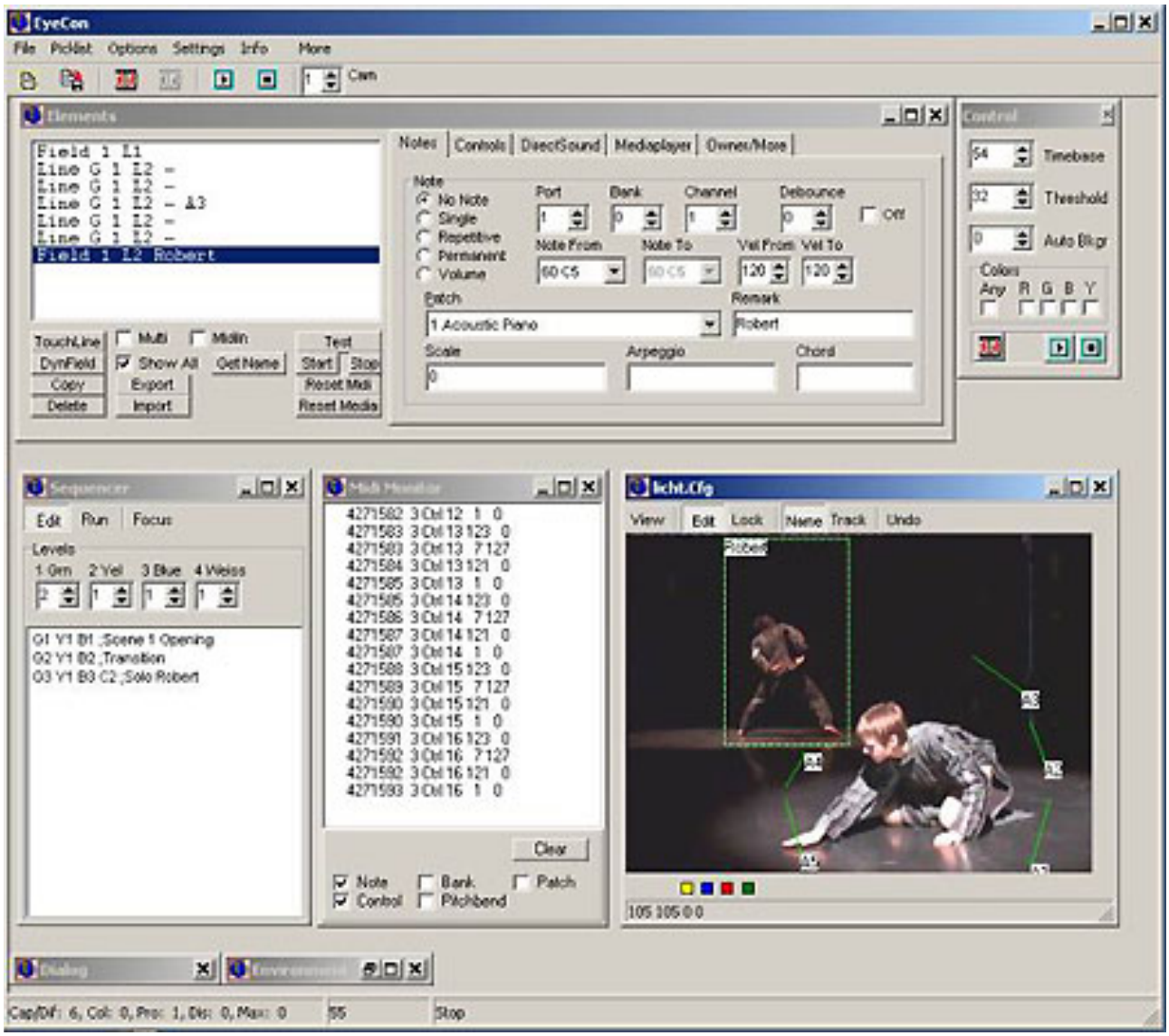

Fig. 4.1 — Eyecon

At the same time, this illustration points to a significant difference between what is perceived by the audience (which includes both the physical movements of the dancer and the outputted visual imagery of different kinds projected mainly on a screen) and the performance of the parameters on the computer screen manipulated and observed by the media designer. During *Glow,* it is of course only the media designer (Weiss) that has view of this technical window into the interactive system, on his computer.

Isadora operates similarly to Eyecon. It utilizes a graphic programming language that "provides interactive control over digital media, with special emphasis on the real-time manipulation of digital video."[39] Isadora gathers movement information from various sensory devices, and uses that information to control and manipulate digital video, music

[39] Farley, Katherine. "Digital Dance Theatre: The Marriage of Computers, Choreography and Techno/Human Reactivity". *BST Journal,* vol 3, no.1, (2002). Available on http://www.people.brunel.ac.uk/bst/home.html. Accessed on 10.09.2012.

synthesizers, sound modulation devices, and theatrical lighting.[40] Hence, during the performance, Isadora functions as "the engine that drives the visual manipulation components" of the art works by means of:

> (...)graphically represented building blocks, each of which performs a specific function (such as: playing or manipulating digital video, capturing live video, controlling a DV camera, etc.), the modules allow information to travel from one source to another inside the computer, and from the computer to outside interfaces.[41]

The developer's commercial website that advertises Isadora's suitability for artistic work places limited emphasis on aesthetic effect and instead upon the fact that Isadora is easy to use, powerful, flexible, and reliable, emphasizing the importance - among artistic consumers of the system - of the quantitative dimension in shaping the qualitative aspects of technological performance. The software offers "over one hundred building blocks that can be connected in an almost unlimited number of ways," allowing the artist "to tailor how the media is presented or manipulated to (…) specific needs."[42] In turn, such a range and degree of artistic options in the relation between inputs and outputs allows expanded possibilities for integrating technology in to the artwork.

The interface of an Isadora file has three main areas: the Toolbox located on the left, the Scene List located on the bottom, and the Scene Editor which fills the remainder of the window.[43] Figure 4.2 illustrates a screen capture of the start screen for Isadora:

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[40] http://www.troikatronix.com/isadora.html, Accessed on 14.12.2010
In addition to its easy-to-use interface, Farley (2002) describes that Isadora offers the following features:
Live Video Input: to mix or manipulate live video with your prerecorded digital video.
Snapshot Feature: to create, store and instantly recall the settings within a scene.
Record Output: to record Isadora's output to QuickTime movie.
Sound Input: to modulate sound volume.
DV Camera Transport Control: to instruct up to 8 cameras to play, stop, start, record.
Farley, 2002. Available on http://www.people.brunel.ac.uk/bst/home.html. Accessed on 10.09.2012.

[41] Farley, 2002. Available on http://www.people.brunel.ac.uk/bst/home.html. Accessed on 10.09.2012.

[42] http://www.troikatronix.com/isadora.html, Accessed on 14.12.2010
It is important to emphasize that Isadora's technical features are very complex and demand a much detailed elaboration than the one presented here. Due to the limited space and scope of this chapter, I have had to bracket this. I intend to more closely articulate links between the elaborated quantitative features of Isadora and the performances it creates in much more in detail in future work, including when I transform this PhD thesis into a publication. Meanwhile, the interested reader can visit Troikatronix's website for a detailed account of Isadora's technical fetaures in the Isadora 1.3. manual available on http://troikatronix.com/download/isadora-download/

[43] http://www.troikatronix.com/izzy-features.html, Accessed on 14.12.2010

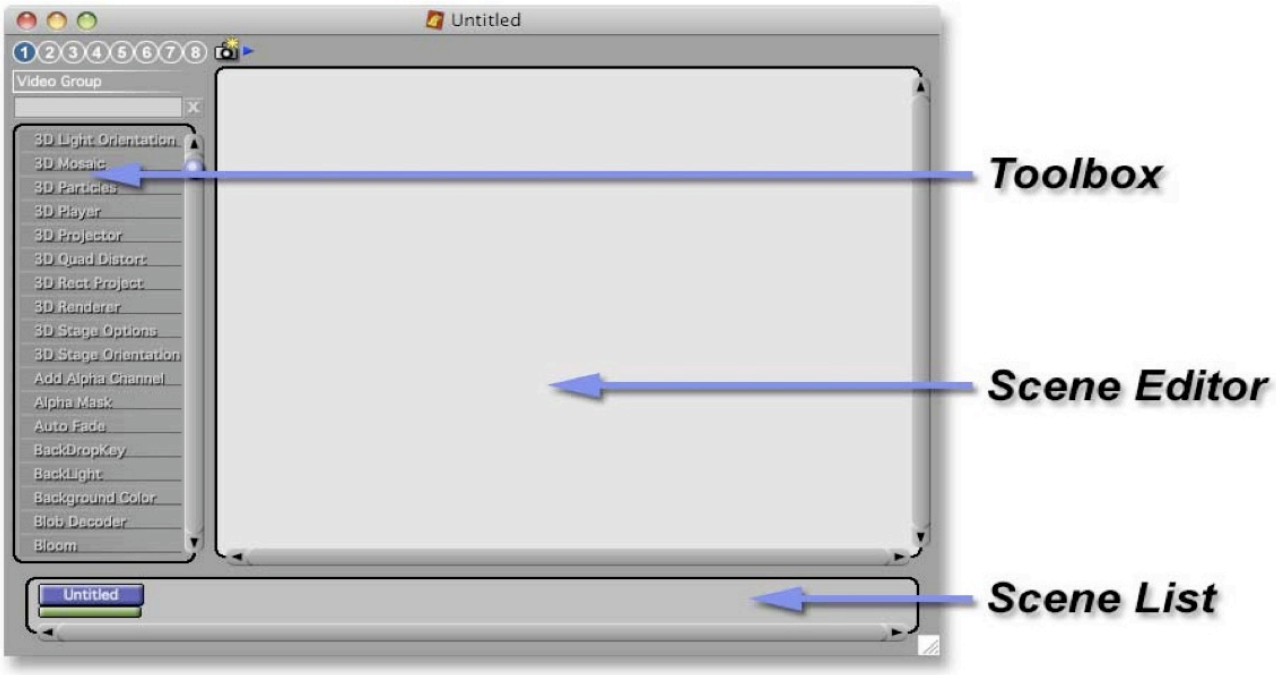

Fig. 4.2 — Isadora

What is interesting arguments this thesis, is the fact that many of the terms used in Isadora's modules derive from the performing arts. The modules seen on the left part of the toolbox are 'actors'. 'Actors' are the most basic building blocks in Isadora; each has a specific role, and they interact with one another through virtual connections, illustrated in figure 4.3. To be more precise, Isadora offers over seventy basic building blocks, some actors "perform simple functions like watching for a signal from a MidiDancer sensor, while others allow more complicated functions such as warping video imagery."[44] The organization of actors via virtual connections leads further to the creation of 'patches.' In Isadora, each scene contains its own patch. Figure 4.3 is an example of a patch with linked modules, consisting of the following (technological) 'actors' Media Player, Projector, Luminance Key, Feedbacker, and Control Watcher:

[44] Farley, 2002. Available on http://www.people.brunel.ac.uk/bst/home.html. Accessed on 10.09.2012.

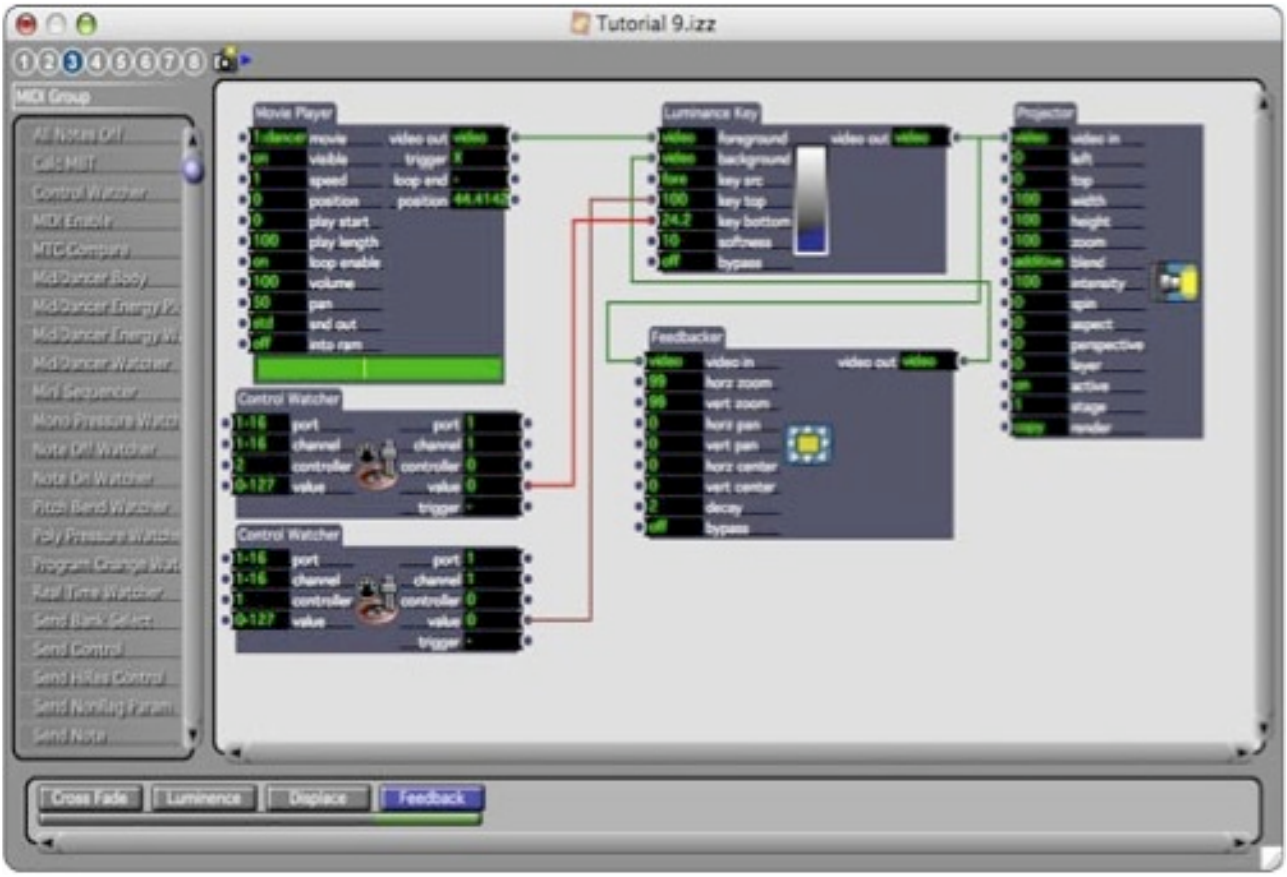

Fig. 4.3 — Isadora

The features of the correlation designed on an Isadora patch can be programmed in numerous ways, depending on the aesthetic choices of the artists. In digital dance, the correlation between physical and visual movements is to a great extent inspired or desired by the aesthetic choices of the choreographer, which are then developed and realized by the media designer or engineer. As I have explained earlier, this collaboration is quite a central and relatively new aspect of digital dance due to the fact that most choreographers have not been experts in media design and programming in their own right. Furthermore the combination of these roles involves a great amount of labor time spent in testing and cultivating configurations in which, most often, the media designer informs the choreographer on the technical and aesthetic possibilities of the software. It is possible to speculate that this collaboration between the choreographer and media designer can be thought of as a kind of back-end feature of the partner-work of staged digital dance, occurring instead in the earliest designing stage. Such dynamics only further reinforce the argument I am making about the dual character of the choreography in staged digital dance as a composite of human and technological performance.

Similar to the creation of a duet between two physical dancers, also in digital dance, most often, the choreographer is concerned with creating a relationship of a certain kind

between the human dancer and the technological ‘actors’ - in the case studies, these actors always include visual projections, extrapolated from the human actors and modulated by the interactive system. The choreographer (with the collaboration of the media designer/artist) needs to create three different kinds of movement for the establishment of the correlation between human dancer and technology, which includes the determination of the physical movements of the dancer, the virtual “movements” (correlations, and modulations) of the technology, and the relationship between these. For example, if the dancer goes left, should the visuals projected on the screen also move to the left, following the dancer or should they move in another direction? To the same degree, or in an amplified way? Or, if the dancer increases the speed of his or her movements, then, should the projected visuals also move faster, or should they move in the opposite direction of the dancer, or should they not react at all? By finding artistic answers to such questions, the choreographer together with the media designer and dancers search for the most effective integration of the visuals provided by the technology into the choreography, with the aim to portray the visual images created by technology as dance “partner” and to create a dialogue between human and technological performances. Let me describe an example in order to further clarify the difference in the quantitative and qualitative aspect of technological performance via Isadora.

Let us say that the aim of one particular scene of a digital dance choreography is to create a correlation between the dancer’s forward or backward movements in space and the degree of brightness of the stage lights. The aesthetic decision made is to portray an increase in the amount of light when the dancer moves to the front of the stage and a decrease in the amount of light when the dancer moves to the back of the stage. For this, the parameters of the actor, ‘Brightness’, are programmed accordingly, to move within a range of zero (total darkness) and one hundred (maximum light). Next, the actor ‘Eyesweb’ (the function which enables to track motion in real-time) is activated for the tracking of the motions of the dancer. In addition, the actors Projector, Brightness, and Eyesweb are connected on the patch of this particular Scene.

Once the correlation is designed on the Isadora patch, the process that takes place from this point in the realization of the performance occurs both on the quantitative level (visible to the media designer’s perspective) and qualitative levels (visible to the audience’s perspective). From the media designer’s perspective, Eyesweb detects a change in data as the dancer changes her location in space and it sends this information to Brightness. Brightness reacts by raising (or lowering) the value of its parameters. From the audience’s perspective, an increase in the brightness of the lights is perceived as the

dancer moves towards the front part of the stage. When the dancer moves backwards, the audience perceives a decrease in the degree of brightness of the light. In this way, the audience becomes acquainted with the logic of a correlation between the dancer's change of spatiality and the aesthetic effects created by the technology. Hence, in terms of performance measurement, the quantitative performance of Isadora in this specific example is effective because its execution of certain calculative acts evolves according to the technical aspects of a larger choreographic plan. But we can also note that an aesthetic logic is also being cultivated through this efficacy.

As I have already outlined in chapter two, in digital dance, the choreographic aim is to achieve an artistic outcome that goes beyond attaining a quantitatively successful correlation between physical movement and interactive software. But how do we talk about this technical-aesthetic correlation between the input of the physical performer and the output of technology for the perception of the audience? And how are these works of staged digital dance judged according to the ability of the visuals provided by the interactive technology to capture technology as a non-human dance partner? In other words, how does the evaluation of technological performance shift from quantity to quality in digital dance? Although it plays an important role in the realization of the aesthetic in digital dance, the answers to such questions cannot be found through more refined approaches to quantitative performance alone. We need to look as well at how quantitative and qualitative dimensions of technological performance combine to qualitative effect. This entails analyzing the aesthetics of correlation within digital dances' cultivated choreographic strategies.

B. Qualitative dimensions of technological performance

In digital dance, the exposure of the aesthetic of correlation entails the deployment of two different choreographic strategies, which involve what I term either 'differential correlative operations' or the 'gradual amplifications of correlation'. The first strategy refers to the exploitation of the aesthetic of correlation by means of four operative modes. These modes derive from principles of dance composition earlier described and are labeled as: direction in space, synchronization of movement, change in movement size, and intensity of movement. The second strategy refers to the way in which the choreography gradually exposes the correlative relationship between human and technology, from more simple to more complex encounters.

In order to pinpoint the different modalities of the aesthetic of correlation, let us revisit the opening scene of *Glow*, described in the introduction of this thesis:

> The performance begins with the appearance of three straight, short white lines projected on to the black dance floor. The lines move horizontally from the left to the right of the stage during which they extend in length. On the right of the stage the three white lines create a diagonal and disappear. [Fig. 4.4 and 4.5]

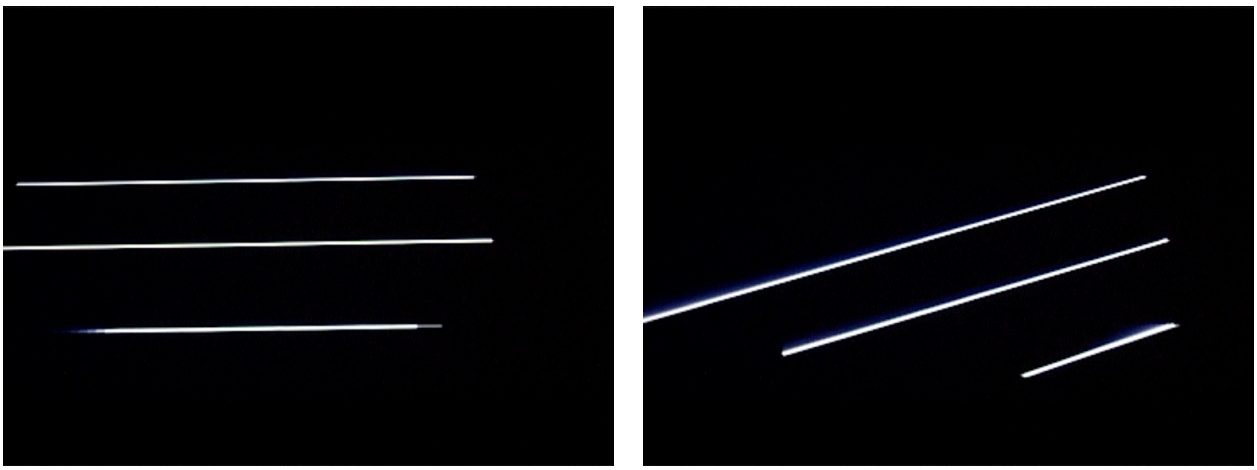

Fig. 4.4 and 4.5 — *Glow* (2006)

> A moment later, a bright, white light takes over the entire stage space, illuminating it uniformly. The dancer appears on the left of the stage. She is sitting in a curled over position. Similar to the movement of the lines before her, she too walks horizontally from the left to the right of the dance floor while maintaining her curled over position. In the meantime, a white line traverses her body vertically and moves together with the dancer to the other side of the stage. During this passage, the line moves forward and back simultaneously with the dancer as she shifts her body weight forward and back. [Fig. 4.6 and 4.7]

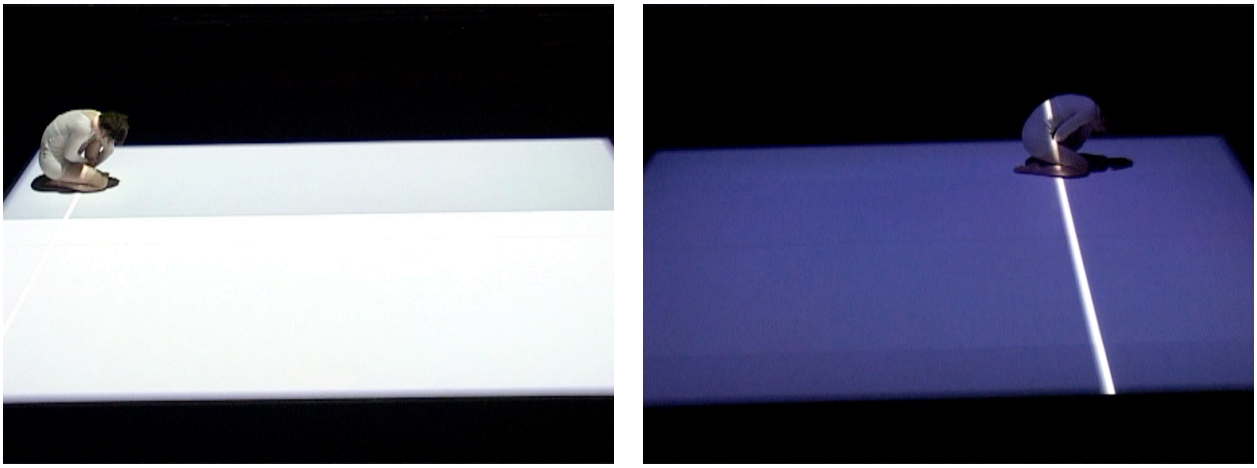

Fig. 4.6 and 4.7 — *Glow* (2006)

Gradually, a second light appears onstage. This time the light forms a

silhouette around the dancer's body and contracts and expands in line with the dancer's movements. In addition, the silhouette intensifies its amount of light as the dancer intensifies the force of her movements, in particular the movements of her arms and legs by extending them upwards or sidewards. [Fig. 4.8 and 4.9]

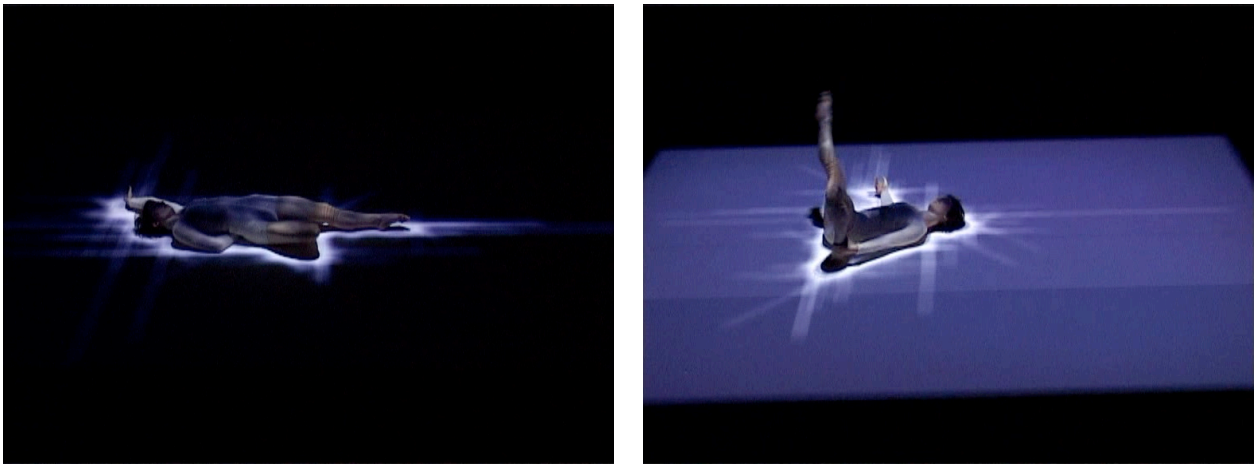

Fig. 4.8 and 4.9 — *Glow* (2006)

In this scene, we can observe four modes of an aesthetic of correlation in operation. The first mode (direction in space) takes place between the movement of the line of light and the dancer's walk across the stage. Here, the correlation is based on the change of the location of the dancer and the light's movement along with her. The aesthetics in this section portray shared direction in space between the movements of the dancer and the visual movements of the technology. Moreover, this section illustrates a well-established synchronization of timing, the second mode of an aesthetic of correlation, between their movements. The precise synchronization of the movements of the technologically realized projection and the physical dancer eliminates the possibility of an external intervention (for example, by a lighting technician who might otherwise manually project light on the stage). The third mode of correlation (change in movement size) occurs between the reduction and enlargement of the size of the light and the expansion and contraction of the movements of the dancer. Here, the correlation is based on changes in the size of the dancer's body and the degree of the light's luminance. In addition, this scene portrays an aesthetic correlation of intensity (which is the fourth mode), as the increase in the degree of light correlates with the dancer increasing the force of movement that she sets in motion. Here, the correlation is one of shared dynamics between the visuals provided by the interactive software and the physical movements of the dancer.

Taken as a staged performance, these shared aesthetic modes of correlation between physical dancer and projected visual images recall two physical dancers who

adjust their movement in terms of quality, timing, or direction in order to be able to dance together. In the analyzed scene the visual effects created by the interactive system are portrayed in a dynamic engagement with the human dancer on the basis of shared qualities of energy, time, and space. For example, the way the projected light changes in size and degree of illumination in accordance with the movements of the dancer is an illustration of this active and dynamic engagement. At the same time, as I have explained in chapter two, during the rehearsal, the dancer needed to adjust her movements according to the limitations and potentials of the interactive system. As explained in section 4.2, mutual assistance is (usually) a feature of partner-work in modern dance. If the support of one dancer given to another and vice versa is an aspect of partner-work, then, in *Glow*, technological elements appear to function as this dance partner.

In this respect, *Glow* destabilizes the generally accepted role of technology as merely supportive devices for the human performer within a hierarchy of perceptual importance. Whereas a staging based on a hierarchy of perceptual importance reduces the effects of technological performance to a minimum level, *Glow* maximizes such perceptual effects by laying bare the presence of the effects of technological performance to the audience as a continuous and apparently autonomous performing element onstage. The visual abstract images provided by the interactive system co-respond in various ways to the physical movements of the dancer in *Glow*, and are staged as a performing element that correlate with the human performer. As a result, *Glow*, in its dual attention to technological and human performance, counter-balances the commonly accepted peripheral status attributed to technologies in dance described in the first chapter.

In order to facilitate the audience's appreciation - both technical and aesthetic - of the correlation between human and technology, in *Glow* the interaction between human and technological performance is exposed via several gradations to the audience, which constitutes the second choreographic strategy. These different phases, which expose the collaboration between human and technology, evolve from simple to more complex interactions. Put differently, *Glow* stages a gradual build-up of correlative exchange between human and technological movement, which starts with scenes that portray simple interactivity, moving on to scenes that show a higher degree of complexity in their aesthetics. *Glow*'s structure for example consists of four parts, which are organized so that the correlation between dancer and technology is slower and more clearly articulated in the first two parts, and more complex in the last two parts. The aim of the second choreographic strategy is to aid the comprehensibility of the real-time correlation between the human performer's input and the technology's activity and output for the audience.

Once set, the choreography complicates the established correlation according to the needs of its dramaturgy.

Saltz (2001) argues that the exposure of the adaptative processes between the human performer and technology (see chapter 2) is itself a general principle and the most important novelty of performances that incorporate interactive technologies. He describes this principle as a strategy that shapes the audience's understanding of the correlation between human dancer and the output of the technology, and further reinforces my own argument that this correlation needs to be purposively staged in certain steps.[45] Calling this staging principle the "paradox of the interactor", Saltz explains that in theatre:

> The more thoroughly the performer explores the technology, the more clearly the audience will recognize the ability of the environment to respond dynamically and spontaneously to the performer's actions.[46]

In other words, the paradox of the interactor is a paradox because it shows in fact the activity of all of the elements that are not that actor's "work" or doing. This pedagogical unfolding of digital interactive performance helps the audience to understand, follow, and appreciate the conventions and dynamics of the encounter between human and technology precisely as an encounter, one that has been rehearsed indeed but that is also before their eyes being experienced as cultivated. For Saltz, during this process the performer - their movements - especially takes on a certain pedagogic responsibility concerning the audience's comprehension and appreciation of the principles of correlation between him or herself and the output of the interactive system. Saltz maintains that in such performance created with interactive technology:

> The performer must teach the audience to understand the conventions that define the interactions by starting slowly with the simplest interactions (e.g., "the sound plays only while I am rocking this chair") before moving on to more complex interactions.[47]

Frieder Weiss, media designer in *Glow*, refers to examples, which portray fairly obvious trigger-response connections, such as Saltz's description of the interaction between the performer's manipulation of the chair and the creation of sound, as tight connections. For Weiss, this staging of a "tight connection" between the input of the human performer and the output of the interactive system is necessary in order to make the audience understand the conventions of the interaction portrayed within the

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[45] Saltz, David. 'Live Media: Interactive Technology and Theatre'. *Theatre Topics*, vol. 11, no. 2, (September 2001): pp.117-118.

[46] Saltz, 2001: p. 117

[47] Saltz, 2001: p. 118

choreography. In his experience, “loose” (meaning less obvious, or less direct) correlations between the human performer and technology are most often not understood by the audience.[48]

Interestingly, for his earlier works with choreographer Robert Wechsler (during 1995-2000), Weiss and Wechsler would actually demonstrate how the system works to the audience before the actual performance had commenced. They would literally go on stage and explain the audience the technical process that takes place, starting from the dancer’s physical movements and the images created by the interactive system. Weiss argues that this preparatory, didactic demonstration was necessary for those early emerging performances because the audience did not believe in the possibility of a wireless connection between dancer and technology and therefore they could not appreciate its conventions, meaning how the visual images provided by the interactive system are generated as a result of a certain technical relationship between human and the projected images. At present, Weiss no longer sees the necessity for pre-performance demonstrations. According to Weiss, audiences of digital dance now are fairly acquainted with interactive technologies and do not experience them as deceiving or confusing.[49] Nevertheless, for Weiss, an element of adjustment, built in to the choreography itself, is still necessary as far as the audience’s perception of the interaction between human and technology within the choreography is concerned.

The logic of the paradox of the interactor can also be demonstrated also by close readings of *Glow*. The contrast between *Glow*’s first and last two parts reveals strategic developments and variations in the exposure of correlation. For example, the aesthetics deployed in the third scene presents a break in the established correlation of shared qualities and direction between the human dancer and technology, established previously in the opening scene of *Glow*. This section introduces instead a correlation of non-simultaneity and oppositionality. The non-simultaneous aesthetics in the third section are illustrated through a multitude of dark, strangely formed patterns on the white dance floor, which appear as the dancer moves across the stage. In this particular scene, some of the dark patterns continue to move towards the dancer as she stands still. The movements of the dark patterns repeat the movements of the physical dancer, but with temporal delay. Now, when the dancer starts moving again, so do the remaining dark patterns, but in the opposite direction of the dancer. This means that if the dancer goes left, the patterns move

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[48] Notes made during lecture of Weiss at the Cinedans festival 2010, Amsterdam, 12.12.2010.

[49] Notes made during lecture of Weiss at the Cinedans festival 2010, Amsterdam, 12.12.2010.

right and if the dancer moves forwards, the patterns moves backwards and so forth. [Fig. 4.10 and 4.11]

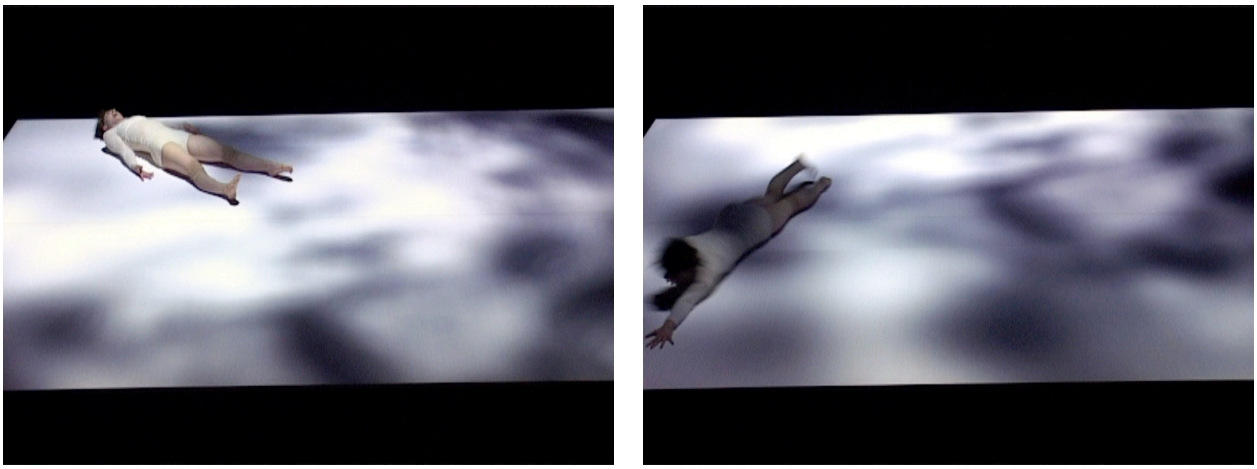

Fig. 4.10 and 4.11 — *Glow* (2006)

That *Glow*'s aesthetics become more complex towards the end of the performance does not mean however that the communication established between dancer and the projected real-time visuals is less perceptible for the spectator. Because the first two scenes took time to establish a "tight" correlation (to use Weiss's term) between human performer and technology, it is clear for the audience that the correlation between dancer and technology exists even in the non-simultaneous and oppositional correlations that are presented in, and transform, the last two parts of *Glow*. Hence, the implementation of the paradox of the interactor facilitates the audience's understanding of complex, ongoing, cultivated relation of the performances of human and technology together.

In this way, staged digital dance offers a new understanding of the notion of partner-work in terms of this parallel performativity of human and technological elements in dance works that are no longer entirely human-centered. In staged digital dance, choreography (here, as a kind of "partner"-work that exists beyond the human) expands from the organization of a correlation of physical movements in energy, time, and space to the organization of a correlation of human and non-human movements in energy, time, and space. This leads to the perception of the sometimes confronting role of technology as a dance "partner", and an understanding of the encounter between the human and the non-human as communication of some kind. From this perspective, the integration of interactive technology in *Glow* underlines the fact that the choreography is not simply a showcase for the demonstration of the quantitative capacities of the interactive system. Instead what is discovered is the productive technical-aesthetic tension of staged digital dance.

When such a communication of correlation is perceived as aesthetically affecting, both human and technological elements contribute to the development of *Glow*'s dramaturgy. For the choreographer Obarzanek, *Glow*'s dramaturgy enacts an encounter between a dancer and a digital world, or in other words, the virtual[50], and it explores the "desire to discard or escape elements from within ourselves."[51] For him, *Glow* can be read as a visual metaphor that represents "our own constant struggle with our primitive state of duality."[52] In the words of Obarzanek, in *Glow*:

> The performer appears to evolve from a huddled form into human shape, creating a world of astonishing shapes and colors around her, one, which eventually takes on a threatening life of its own. It's an intense experience and, [dark as its theme appears to be], an exhilarating one.[53]

Obarzanek describes his desire to present the encounter between the dancer and the digital world through the themes of 'fusion' and 'separation.' Fusion is explored in the first two parts of the performance:

> As the work develops so does the initial responsive relationship of light and graphics to the moving body. At one point the dancer's effect on a graphic pattern gives us the impression that all particles are related and that the body has merged into a single entity with the system.[54]

'Separation' is staged in the last two parts of the performance. Obarzanek describes the dramaturgical ideas behind separation in this way:

> Later, projected shadow figures expelled by the performer take on a dramatic form of their own and influence the behavior response of the dancer. Approaching a climactic end, there is an intense physical process that ultimately leads to the separation between the body of the performer and its projected image. The seamless joint venture forged in *Glow* between a moving body and tracking light and images ultimately reveals itself as flawed and in the end irreconcilable.[55]

Obarzanek's explanation of *Glow*'s dramaturgy aids an understanding of how and why the two choreographic strategies are utilized in *Glow*. The simultaneous correlation portrayed in the first two parts of the choreography facilitates the staging of a fusion between the dancer and the 'digital world'. The exploitation of shared timing and dynamics

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[50] I have explained the notion of the virtual in the previous chapter.

[51] http://www.realtimearts.net/feature/Dance_Massive/9365, Accessed on 18-12-2010

[52] http://www.chunkymove.com/Our-Works/Current-Productions/Glow.aspx, Accessed on 18-12-2010

[53] http://www.realtimearts.net/feature/Dance_Massive/9365, Accessed on 18-12-2010

[54] http://www.chunkymove.com/Our-Works/Current-Productions/Glow.aspx, Accessed on 18-12-2010

[55] http://www.chunkymove.com/Our-Works/Current-Productions/Glow.aspx, Accessed on 18-12-2010

of movement help establish a fluid engagement between physical and virtual movements. For example, the increase in the amount of light in relation to the increase of the dynamics of physical movement creates a harmonious connection between physical input and visual output. In turn, the exploration of separation in the later sections of the performance signals a change in the quality of the relationship established between dancer and technology, explained via the aesthetics of non-simultaneity and oppositionality.

Glow brings together through both human and technological capacities to destabilize the hierarchy of perceptual importance, especially by showing that the physical and technological elements and movements are productively relational to each other. Staged digital dance generates this understanding that the movements of the inhuman elements and forms generated by technology are as important as the movements of the human dancer for the realization of *Glow*'s aesthetics. In turn, the collaboration between human and technological performances paves the way to the perception of an aesthetically impactful quantitative and qualitative tension perceived between the human and technology, staged in various ways throughout the progress of *Glow*'s dramaturgy. From this it is possible to conclude that key concepts of 'technological performance' adapted from the discipline of techno-performance research and especially from the work of McKenzie, can be applied to evaluate technological performance within the context of staged digital dance.

4.4 Discussion of the framework of technological performance

A major advantage of the application of technological performance as understood in the domain of techno-performance is that it helps to acknowledge the actions of the technology in the choreography of *Glow* as performance in its own right. Moreover, the framework of technological performance grants technology the capacity to be deemed a performing element, without anthropomorphizing the technology, which I explained to be a tendency in the literature of digital dance in the previous chapter. In this respect, the analysis of technological performance conducted in this chapter helps to enhance the main argument of this thesis by showing how staged digital dance challenges the hierarchy of perceptual importance in dance.

In addition, the framework of technological performance is particularly productive for working beyond or to the side of the phenomenological heritages of dance theory; technological performance does not take the human body as its starting point. As I have explained in chapter three, first generation digital dance scholars' continued investment in humanist or human-centered dance conventions, their tendency to "incorporate" and absorb emerging technologies in to those durable conventions, and their major use of phenomenological theory which they considered most suited to this task of incorporation, has had the impact of largely neglecting and downplaying the role of technology in digital dance discourse. They (to a large degree) have not recognized or theorized the capacities of technological elements for performance. In light of this, the framework of technological performance created in this chapter contributes to existing studies on digital dance.

Finally, this analysis of technological performance - which recognizes the human and technological in a double or parallel view - raises interesting further questions about the nature and comparison of human and technological performance. Firstly, by granting technology the possibility to perform, it is also possible to demonstrate that the actions taken by technology have an impact on the progression of the choreography. This leads to the recognition that the actions executed by the technology may have a certain agential or generative power when it comes to the creation and realization of the choreography. Second, by showing that the actions of human and technology both contribute to the creation of the choreography, the analysis raises questions on whether the notion of skills

can be applied to technological performance within the staging of the partner-work in staged digital dance.

At the same time, the analysis demonstrates that the framework of technological performance is limited, in a similar but inverse way, to the human-centered model. Due to its exclusion of human performance, the established framework is insufficient to analyze the relationship between human and technological performance within the choreography. Such a framework cannot account for the dual character of staged digital dance as a composite or tension, with quantitative and qualitative dimensions, emerging from the relationship between human and technological performance.

Therefore it is important to build further upon this new contribution that I am making to dance studies by this transposed framework of technological performance. In the next chapter, to deal with the problem of reading human and technological performance together, in line with the relationality of staged digital dance, I propose to read the choreography in staged digital dance through the notion of interperformance. Interperformance is a useful way to examine staged digital dance as that which emerges from the engagements between the two ontologically different performing elements. Moreover, interperformance helps further deconstruct the hierarchical ordering between human and technology in dance by addressing abstracted similarities and differences between the capacities of human and technological performance, especially, as I consider, the notion of agency and skills.

4.5 Conclusion

This chapter has set out to develop a much-needed framework to account for the actions of technology incorporated in staged digital dance as a kind of performance. To do this, I have taken the understanding of performance within the domain of techno-performance research as a point of departure. Because the field of study of techno-performance research differs greatly from that of staged digital dance, I have productively adjusted the evaluative criteria associated with this concept to the context of staged digital dance, and applied the concept of technological performance that this makes possible to the case study of *Glow*.

The analysis conducted in this chapter demonstrated that the framework of technological performance is a productive way to understand the role of technology as a performing element and as dance "partner" in the choreography of the selected case study. The framework of technological performance also helped show how technology contributes to the creation of the choreography both from a technical (quantitative) and perceptual (qualitative) dimension. In this respect, an analysis of technological performance helps to unsettle the hierarchy of perceptual importance by portraying a change in the center-periphery ordering between human and technology within the choreography.

Nevertheless, the framework of technological performance remains insufficient to account for the choreography as an amalgam emerging from the relationship between human and technological performance in staged digital dance. For this reason, in the next chapter, I propose to approach staged digital dance through a specific notion, which I label as interperformance. Interperformance is a way to read choreography as that which emerges on the basis of the intersections of two different performance types within the context of staged digital dance. Moreover, interperformance addresses the issues of agency and skills, which presents new ways to destabilize the hierarchical ordering between human and technology.

CHAPTER 5.

Interperformance: a posthuman perspective of digital dance

5.0 Introduction

While the previous chapter has introduced new analytical frameworks for thinking through the contributions of technological elements to performance and performance theory, an analysis based on technological performance still falls short of being able to deal with staged digital dance choreographies in terms of their emergence from a *relationship* between human and technological performance elements. The treatment of this dynamic process arising from the relationship between human and technological performance, requires me to focus in this final chapter upon framing staged digital dance through the concept that I am calling *interperformance.* The concept of interperformance enables a framing of the engagement between human and technological performance elements in less hierarchical terms, especially once we consider interperformance through a focus on parallel technical skills and capacities, and agential forces of human and technology.

Susan Leigh Foster's (1998) theoretical reappraisal of the notion of "performance" from the perspective of dance, has pointed to the way in which dance skill and competency specifically is able to reframe and critique recent post-structuralist conceptions of performance that have been developed by gender studies scholars. Drawing on Foster, in the first part of this chapter, I emphasize similarities between human and technological performance from the perspective of capacity or skill. While Foster's insights are intended to reframe the performance of gender specifically, her achievement of this through such a pointed coupling of performance and skill is a coupling that I consider extremely useful to apply laterally to the performances and active relationalities of the human performer, the interactive system, and the imagery implemented in staged digital dance. I will show that positioning human and technological performance in terms of "skill" or capacity complicates the normative association of "agential force" with the human, and allows us to draw lines of connection between human and technological performance through the concept of agency.

In making this argument, I am also drawing from the Actor-Network-Theory of Bruno Latour. For Latour, a post-human reframing of agency, in terms of elements that "make a difference" within a performance ecology,[1] allows us to make striking comparisons between the human and technological in terms of agential power. Presented in this way,

[1] By performance ecology I mean the type of choreography, which portrays humans and non-humans as performing elements that are both part of the choreography proper.

my proposed concept of interperformance is also intended to offer an alternative to the concept and discourse of interactivity, discussed in chapter four, which standardly sees human agency as the (positive) orienting criterion for (interactive) performance analysis. That is, in terms of the empowerment, or technologically bound constraint, of the human participant. Contrarily, the application of Actor-Network-Theory to staged digital dance helps further unsettle the hierarchy of perceptual importance by both problematizing and multiplying, across different human and non-human elements, the definition and possibility of who and what can contribute as a performing element to any choreography. In this way, from the perspective of skills and agency, interperformance allows us to destabilize the human-centered perspective in dance, opening this art form to the domain of the posthuman.

I want to be clear that in reframing performance in this way, in terms of a concurrent reading of human and technological skill, capacity, and agential power, I do not claim that human and technological performance are seen as the same thing, or as converging. On the contrary, the 'inter' accentuates a relationship that takes place between two different kinds of performance. The differences that remain between human and technological performance, I argue, can be understood as productive differences, which open up dance to non-human agencies and, therefore, contribute to expand the art form of dance beyond the human. As a concept that reframes its object of staged digital dance, interperformance also enables me to bring together an analytical approach to examine the relationship between human and technological performance non-hierarchically, which has long been overdue during the emergence of digital dance, and the theory surrounding it. While current studies on theatre and performance are beginning to account for a shift towards a posthuman paradigm in art works created with digital technologies[2], digital dance to a certain extent has been neglected from this. Connecting staged digital dance with the posthuman paradigm helps show how dance corresponds with other contemporary art forms and with changes taking place in culture and society more generally.

Through the notion of interperformance then, this chapter aims to deconstruct the hierarchy of perceptual importance between human and technology in dance. Section 5.1 starts out by discussing similarities between human and technological performance in terms of technical skills or capacities. Section 5.2 problematizes the notion of performer as a human-centered concept. The following section elaborates on the notion of agency,

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[2] See for instance Bay-Cheng, Sarah, Kattenbelt, Chiel (eds.) *Mapping intermediality in performance*. Amsterdam: Amsterdam University Press, 2010.

followed by a discussion of interactivity. The notion of the posthuman in philosophy and in the discourse in theatre and performance is presented in section 5.5.

5.1 Performance as (technical) skills

After the journey we have taken through these four chapters so far, it is possible to observe that concepts of performance skills and capacities might need to be rethought further if they are going to be useful in rethinking potential relations *between* human and technological performing elements. That is, between two different kinds of efficacies. Foster's approach to performance and skill is useful because it allows us to open up the notion of performance to non-human entities, even while this falls beyond the scope of Foster's own project.

Foster's starting point in 'Choreographies of Gender' (1998) is her critique of the use of "performance" as a term in recent theory that draws from a critical approach to gender as performance.[3] She pays particular attention to the insights and impact of Judith Butler's *Gender Trouble* (1990). Butler's acclaimed study draws on the theories of philosopher of language J.L Austin, to describe sets of ultimately creative social processes, considered normative, that constitutes the subject as gendered. Butler argues that our participation in gendered performativity is ensured by various discourses, such as those learned from our parents, institutional organizations and the media. Accordingly, she understands performativity as "cultural ritual, as the reiteration of social norms."[4] Here in Butler performativity is a *repetition* of, to a certain extent, externally scripted acts, that are naturalized or normalized as culture, and in which we unconsciously partake (and which in turn determine our gendered identity).

For Foster, there are several problems that arise from Butler's theory of performance, which has had strong theoretical appeal in cultural analytic studies considering the relationship between culture and performance. For Foster, Butler largely neglects corporeal enunciation and restricts speech acts to the domain of linguistics in order to explain gender, as her example, as performance. Also, she does not explore action (opposed to speech) as a kind of *accomplishment* of the body (as opposed to a cultural submission or petition). Furthermore, we can understand the relevance of Foster's critique for my own work when we can consider that although Butler emphasizes that performativity is composed of series or multiples of acts, based on the reiterations of a set

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[3] Foster, Leigh, Susan. 'Choreographies of Gender'. *Signs,* vol. 24, no. 1 (Autumn 1998): pp. 1-33.

[4] Butler, Judith. (2000), 'Restaging the universal', in *Contingency, Hegemony, Universality: Contemporary Dialogues on the Left*, by Judith Butler, Ernesto Laclau and Slavoj Zizek, London, Verso: p. 29.

of social norms, for Foster, Butler's focus on the repetition of acts overlooks differences and relationality between them. Finally, Butler's understanding of gender as performance neglects the domain of the performing arts in which verbal *and* non-verbal actions are (in most cases) consciously created and staged, rather than unconsciously reiterated on the basis of a set of rules and conventions. Paradoxically, I suggest, Foster's awareness of this disconnect does not push dance theory and (cultural but inartistic) theories of performance and performativity further apart, but instead points out what dance actually can offer to such theories in general.

To fill the gap in which Butler's approach to performance falls short, Foster develops a revised methodological way of thinking about performance through the example of dance. For Foster, dance is useful to rethink the notion of performance (of gender) for two reasons. It entails verbal and non-verbal bodily acts and it grants a clear function for the performer as the one who actualizes encoded behavior through idiosyncratic skills. The way in which Foster sheds light on performativity, inside of dance arts, to make these claims, generates numerous theoretical insights that I consider hugely productive to apply to this chapter of the thesis on staged digital dance choreographies as interperformace.

Key to Foster's methodology is that she makes a distinction between performance and choreography as two separate but interrelated concepts or components of dance works that have remained separable throughout dance history, but that have each also changed conceptually over the course of that history.[5] Choreography, she understands as the historically developed social and cultural codes and conventions of behavior (drawn from artistic and extra-artistic realms) through which meaning is constructed in dance. Inside of dance, choreography furthermore implies the creation of two kinds of 'human' relations: the relations of body parts one to other and relations among different bodies. Performance, on the other hand, refers as a concept to the idiosyncratic nature of interpretation - whether by dancer or audience - of bodily and social values. The individual embodied executions of codes and movement patterns that are developed in, and prescribed by, the choreography are elements of performance, in her model. In other words, Foster writes, choreography is the score and performance is the execution of that score based on the dancer's skills. This is in order to be able to "translate the choreography into performance by learning the movement, its timing, and its disposition for body in space as meticulously as it is required by the aesthetic demands of the situation."[6]

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[5] I have explained the changing meaning of the term choreography in chapter one. See footnote 25.

[6] Foster, 1998: p. 9.

As we can see, through this line of thinking, the distinction between choreography and performance remains, even if the dancer contributes to the development of the choreography. And indeed this is often the case: dancers for example in many companies and director-performer relationships are given the liberty to slightly modify the choreography so as to adapt the movements of the choreography to the capacity of his or her own physicality. At other times also, the dancer may develop certain movement material on the basis of various directions from the choreographer. Yet for Foster, even in examples such as these, choreography remains the guiding score for action whilst performance refers to the execution of that score. Following the logic of Foster, it can be concluded that the task of the dancer is to execute the score of the choreography with as much aesthetic efficacy at the level of performance as possible, by means of slight adjustments in his or her physicality. Such an awareness of aesthetic efficacy, so key to the analysis of the performance of the dancer, foregrounds theoretical attention to skills, capacities, and agencies. But further than this, it also points to a striking resemblance between the task of the dancer and the task of technology in terms of performance in staged digital dance.

Recall that in the previous chapter, I have defined technological performance as the execution of a given task in a specific context, which is evaluated on the basis of its effectiveness within that context. In the context of staged digital dance, I have shown that the effectiveness of technological performance within such projects can be evaluated on the basis of the execution of the technology's role in the choreography, meaning the actualization of certain features in dance composition: energy, time, and space. Reading Foster's theoretically productive distinction between choreography and performance alongside the frameworks I have developed in chapter four, we can notice common theoretical ground between human *and* technology within these notions of performance. Specifically, an effectively staged digital dance comes together in different but parallel concepts of human and technological execution; or in other words, the presentation of the score of the choreography as *effectively* as possible. To theorize digital dance in terms of this notion of effective execution requires close (and theoretically rewarding) attention to the concepts of skill and agential power, in so far as these inform human and technological performance. This brings out totally new insights for our understanding of performance in staged digital dance as an actualization of what the human and the interactive system differently and together contribute to the choreography. It also points to a shift in the understanding of dance: from a human-centered art form to a posthuman artistic practice in which the human and non-human "share" the stage.

We might ask at this point: What kind of skills does a human performer need to develop to be a professional performer? Philosopher Stan Godlovitch's (1998) description of skills within the context of music provides a useful way to really engage with what is meant by this question (and in the presence of the technological). Godlovitch considers two aspects of 'skill' that are necessary for a human performer to bring to an effective or successful performance. The first aspect of skill is technical, but the other imperative skill is interpretive. According to Godlovitch:

> Whereas technical skills involve causing objectively determinable and (often) quantitatively measurable acoustic effects (...) interpretive skills involve aesthetic effects for which no obvious quantitative measure exists, and typically emphasize "expression, the details of which are often matters of irresolvable dispute.[7]

Godlovitch's distinction between technical and interpretive skills can be translated easily enough to dance.[8] I suggest that technical skills can be translated as dance technique, that is, the physical training of muscles and the coordination of body parts according to the norms and values of a certain form of dance (i.e., classical ballet technique, modern dance technique, partner-work technique). Interpretive skills on the other hand, can be translated as the artistic or expressive qualities that a dancer may articulate whilst actualizing dance movement through the principles of choreography, such as energy, time, and space.[9] My use of this concept of skills as described by Godlovitch points to a difference between human and technological performance. Whereas human

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[7] Godlovitch, Stan. *Musical performance: a philosophical study*. London: Routledge, 1998: p. 54. Godlovitch's distinction between technical and artistic skills can also be illustrated via figure skating championships in which the performance of the skater is evaluated separately on the basis of technical and artistic skills.

[8] It should be noted that, although a distinction of technical and artistic skills is useful for the sake of analysis, quite often, technical and artistic skills overlap.

[9] In chapter four I have described these elements via Lois Ellfeldt's study. To recapitulate, in *A Primer for Choreographers: An Introduction to Modern Dance Composition* (1967, 1974), Ellfeldt describes energy, time, and space as the three major elements with which a choreographer engages during the composition of the choreography.

performance entails technical *and* artistic ("aesthetic") skills and capacities, technological performance entails only technical "skill," or capacity.[10]

Let us take a scene from *16[R]evolutions* (2006), created by the New York based company Troika Ranch, to illustrate the operation of skills and capacities within human and technological performance. As I have mentioned earlier in the introduction of this thesis, the imagery created by the interactive system in this work plays out as one element within a larger staged narrative about socialization and domesticity, exploring the differences between our intellectual and animal or primitive selves. The scene that I want to consider here takes place towards the end of the choreography and can be seen as the dramaturgical climax of this piece, in which the performative and aesthetic effects of the interactive system feature prominently. At this moment, a female dancer (Lucia Wong) and two male dancers are on the stage, sitting on chairs at a table. One of the male dancers strips off the woman's clothing and quite literally makes her more 'accessible' to a strongly reciprocal interactive relationship with the motion-tracking technology.[11]This is the first time in this scene that a dancer has extracted themselves from the human "company" on stage (which is centered often around the table) to engage directly with the live 'feed' of interactive light data. The dancer at this point appears to reciprocally feed all of her gestures, the full range of her movements, into the interactive system, in a space apart from the other dancers and also furthest from the audience, towards the back of the stage.

In this climactic scene, both the human choreographed body and the technological system are acting at the edge of their limits and capacities. The female dancer taps in to the border of the system, revealing its potential by making clear its limits of its constraints. Individual gestures are also worth noting. Initially she executes a set of movements, engaging her legs, arms, and then upper torso, which can be described as smooth in

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[10] It can be argued that technology cannot possess technical skills because skills involve a level of conscious reflection in order to learn and develop a certain skill. It is true that the capacities demonstrated by interactive technology in staged digital dance are not learned by the system itself but are developed and programmed by humans. Nevertheless, in staged digital dance what counts for the perception of the choreography are aesthetic effects, which are produced by technological and human performance. Since the aesthetics of the projected images are created in real-time by the performance of the interactive system, I argue that it matters little whether or not skill is a learned process or in-built feature. Moreover, the requirement of learning a skill is problematized by technologies equipped with Artificial Intelligence that are able to learn from external stimuli and adjust their behavior accordingly, such as the acclaimed chatbot Jeremiah, performing in Susan Broadhurst's *Blue Bloodshot Flowers* (2001), which I explain in the conclusion of this thesis.

[11] In general, motion-tracking works best when the dancers wear neutral colored clothes that are close to skin color. Clothing makes the dancer less susceptible to the video capture, and therefore the removal of the dancer's yellow colored vest is both dramatic and technical in this instance.

terms of energy, but she also changes the accent[12] of her movements from subtle to sharp gestures. She primarily performs on the same point in space and the height of her posture in space changes from being hunched down low, to eventually shift in to an upright body position, whilst she increases and decreases the size of her movements [Fig. 5.1 and 5.2]. The second female dancer gradually joins the first dancer in a disorderly duet.

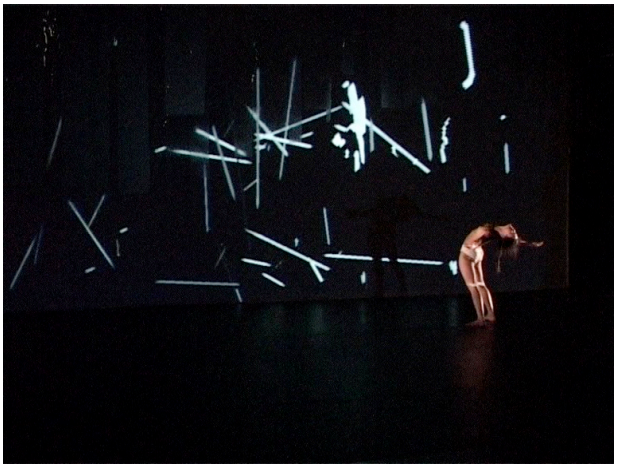

Fig. 5.1 and 5.2 — *16 [R]evolutions* (2006)

The technological system responds to these movements by producing a moving line of light on the backdrop that changes color- from blue to red and to white - and which gradually become thicker, developing into layers. The line projects firstly from a position high up on the backdrop, and gradually moves downward to position itself more or less at the same level in the space as the human dancer. From this point, the colored line moves in to a much more close alignment with the dancer (in real-time) as she changes her location across the stage. The line also changes its height in space, moving higher and lower, with the human dancer's movements. The energy of movement executed by the line can also be described as smooth and flowing. Moreover, the line fades as the dancer stops moving and reappears as the dancer reinitiates action. As the second dancer enters, the light starts engaging and responding to both dancers simultaneously. The backdrop gradually is filled up with these kind of reciprocal marked lines, which creates the effect of storing, archiving, or showcasing all of these *different* layers of the dancer's series' of movements in to one plane. The thick lines of gestures, in white, red (higher) and blue (at the top) – serve in this way as a kind of live 'store' of the recent human score, that is also quite emotive due to the intense color. Then the system suddenly stops accumulating

[12] Movement accent should be understood as a jargon term, referring to the emphasis given to certain movements during their execution by the human dancer.

these live gestures – though not completely. The accumulation is much slower and less responsive in the background, putting the centre of focus back on to the two female dancers, who again take up a central role between the “filled” system and the two men sitting at the table – the dancers here are taking over again, essentially, from the inhuman (technological) performance. [Fig. 5.3]

Fig. 5.3 — *16 [R]evolutions* (2006)

How can we understand this scene through the notion of performance that I have just outlined for both human and technology? Here, the human technical capacities include the dancer’s trained physical strength, as well as coordination necessary to execute the type of movements required by the choreography. Of course, a level of artistic skills is also required to relate to these technical capacities. For instance, to some degree, the artistic skill of the dancer helps to determine the appropriate timing and different uses of energy applied to the physical and technical changes in movement, direction and tempo. In this respect, the dancer cannot but help add some degree of interpretation. Nevertheless, such artistic decisions and freedoms on behalf of the dancer do not alter her main task, which is to execute the score of the choreography as it has been determined by the artistic choices of the choreographer. To this extent, while the dancer is equipped with aesthetic capacities that the technology does not have at all, from the perspective of technical skills, I argue

that the analysis of human and technological performance in many respects (but not all) traverses common theoretical and conceptual ground in choreographies that demand high technical skills from the dancer, such as in staged digital dance.[13] In such cases, quite often the human performer will make reduced use of his or her artistic skills, relying instead mainly on technical skills for the execution of the score of the choreography.

Concerning the technology, technical skills or capacity refers to the capacity to produce different types of visual images, the system's ability to react in real-time with visual imagery of different kinds, and the speed with which it can process its incoming data.[14] These are the intrinsic capacities of the interactive system, such as those of Eyecon and Isadora, which I have explained in chapter four in the section "quantitative performance". In that section, I explained what is distinct about the quantitative performance capacities of motion-tracking interactive systems, which stands them apart from other digital technologies used in interactive dance (such as telematics). Moreover, I outlined there that the performance capacities or skills of the interactive systems used in digital dance have evolved since their initial application in the early staged digital dance works of the mid-1990s. Relying on first-generation digital dance practitioner-authors' arguments, I showed how the advances in technical skills of the interactive system has led to "more subtle" dialogic processes between the input of the human dance and the output of the interactive system, perceived in the form of visual abstract imagery projected on a backdrop/screen and at times on the body of the human dancers. Pulling together the above close reading of *16 [R]evolutions* with this theoretical toolkit, it is possible, unconventionally, to observe that the notion of performance as skill or capacity can be applied to the actions taken by both human and technology in *16 [R]evolutions*, alongside the other case studies examined in this thesis. Such an application involves also a destabilization of the hierarchical positioning of human and technology understood within conventional hierarchies of perceptual importance in dance, and, points to the undoing of a human-centered understanding in staged digital dance.

It is from this point that I propose to examine the relationship between human and technological performance in staged digital dance through the notion of interperformance.

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[13] I would like to emphasize that I am not making a universal claim on choreographic practices as these tend to vary. What I refer to here are choreographies in which the dancer needs to perform quite a high level of technical skills for the execution of the choreographic score as determined by the choreographer.

[14] From this perspective human and technological performance show one more similarity. The comprehension and appreciation of technical skills of human and technological performance requires a certain amount of literacy from the spectator: movement literacy concerning the former and technical literacy concerning the latter.

Interperformance, is not a homogenizing term; it respects ontological differences between human and non-human performance. On the one hand, interperformance schematically reduces differences between human and technology by resort to the analysis of technical skills and capacities, but it should be underlined that human and technological performance are not the same. Indeed, no physical dancer can project light, turn into particles, or create digital colorful patterns by means of their physical capacities. No technological system possesses the physical texture and qualities of a breathing and sweating human body. In other respects, the staging of these different qualities offered by human and technological performance and the assembly of various performance qualities within staged digital dance can be perceived as an enrichment for this art form resulting from the leveled incorporation of non-human performances in dance. In this sense, the drawing of parallels between human and technological performance through the framework of interperformance is beneficial because it problematizes the human-centered understanding of the performer concept, and acknowledges the presence of non-human performers in dance.

5.2 Machinic performers

The work of performance scholar Philip Auslander captures in a different way my argument on these matters of skills and capacities as they apply to human and technological performance, especially in his problematization of the humanist notion of performer – of what is permitted to be considered to perform. Rejecting ontological differences as the rationale to exclude technologies from the domain of performance, in 'At the Listening Post, or, do machines perform?' Auslander argues that even if machines are assumed to be incapable of interpretation, this limitation in itself does not distinguish machines decisively from human performers.[15] He argues that the history of each of the performing arts consists of so many examples and ways in which human performers have been asked to exercise their technical skills but not their interpretive skills. In such cases, Auslander reports, human performers are employed primarily for their technical skills and are asked to transfer their agency elsewhere. In dance of course, the performer's agency would most often be transferred to the choreographer. But this means also, Auslander argues, that such supposed "performer" roles might be taken on just as easily (conceptually speaking) by humans who are not using their interpretive skills as by machines that simply lack artistic skills but possess technical skills.

In 'Humanoid Boogie. Reflections on Robotic Performance' (2006), Auslander illustrates this argument via the Tiller Girls dance troupes.[16] The first Tiller Girls group, Auslander points out, was founded in the 1890s and in its aesthetic it carried Taylorist methods of labor and mass-production into the popular cultural realm. The Tiller Girls were highly trained and precise in terms of technical skills and were mostly known for their high-kicking routines with linked arms. Auslander underlines that the dancer girls not only performed movements accurately but they also looked identical and were matched very precisely in terms of height and weight. Of course, it is possible to argue that as soon as this is an aesthetic effect, there is an artistic performance and knowledge being shaped by such a purposively "technical" composition. Nevertheless, the Tiller Girls exemplify an exaggerated form of technological capacity within a supposedly human performance that can easily be compared with the discussion of machinic effectiveness of chapter four.

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[15] Auslander, Philip. 'At the Listening Post, or, do machines perform?' *International Journal of Performance Arts and Digital Media* (2005): vol. 1, pp. 5–10. [doi: 10.1386/padm.1.1.5/1]

[16] Auslander, Philip. 'Humanoid Boogie: Reflections on Robotic Performance', in Saltz, David, Krasner, David (eds.). *Staging Philosophy: Intersections of Theatre, Performance, and Philosophy.* Michigan: University of Michigan Press, 2006: pp. 87-103.

An additional and very useful perspective on the Tiller Girls, which interweaves labor, performance, and effectiveness is offered in the work of dance scholar Felicia McCarren (2003). According to McCarren, Tiller Girls formed part of an 'economy of gesture', which comes in to view in culture and society in the late nineteenth and early twentieth century and which captures and represents an industrial background in which, labor, performance, and physicality are being made sense of, assembled and scientifically examined for mass industry purposes. This concept of an 'economy of gesture' articulates the fact that human and technological/machinic performances were being schematized and reduced at this moment, in terms of energy expenditure, and furthermore that the performance of humans and machines, converging in industrial modernity, were being increasingly viewed together through the lens of productivity.

In his study *Human motor. Energy, Fatigue, and the origins of modernity* (1992), historian Anson Rabinbach gives a detailed account of this economic-cultural mode of thinking that dominated the nineteenth century. He writes that the metaphor of "the human motor" strongly dominated the era between the nineteenth century and the end of World War 2 as a result of the discovery of automation, while (paradoxically) promising to liberate work from materiality and physicality (muscles, nerves, energy). The human motor then is a metaphor of work and energy that provided nineteenth century thinkers with a new scientific and cultural framework. Through this metaphor, scientists and social reformers could articulate materialism, nature, industry, and human activity into a single, overarching concept: labor power. In Rabinbach's explanation:

> In the mental life of nineteenth century, work was at the centre not only of society but of the universe itself. The metaphor of the human motor united these developments into the single idea that the working body is a proactive force capable of transforming universal natural energy into mechanical work and integrating human organism into highly specialized and technical working processes.[17]

Hence, the human body and the industrial machine were both entities that converted energy into mechanical work, which "points to a striking similarity between physiology and technology."[18] A very important consequence of this, of relevance for the arguments of this chapter, is the association of notions of performance to human work in terms of labor power. As Rabinbach explains, since the human organism was considered as a productive machine, it could be stripped of all social and cultural relations and

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[17] Rabinbach, 1992: p. 289

[18] Rabinbach, 1992: p. 24.

reduced to “performance”, which could be measured in terms of energy and output. McCarren too underlines the association between performance and productivity:

> As the scientific term *puissance*—power or force—became associated with the force or energy mobilized in labor power, it intersects with the term ‘performance’, used in engineering and mechanics to describe the technology. With a different resonance, and a different history, from *puissance,* the idea of ‘performance’ as measurable productivity becomes important in European work-science late in the nineteenth century and in the theories of productivism inspired by the application of thermodynamics to working bodies.[19]

In other words, humans are understood as efficient machines and performance is measured through productivity. As a result, human and technological performances intersect at this moment, as the evaluation of performance becomes viewed through frameworks of quantifiable efficiency.

It is unconventional, counter-intuitive, and indeed somewhat contentious to conceptualize dance through concepts of labor; but what this quote is doing is illustrating how human and technological performance may meet in situations where performance is seen as equivalent to physical labor and efficiency of effort. In dance, the connection between performance, physical labor, and efficiency of effort can be applied to choreographies that require high technical skills from the human performer, such as in staged digital dance or classical ballet, which enables us to deconstruct the hierarchy between them. In chapter three, I have already described how the mechanistic principles in classical ballet were one of the reasons some dance artists began looking for other means of expression, which led to the development of modern dance. To recapitulate, evolving as a reaction to the restrictions of classical ballet but also as a reaction to the mechanization of dance by cinema, in free dance, the body was considered an “instrument of redemption from growing mechanization.”[20] Hence, the idea that human and machinic performance have conceptual affinity counter-balances the received modernist notion of the authenticity of the human dancer within contemporary and especially digital dance theory. This enables us to shift the emphasis from the human performer to non-human performing elements in staged digital dance. In addition, it enables me to apply the notion of effectiveness, which I described as a quality of technological performance in chapter four, to human performance. There, relying on the work of Jon McKenzie, I have described

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[19] McCarren, Felicia. *Dancing Machines. Choreographies of the age of mechanical reproduction*. Stanford: Stanford University Press, 2003: p. 17.

[20] Evert, 2002: pp. 34-35

the challenge of cultural performance in terms of “efficacy” and the challenge of technological performance in terms of “effectiveness.” Now, we can see that the qualities used to describe and distinguish cultural and technological performance may not be so clear-cut after all, which results from staged digital dance’s problematization of the humanist assumptions of the notion of performance.

What controversially challenges the humanist foundations of modern dance here, in Auslander, is the acknowledgement that the capacity to produce and reproduce certain results on call is not only a requirement for technological performance but it is an important condition expected from a human performer. In fact, Auslander (2006) argues that the capacity of the human dancer to produce and reproduce specific results on call *establishes* a strong measure of dancer skill:

> Since a performer who does something only once and cannot repeat it is not of much value in the traditional performing arts—or in most realms of human endeavor—the ability to “duplicate a result” is a measure of skill. We ask of human performers the same reliability that we demand from machines and measure their skills in those terms.[21]

For Auslander, the skill to reproduce a result on call in human performance undermines the cultural value attached to conventionally romanticized artistic skills - such as individuality and uniqueness - which are most often considered to be distinctive features of human performance within the performing arts. In this respect, the argument for the analysis of digital dance that has been formed around the perceived “compatibility” of interactive technologies with the liveliness of human performers (which I have explained in chapter three) only reinforces Auslander’s recognition of the strong role of cultural habits and values in assessing the apparent authenticity of human performers.

As you will recall, in chapter three, Mark Coniglio and David Saltz argued that interactive technologies are compatible with live performance because in contrast to recording technologies, which produce and reproduce the same content each time, interactive technologies generate ‘live’ unrecorded content during the time of performance itself. As we can see, this kind of logic, valorizing liveness, tends to confer or re-cognize human qualities in the technological system – arguably a sort of human-centric projection of authenticity in itself. In contrast, Auslander deconstructs the authenticity of the human performer, and argues that much of the actual performing in conventional, Western genres of the performing arts is highly routine and automatized, a fact which is overlooked in favor of the individualistic and interpretive views of performance. Here, Auslander’s revaluation

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[21] Auslander, 2006: p. 93

of the concept of performer resembles the arguments of performance scholar Michael Kirby, which I have addressed in chapter two, who has shown how the perceptual habits and expectations of Western theatrical presentation are influenced by the cultural institution of theatre, its power and cultural connotations, and on the modern perception of acting in particular.[22] In his acclaimed essay 'On Acting and Not Acting' (1972), Kirby concludes that the placement of any human onstage automatically transforms him or her into an actor, aided by props and costumes, which enhance the credibility of the specific role, even though the person onstage may just as well be standing there as a figurant.

This is a very interesting inversion of human-centered perspectives within performance theory. Why indeed is our perception so focused on singling out the human onstage? And why are we so keen on preserving the so-called humane qualities of being a performer, such as authenticity and originality? Auslander proposes an interesting answer to these questions: he argues that the cultural value given to interpretive skills within the performing arts may in fact be a defense mechanism against larger societal fears of becoming machinic, or becoming automata.[23] The fear of becoming automata is perhaps best explained by Jane Goodall in 'Transferred Agencies: Performance and the Fear of Automatism' (1997).

Goodall argues that the fear of losing agency has taken many diverse forms and expressions in the history of culture, all of which "vary according to the discourses in which they are reflected."[24] She gives the example of the fear being captured in the technological determinist conception of technology (perceived to limit human creativity and variation); but also for example in fairy stories about evil enchanters (such as in classical ballet). Capturing many other instances of these externalizations, in performance practices, of anxiety surrounding the risk of the loss of human agency, Goodall traces these anxieties to the late nineteenth century, when electrical technologies began to link bodies and machines in continuous circuits of activity. According to Goodall, "as the automatic machine became increasingly suggestive of agency, any appearance of the automatic in human behavior conversely seemed to suggest loss of agency."[25] She concludes that "the performer and the machine have some strange affinity that draws out cultural anxieties

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[22] Kirby, 1972: pp. 3-15.

[23] Auslander, 2006: p. 93.

[24] Goodall, Jane. 'Transferred Agencies: Performance and the Fear of Automatism'. *Theatre Journal*, vol. 49,no. 4 (1997): p. 441

[25] Goodall, 1997: p. 441

about becoming automatic."[26]In the previous chapter, I have shown a contemporary example of such anxiety in the criticism of Martina Leeker, who argues that choreographies created with real-time interactive systems reduce the body to electric circuits, which in her view leads to a loss of the personality of the human dancer as s/he becomes part of the technical system. In chapter three, I cited the early origins of this anxiety towards automatism within the formative years of modern dance, when 'free dance' was being established in the late nineteenth century as a counter-movement to balance this anxiety. Auslander and Goodall's work helps us to contextualize these anxieties inside of dance history and discourse, and to not only recognize but make room for the very conceptual tension between the human and technological that contribute to the interperformance paradigm.

The articulation of interperformance from the perspective of technical skills in particular enables us to undo these kinds of primary/secondary hierarchies between human and technology in staged digital dance. Interperformance problematizes the notion of performer because it draws attention to what human and technology both do, differently, and how they interact within the choreography in terms of technical capacities. In this sense, interperformance requires the application of the notion of performer to non-human entities because their actions also contribute to the realization of the choreography. Hence, interperformance helps to illustrate certain unforeseen similarities between humans and technology in terms of agency, and signals a shift towards the domain of the posthuman. To further undo the hierarchical ordering between human and technology, in the next section, I consider another line of connection between human and technological performance in terms of agency.

[26] Goodall, 1997: p. 442

5.3 Human and non-human agencies

A comparison between human and non-human agency turns out to be very useful in terms of thinking about interperformance in the wake of staged digital dance's destabilization of the hierarchy of perceptual importance between human and technology in digital dance. Agency, most usually figured in terms of consciousness, intention, and reflection, frequently figures in analytical discussions of human performance. It is important to spend some time with this discourse, which most often takes as its starting point the (liberal) humanist subject,[27] and which, I argue, even in the context of dynamic human-technology interactions, tends to anxiously figure technology as an overpowering, alienating other.

In staged digital dance, I suggest that agency captures some additional human capacity on behalf of the performer to contribute to choreographed performance. Auslander, for example, reminds us that most traditional definitions of performance place their "emphasis on the agency of the performer as one who does not merely execute the instructions contained in a text but who interprets the text and expresses something of his or her own through the act of interpretation."[28] Dancer and researcher Susan Kozel (2007), writes that performance entails a "reflective intentionality on the part of the performer herself, a decision to see/feel/hear herself as performing."[29] Godlovitch (2005) considers intention as an asset possessed by humans and describes it as "action undertaken expressly in order to affect someone else who has chosen to be affected."[30] For Godlovitch, such intentions are integral to performance because they allow the performer to influence the kinesthetic reactions of the spectator. It is through these means, Godlovitch argues, that musical performance constructs a communication between performer and audience. Performance scholar Marvin Carlson (2004) writes that the performer needs to be conscious of the fact that s/he is putting on a role for someone. In fact, for Carlson, during performance, the performer takes on a double consciousness "according to which the actual execution of an action is placed in the mental comparison

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[27] The liberal humanist values are considered in Hayles (1999) as a "coherent, rational-self, the right of that self to autonomy and freedom, and a good sense of agency linked with a belief in enlightened self-interest." Hayles, Katherine. *How we became posthuman: virtual bodies in cybernetics, literature, and informatics.* Chicago: University of Chicago Press, 1999: pp. 85-86.

[28] Auslander, 2005: p. 6.

[29] Kozel, 2007: p. 69

[30] Godlovitch, 1998: p. 42

with a potential, an ideal, or a remembered original model of an action."[31] The agency of Carlson's performer described in this work is of course figured in terms of the rational liberal subject position giving little consideration to the actual acts and impacts of other non-human elements.

I would like to introduce the recently developed Actor-Network-Theory of sociologist Bruno Latour in order to present an alternative, non-hierarchical understanding of agency that makes room for technological effects.[32] Actor-Network Theory challenges agency as understood by the rational liberal subject position because it considers the social as a network of heterogeneous participants, called actors, but which need not be human. An actor is instead any independent entity that has the capacity to 'make things happen' within the network. Actors do not need to possess the qualities associated with humanness; they need not be conscious of what happens, or to become reflexive about a certain action. Hence, an actor is not defined on the basis of their 'humanness'. Rather, actors are defined on the basis of what they do, their capacity for interaction, and how their actions cause changes within the network.

The translation of this recent conceptualization of agency from Actor-Network-Theory to staged digital dance helps to further deconstruct the hierarchy of perceptual importance towards other ways of thinking the performance of technology and the human together, for three reasons. First, it makes it possible to apply the notion of agency to objects since any component (human, animal, object) can function as an actor as long as their actions create changes within the network. Translating Actor-Network Theory to staged digital dance, it is possible to argue that the actions taken by human and technological entities contribute to the realization and actualization of the choreography.[33] As I have described in the previous chapter, the capacities and limitations of the interactive technological system both inspire and constrain the movements of the dancer, who adjusts his or her movements accordingly. In turn, the qualities of the visual images projected by the interactive system during the creation of the work are programmed to correspond to

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[31] Carlson, Marvin. *Performance. A critical introduction.* 2nd ed. New York: Routledge, 2004: p. 5.
It should be underlined for Carlson the spectator, too, should be conscious of the fact that the performer is putting on a role. In other words, the audience should recognize and validate what they see onstage as performance.

[32] Latour, Bruno. *Reassembling the Social. An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press, 2005**.** Originally formulated by Bruno Latour, Michel Callon, and John Law, Actor-Network-Theory challenges what sociologist Karen Cerulo (2009) describes as the human-only tradition in sociology. This tradition, according to Cerulo, excludes non-humans from social interaction on the basis of five qualities, which non-humans lack: consciousness, intention, self-identity, affect, and language.

[33] Taking this argument one step further, it is also possible to consider the actualization of the choreography as the operation of a network described within Actor-Network-Theory.

the movements executed by the human performer. Hence, the technical system influences the creativity and responses of the movements of the human dancer; the aesthetics of the choreography are partially inscribed with the agential power of the interactive system. In this respect, Actor-Network-Theory grants agency to technology in staged digital dance. Indeed, if we are to think the consequences of this line of thinking, with a backward glance, and beyond the scope of this thesis, it would be possible to recognize many kinds of non-human actors within dance history, a history otherwise considered to be mostly object-less.

It is also worth bearing in mind that Actor-Network-Theory understands the "collective" as made out of heterogeneous actors that possess various *degrees* of agencies.[34] It is in this respect that this theory goes beyond the boundaries of human agency to address other, including non-human agencies inside staged digital dance. Further, the degree of agential power and power relationships between different actors are not fixed but are reconfigured each time anew on the basis of the specific situation in which an action takes place. With this shift, we have the recognition that human and technology both can possess potentially low or high agential status - or in other words, agency is unpredictably co-determined. The interactive system has an unpredictable, and only partial agency because it is dependent on the movements of the physical dancer in order to perform at technically translating the dancer's physical movements into abstract visual imagery in real-time. The dancer has an unpredictable, and only partial agential status because his or her task is to execute the score of the choreography as efficiently as possible. Therefore, s/he, to a great extent, is dependent on the interpretive choices made by the choreographer, regardless even of whether or not technological systems have been incorporated into the choreography. Human-centered understandings of dance tend to downplay this fact, to the detriment of a theoretical encounter with dance-making.

A very obvious but not often discussed fact of dance production that makes another case for the need for this concept of interperformance is the way in which the agency of dancers is often delegated outwards, beyond the dancing body. Delegated agency means

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[34] For Latour Actor-Network-Theory refers to a movement, a transformation; it is "an association between entities which are in no way recognizable as being social in the ordinary manner, *except* during the brief moment when they are shuffled together." (p.65) This insight makes possible to understand the importance of the way the interactive system is integrated in the artistic practice of dance since an interactive system used within a different context will be evaluated differently than in staged digital dance. For example, sensors placed at the entrance of a house at night that detect external stimuli and react by turning on a light have the function of night illumination and they function as a safety device against trespassers in one's property. Hence, the way in which the output of the technology is integrated in the choreography and the way it interacts with the human performer transforms the interactive system into an artistic device and cultural tool of analysis.

that the dancing body can often be figured in a decent red way, they are not the producer but instead a contributor to the larger creative 'work' of the choreography as a whole. A closer look at dancers who have worked with a distinguished choreographer for a long time period helps me to illustrate the dancer's delegation of his or her agency also to the choreographer.

Delegation happens explicitly and implicitly, and at numerous levels of production. The most common example is that the choreographer expects the dancer to take over his or her movement style, and to recreate it within the borders of his or her physicality. This is the way that dancers working with George Balanchine or Ohad Naharin are expected to cultivate performances inside of others' choreographies. From this viewpoint, the supposedly low agential power of the dancer in staged digital dance (supposedly submissive to or constrained by overpowering technologies), combined with the dancers' assimilation of a specific choreographer's movement style, complicates the notion that agency is only ever reduced in dancer's negotiations with non-human components. Indeed, agency may be an over-simplified and celebrated concept when it comes to this perception of restriction versus human agency within a particular performance of staged digital dance.

A third reason why Actor-Network-Theory is useful in breaking down bias in the hierarchy of perceptual importance between human and technology in dance, is because it requires us to examine the relations between different agencies that take part in an action or sequence. Latour understands action as a node created between different set of agents. For Latour, action "is not done under the full control of consciousness; action should rather be felt as a node, a knot, and a conglomerate of many surprising sets of agencies that have to be slowly disentangled."[35] My disentanglement of the relations between human and technological agent inspired by this, via the concept of interperformance, helps to acknowledge choreography as a collection of human and technological performances, which emerge out of the whole set of relations between these two performing elements onstage. By interlacing the agential power of human and technology, interperformance confronts the dominant understanding of the role of technology as a supporting device, and figures it instead as a serious player - in relations. Finally, the concept underlines the fact that staged digital dance needs to be understood within a posthuman approach to the art form of dance, rather than within very humanistic perspectives.

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[35] Latour, 2005: p. 44

To sum up, this articulation of agency, in interperformance, via Actor-Network-Theory demonstrates how the hierarchical understanding between human and technological performance is capable of being radically and unpredictably realigned in digital dance. My own adaptation of Actor-Network-Theory through the concept of interperformance also clearly confronts and makes sense of the new focus upon (and anxieties around) the actual set of relations between human and technological agencies in the first generation of digital dance practice and theory. Developing this perspective further, I argue that interperformance is also useful in theory as an alternative means of thinking about "interactivity," a concept which has quite standardly been applied to, and conceived within, this emergent cultural practice of staged digital dance.

5.4 Replacing interactivity with interperformance

It is unconventional that I have come this far in to a thesis on digital dance and paid so little attention to interactivity, but there are many reasons for this avoidance. In the previous section, I have outlined the concept of interperformance which I suggest as a preferred analytical framework over "interactivity", otherwise more familiar to scholars of new media theory, human-computer communication, and new media art and so on. While different related disciplines like these understand interactivity in slightly different ways, generally speaking, the concept of interactivity tends to denote a communication process between at least two entities.[36] Whether this process involves human-to-computer or human-to-human communication depends on the context in which interactivity takes place. Nevertheless, for cases that entail human-to-computer interaction, most theories of interactivity take human agency as the focal point of theorization, and in this sense tend not to attend to the agency of the technology as I have done in the previous section. Some contemporary performance theorists do draw on theories of interactivity in their work, so it is worth emphasizing the difference of my own approach in this thesis by comparison.

In *Digital Performance* (2007) Steve Dixon's treatment of interactivity in his historical overview of new media in theatre, dance, performance art, and installation, comes closest to being applicable, in an overarching way, to the argument that I am fine-tuning around staged digital dance practices in this thesis. Since digital dance is a sub-genre of digital performance, the schema of different models that Dixon sets up in this text to address interactivity across digital performance should also cover individual digital dance practices. However, a detailed look at this model, despite its useful taxonomic arrangement of practices, shows us that this is not necessarily the case.

In his model, Dixon offers four different categories of interactivity and illustrates how each category operates in the context of specific and numerous artwork examples. The four categories furthermore are related in a hierarchical order, which Dixon suggests move consecutively from "less" interactivity to greater degrees. For Dixon, "more" interactivity is

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[36] For an overview of the history of interactivity in relation to new media art see Dinkla, Soke and Morse, Margaret. 'The Poetics of Interactivity' in: Malloy, Judith. *Women, Art and Technology*. Massachusetts: MIT Press, 2003: pp. 2-33, Lovejoy, Margot. *Digital Currents. Art in the Electronic Age*. New York: Routledge, 2004. For discussion of interactivity in new media theory see Manovich, Lev. *Language of New Media*. Cambridge: MIT Press, 2001, Zizek Slavoj, Zizek, Slavoj. 'The interpassive subject'. http://www.egs.edu/faculty/zizek/zizek-the-interpassive-subject.htm, Murtaugh, Michael. 'Interaction' in: Fuller, Matthew. *Software Studies. A lexicon.* Massachusetts: The MIT Press, 2008: pp.143-149, Jones, Steve. *Encyclopedia of New Media*. Chicago: Sage Publications, 2003. For discussion of interactivity within politics, see Barry, Andrew. *Political Machines. Governing a technological society*. London: Athlone Press, 2001.

achieved when most agency is granted to the interactor [37] and the artwork is open to change in its content. Furthermore, he conceives of this hierarchical arrangement using three criteria, which he labels as the degree of the openness of the system, the degree of agency of the interactor (the human participant who engages with the technical system), and the degree of change in the content of the artwork.

The openness of the system refers to whether the technical settings of an interactive system are flexible (meaning changeable) or restrictive (meaning showing little changeability) during the engagement between the interactor and the content of the artistic work. The second criterion concerns the degree of agency of the interactor. That is, whether the technical system grants a large or limited amount of freedom to the human agent in making decisions within the interactive system. The last category, degree of change in the content of the artwork, is a follow-up of the first two categories. It is concerned with whether the interactor's choices cause a significant change in the content of the artwork in comparison to the artwork's initial stage envisioned by the artist. Appendix 4 presents an overview of the characteristics of Dixon's model of interactivity for summary purposes.

The hierarchical ordering in Dixon's categories and the criteria to evaluate interactivity in fact situate human agency - yet again - at the centre in Dixon's model. To illustrate this, I will elaborate on the particular typology of interactive art that Dixon labels "participation" which is relevant because Dixon locates staged digital dance created with first-generation interactive system within this typology. In "participation" type interactive works, Dixon suggests participants help to bring the environment's sensory features to "life" by means of their physical engagement with the artwork rather than clicking on some buttons. In other words, he suggests, interactive works that enable "participation" require the inclusion of more than one body part than for example just the hand or digits.[38] Dixon curiously locates "participation" on the lower end of a continuum of art interactivity, arguing that it leads to "less" interactivity because human agency in such works is restricted in

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[37] By interactor I mean the human participant who interacts with the artwork.

[38] Other examples, which Dixon describes to be representative of this category are: interactive cinema, live performances, and installations based on motion-tracking technology, such as Krueger's early work, *Metaplay* (1970). In this respect, the inclusion of more body parts in "participation" has affinity to what Kerstin Evert describes as "whole-body interface", which I have described in chapter three. To recapitulate for Evert examples of digital dance created with first-generation interactive technologies in the 1990s allow the engagement of the entire body with the interactive system and are thus more compatible with dance than artworks created in the 1960s which were made with less sophisticated (and analogue) interactive technologies.

comparison to other types of interactive art works.[39] What is interesting here is that Dixon's categories of interactivity evaluate the level of interactivity on the basis of the empowerment offered to the human by the artwork, whilst at the same time overlooking the agency of technology within his model – or perhaps even figuring this as a negative element. Moreover, the examples with which Dixon illustrates "more" interactivity rely on artworks that facilitate human-to-human interactivity rather than human-to-technology encounters.

The very obvious value granted to human agency illustrated via Dixon's model underlines why interperformance as a concept is better suited to examine the different type of agencies involved in staged digital dance performances, as well as their interrelationship within the context of staged digital dance choreographies. Interperformance accentuates a plurality of agencies and it requires examining how different agencies influence each other by means of their actions. Moreover, within the context of staged digital dance, interperformance shows that human and technology both possess an unpredictably co-determined agential status. In this sense, interperformance brings human and technology closer together in terms of the recognition of their degrees of agency and enables us to co-relate these as two performing components, which leads to a destabilization of the hierarchy between their roles within the choreography. From this perspective, the reading of staged digital dance that I am presenting here, sees staged digital dance in terms of an interperformance: an art work is produced out of exchanges between and negotiations of both human and technological performances, which come together. To examine staged digital dance as interperformance through these perspectives of agency and skills enables us to better grasp the impact of that decentralization of the human performer in the choreography. There are numerous ways in which we can map the consequences of this line of thinking.

To begin with, in staged digital dance both human and technological performing components are part of a feedback system, but in contrast to Leeker's negative view of

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[39] Dixon locates "more" interactivity within the last two categories of his model, which are "conversation" and "collaboration." Conversation is positioned higher up in Dixon's hierarchy because it involves a "complex relationship or negotiation established between the user/audience and the work, which is reliant on such issues as trust, cooperation, and openness." (p. 585) Dixon illustrates conversation between single user and computer via Toni Dove's *Artificial Changelings* (1999) and he describes conversation between multiple users through Paul Sermon's *Telematic Dreaming* (1992). For Dixon, "collaboration" ranks highest on the scale of interactivity because here the participant becomes a co-author of the artwork, experience, or performance. Dixon writes that collaboration may take place between a single user and the computer, but most often, it occurs when multiple users work together to create new work by means of computer technologies. An example in this category is Stephen Wilson's *Ontario* (1990), a sound installation in a church square in which the interactions of passers-by with the installation determine the location from which the pre-recorded answers given to questions on religion may be heard.

this, both retain their distinction as separate performing entities. Secondly, both components "perform," as well as technically "actualize", the score of the choreography. Thirdly, the perceptual effects created by the actions, movements and interactions of human and technological performance - which include intensity, color, tempo, spatiality, responsivity, and so forth – generate kinesthetic responses in the spectator. As a result, the integration of the effects of technological performance within the choreography in staged digital dance presents a break from established perceptual habits concerning the coupling of the definition of performer with the human. Accordingly, this integration of the technological into the experience of such performances urges us to redefine or indeed let go of existing definitions of the "performer" or performing components of dance, so as to include non-human elements within this definition. This line of thinking inevitably leads to a posthuman approach.

Posthuman thought is not only relevant for staged digital dance but for many other art practices that integrate digital technologies in to the creation and perception of the artwork. In *Mapping Intermediality in Performance* (2010), performance scholar Robin Nelson suggests that we already find ourselves in a shifted stage of posthumanist, (what he calls) "intermedial reality," in which the impact of computer technologies plays out in our performance practices.[40] Here, "the digital doubling of bodies, virtual bodies, robots, and cyborgs, have entered the intermedial stage, if not to displace humans, then most assuredly to engage with them and question some of their most fundamental assumptions."[41] Nelson's observations of current forms of intermedial performance practices leads him to state that we might be "at the cusp of a paradigm shift into a new age where former paradigms are displaced" in theatre, dance, and performance.[42] Dixon writes that "there is no reason why we should recognize breathing living bodies to have greater solidity and authenticity than electronic humans similarly engaged in performative

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[40] I would like to underline that *intermediality* comes very close to the interests of this thesis in terms of examining the role of technology and the relationship between humans and non-humans in staged digital dance. In *Mapping intermediality in performance*, Robin Nelson (2010) describes intermediality a concept which respects "those co-relations between different media that result in a redefinition of the media that are influencing each other, which in turn leads to a fresh perception" (p. 19). Nevertheless, intermediality seems to concentrate on the features of the media involved in an intermedial process whereas I choose to examine the actions between human and technology in terms of performance. For this reason, I prefer to work with the concepts of performance and interperformance rather than intermediality in this thesis.

[41] Nelson, Robin. 'Prospective Mapping' in Bay-Cheng, Sarah, Kattenbelt, Chiel (eds.) *Mapping intermediality in performance*. Amsterdam: Amsterdam University Press, 2010: p. 23.

[42] Nelson, 2010: p. 22.

actions" from a posthuman perspective.[43] In Dixon's view, posthuman perspectives may offer alternatives for analyzing certain performance practices, which increasingly trouble the traditional notions of embodiment and presence.[44] What these quotes point to is the need for a less ontological and more variable understanding of *what* performs; this enables non-human performers to enter the stage and engage with humans in less hierarchical terms.

The changing understanding of performance, and perspectives of performance theory, that I am tracking in this thesis, in proximity to staged digital dance production and reception specifically, when viewed in this larger posthuman milieu, allows us to rethink human-technology relationships. The less hierarchical ordering between human and technology offered by interperformance corresponds with these larger transformations of contemporary thought, including especially the posthuman thinking and ethics of Katherine Hayles. Hayles' strongly articulated ethical positioning of the human vis-à-vis other organic and non-organic beings and things with which humans share the world is the level at which I would like to conclude the contributions of this thesis. Following the lines of thought that I have produced, I think it is possible to show not only show staged digital dance's connection with current theatre and performance practice but I also possible to demonstrate that dance, but especially staged digital dance, is in these works reflecting on changes taking place within culture and society at large.

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[43] Dixon, 2007: pp. 153-154.

[44] Dixon, 2007: pp. 11, 153.

5.5 Posthuman encounters in theatre, dance, and performance

Posthuman thinking tends to capture, as Katherine Hayles recognizes, certain conflicts of divisions in thinking about the future of human and technology relations in either greatly optimistic or pessimistic registers. Hayles' description of these two perspectives upon the posthuman are able to be easily associated with the similar vacillations between positive and negative discourses regarding the integration of technology in dance at the beginning of the twentieth century, which I have noted in detail in chapter three. In that chapter, I distinguished those that wanted to synthesize dance and technology and celebrate technology as the optimists, such as Oskar Schlemmer and Craig Gordon, from the pessimistic naturalism that resisted the machinization of the human body, such as in the work of Isadora Duncan. I emphasized also that this anxiously vacillating discourse is a kind of legacy, which haunts the discussions on the integration of technology in dance within the literature of digital dance, up to today. Drawing on the work of Hayles, it is possible to point to certain parallels between the discourse in dance and the broader philosophical discourse of the posthuman. That is, how (staged digital) dance reflects upon changes and discussion taking place in present society at large.

In *How We Became Posthuman* (1999) Hayles writes that becoming posthuman both invokes terror and excites pleasure.[45] The terror, for Hayles, is in the dual connotation of "post-." It seems to imply replacing the human, or at least thinking in the wake of it, suggesting that the days of humanity may be numbered. According to Hayles, this is a teleological and apocalyptic version of the posthuman, found within certain discourses of robotics and cybernetics, but also in literary studies and evolutionary biology. Such terror has its origins, Hayles explains, in the default position of the liberal humanist subject, for whom conscious agency is considered to be the essence of human identity, and whose ethics assumes that humans, not machines, must be in control of the world. During the rise of the machine age, this apocalyptic view, which figures the loss of conscious agency and man's lack of control over his environment, fears the contamination of human essence with mechanic alienness, and implies the inevitable end of humanity.[46] In chapter three I have

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[45] Hayles, Katherine. *How we became posthuman*: virtual bodies in cybernetics, literature, and informatics. Chicago: University of Chicago Press, 1999.

[46] Hayles, 1999: pp. 283-284.

described similar fears surrounding loss of agency in dance, especially in the rejection of the influences of machinization at the beginning of the twentieth century.

Rejecting such apocalyptic views, Hayles finds pleasure in the notion of the posthuman precisely because it requires "getting out of some of the old boxes and opening up new ways of thinking about what being human means."[47] Hayles's version of the posthuman has a predominately optimistic tone, in its thinking about human and non-human encounters. For Hayles, the posthuman requires letting go of the assumptions that equate the essence of the human with the liberal human subject especially its high valuation of conscious agency and control. Hayles's version of the posthuman discards such essentialist assumptions associated with the human. For Hayles, human subjectivity and the world was never 'ours' to begin with. Conscious agency has never been in control of the subject either; rather, subjectivity is an emergent process that takes place through complex interactions within an environment that includes both humans and non-human actors.[48] It is worth pointing out that in Hayles' posthumanist vision, what comes to an end is not humanity as such, but a certain understanding of humanity:

> Posthuman signals (…) the end of a certain conception of human, a conception that may have applied, at best, to that fraction of humanity who had the wealth, power, and leisure to conceptualize themselves as autonomous beings, exercising their will through individual agency and choice.[49]

Hayles here comes very close here to Latour's argument on multiple and distributed agencies, to the degree that we can recognize how our persistent resort to arguments about conscious agency in the context of dance tend to always frame technology as inferior to the human simply because technology lacks (or indeed even violates, in this perceived lack) consciousness, agency, and intention. Hayles' understanding of the posthuman supports a rather different framework that I have been capturing in this chapter - namely that staged digital dance's choreography is an emergent process, evolving from the interperformance between human and technological performances. Hence, a posthuman account helps re-think Western theatrical dance as an amalgam of human and non-human components. Such a reading of dance is also ethical because it acknowledges the crucial role played by non-humans in terms of the staging of choreography within the history of dance—at least since the establishment of Western theatrical dance in the

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[47] Hayles, 1999: p. 285.

[48] Hayles, 1999: p. 288.

[49] Hayles, 1999: p. 286.

nineteenth century. Indeed, also for Hayles, the posthuman offers an ethical way of thinking about the position of man and other life forms (biological or artificial) “with whom we share the planet and ourselves.”[50]

At the same time I am emphasizing in this conceptualization that staged digital dance does not portray a synthesis between human and technology, as for example is captured in the political and metaphorical work of Donna Harraway, writing posthumanism in the same period as Hayles.[51] Rather, human and technologies remain as separate entities in collaboration, which results in complex, observable relations between dancers’ physical movements, the interactive system’s programming, and the outputted digital visual imagery within the aesthetics of the choreography. Across the range of practices researched for this thesis, it can be noted that in both practice and theory, staged digital dance does not tend to be focused at all at synthetic mergers of human and technology.

The application of a posthuman approach to dance implies indeed the end of a certain conception of dance as an art form, which situates the human at the centre and non-humans at the periphery of attention. In this regard, the posthuman thinking of dance helps to liberate dance from its strong humanist assumptions, leading to the acknowledgement of non-human performing elements, alongside the human. This conclusion inevitably raises questions on the future of digital dance and dance theory, far beyond the period of production and theory upon which this thesis is focused.

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[50] Hayles, 1999: p. 191.

[51] The posthuman as Hayles understands it is different from the frequently applied understanding of posthuman popularized by the figure of the cyborg, the subject of Donna Haraway’s popular treatise ‘A Cyborg Manifesto’ (1991). In that text, Haraway maps out the cyborg, or cybernetic organism, as a metaphor that challenges feminists to engage in a politics beyond naturalism and essentialism. She also sees in this metaphor a new political strategy for the seemingly disparate interests of feminism, writing that “we are all chimeras, theorized and fabricated hybrids of machine and organism; in short, we are all cyborgs.” (p. 150) For the arguments of this chapter, Haraway’s description of the cyborg as a hybrid of machine and organism is quite distinct from the notion of interperforming human and non-human elements that are captured by staged digital dance; this is because I am not recognizing any degree of synthesis in existing dance practice or theory, in which man and machine merge to become one unity.

5.6 Conclusion

In this chapter, I have set out to show the destabilization of the hierarchy of perceptual importance and distribute performance and agency between the human and technological elements in dance through the notion of interperformance. Understanding interperformance as that which emerges from the relation between human and technological performances, I demonstrated the dismantling of the hierarchical ordering between human and technology through focusing upon technical capacities and agency. By expanding and examining the notion of both human and technological performances through these concepts I have pointed out how the human and non-human co-relate within the choreography of staged digital dance practice. By achieving this kind of reframing, it has been possible to demonstrate that the human can no longer be perceived as the primary performing element situated at the center of attention in dance.

Consequently, interperformance presents a break from the dominant understanding of the role of technologies as supporting devices for the centrally figured human performer within the art form of dance. Technologies are also granted the role of performer and share the stage with human agents. The impact of this unsettling is significant, if we remind ourselves that the hierarchical mode of perception between humans and technology has remained the dominant mode of perception in dance, at least since the nineteenth century in which Western theatrical dance became an autonomous art form.

It seems that we are at the threshold of the posthuman paradigm within the performing arts in general and digital dance in particular. In this respect, the issues concerning the positioning of human and technology in dance examined in this thesis are timely and provide an innovative point-of-view to understand the relationships between humans and non-humans within this art form. Moreover, connecting dance with posthuman thought shows digital dance as a response to the increasing human-technology confrontations taking place within our cultural and historical moment.

The notion of posthuman practice and interperformance may sound frightening to some, especially in the field of dance, in which a fear of disembodiment and the assumption of an incompatibility between body and technology is still operative. Yet, as Hayles's and Nelson's remarks accentuate, the integration of technology in dance practice does not need to imply the replacement of humans with technologies. On the one hand this much-needed perspective merely recognizes, and belated acknowledges, the ways that dance has always brought humans and technology in to contact; on the other hand it

offers ways of understanding and creatively producing such relationships. Indeed, computer technologies have become an integral part of our everyday lives and they have a major influence on how we perceive ourselves and the world. If dance is to reflect upon changes in human life, then, we need to reconsider the role of non-human components in these and many more ways, embrace our fascination with this tension, and be willing to share the stage with the technologies that are already within and around us.

Conclusion

6.1 From assistants to performers: the changing role of computer technologies in digital dance

In this thesis, I have argued that staged digital dance marks a turning point in the perpetuation of the hierarchy of perceptual importance, which, since the nineteenth century, has been the most dominant convention in the construction and reception of the relationship between the human and the non-human elements of theatrical dance is understood within a certain hierarchy. In the first chapter, I explained the historical development of the position of technology in dance and theater in the nineteenth century, showing how the artistic and infrastructural changes in this era led to the positioning of the human performer at the center of attention and the aesthetic effects created by technology at the periphery even when the technology is implemented to create spectacular visual aesthetics. In addition, I have shown how an understanding of this hierarchy in theatre and dance is reinforced in process of creative development, staging and reception - that is, in the cultural practice of dance. In the second chapter, I examined how changes in the cultural practices of staged digital dance illustrate challenges to the hierarchy of perceptual importance at the level of creation and reception. In chapter three, I have shown that, in contrary to how much attention is given the performance of technology in digital dance practice, the same performances of technology is reflected upon only in preliminary ways within the literature on digital dance. Furthermore, the notion of performance is still failing to be granted to non-human components. I have divided the literature into three different observed understandings of technology, showing how each category extends the hierarchy of perceptual importance in one way or another.

Whereas the first three chapters focus on historical, practical, and conceptual aspects related to human-technology relationship in dance, chapter four and five make innovative theoretical contributions. In chapter four, relying primarily on Jon McKenzie's study *Perform or Else* (2001), I have applied the notion of performance to the actions taken by the interactive system as technological performance, showing how the actions of technology as well as the aesthetic effects created by them can be understood as performance in their own right. In the final chapter, I elaborate on the notion of

performance further as interperformance. This term enables me to read the choreography in staged digital dance as that which emerges from the relationship between human and technological performance. By means of a closer look at the notions of agency and technical skills, I underline the similarities between human and technological performance, concluding that staged digital dance marks the entry of the art form of dance into a posthuman paradigm.

The work of this thesis addresses staged digital dance practice created with first-generation interactive technologies, however, I believe that it will have lasting value in contributing to the comprehension of performance practices in to the future, including especially staged digital dance created with second-generation interactive technologies. (To recapitulate, by first-generation interactive technology I am referring to technologies that only react to external stimuli. By second-generation interactive technology, I mean technology that are capable of creating their own behavior in ways that are unexpected by the makers.) In fact, all of the original work that I have done in this thesis, especially chapters four and five, is able to be brought to the theory and practice digital dance created with second-generation interactive technologies to some extent. To demonstrate this in a summary way, a close reading of an example of second-generation digital dance *Blue Bloodshot Flowers*, is quite useful.

6.2 Unpredictable technological agents

Fig. 6.1 — *Blue Bloodshot Flowers* (2001)

Inside of the trajectory of her own practice, Susan Broadhurst has made the transition from first to second generation digital dance practice/theory - that is, from using technologies in dance that merely react to external stimuli, to using technologies capable of generating their own behavior. *Blue Bloodshot Flowers* is in this sense a critical, technologically 'progressed' departure from first generation staged digital dance, in so far as it portrays a duet, or relationship, between a human performer and the artificial intelligence avatar, Jeremiah. Broadhurst (2002) describes *Blue Bloodshot Flowers* as a "text and movement piece", which "involves the remembrance of a love affair."[1] It was performed for the public at 291 Gallery in East London and reached a broad audience. Broadhurst's motivation in this artwork was a search for 'markerless' (or sensor-free)

[1] Broadhurst, Susan. 'Blue Bloodshot Flowers: interaction, reaction and performance'. *Digital Creativity*, vol. 13, no. 3 (2002): p. 159

motion-capture technologies, which allows the “3D pose of an individual and its motions to be extracted without the need for sensors, calibration or preparation.”[2]

As you recall, motion-capture either in the form of magnetic or optical tools has been used in digital dance performance since the 1990s. Magnetic or optical motion-capture entails placing markers (or sensors) on the body of the physical dancer, which capture the movement data of the dancer’s body. The information extracted from the body is used to create animated virtual dancers, such as in Cunningham’s *Biped* (1999) examined in the introduction of this thesis. Broadhurst’s interest in now markerless motion-capture technologies is for her based on a critique of those first generation tools - which I have mentioned in chapter two. This critique is wary of the fact that motion-capture sensors or markers restrict the physicality of the body and its spatial reach, while also taking a long time to set-up. Of course I discussed these critiques while emphasizing a contrary argument also exists in the understanding of ‘constraints’ on and ‘limits’ to creation as being productive and generative. In Broadhurst’s view, markerless motion-capture is a way of working beyond the specific limitations of first generation interactive technologies at least.

For her also, the real-time interaction between the human performer and Jeremiah makes the artwork closer to being “live” in comparison to the pre-recorded images in *Biped*, which resulted in an “absolutely stunning yet ultimately distancing performance.”[3] What makes the performance of the technology of Jeremiah different is the fact that he possesses artificial intelligence, which enable him to demonstrate several emotions as a reaction to visual stimulus in ways that are not pre-programmed by the artistic creators. As an artificial intelligence system, Jeremiah is able to generate random behavior, or actions and reactions that deviate from prescribed reactions programmed by the system’s creators. This has two important consequences for the arguments of this thesis. First, Jeremiah has a certain agency based on ‘his’ technical capacities with which he can actually create his own reactions; this is of course not the case with first-generation interactive technologies. “Jeremiah”, Broadhurst writes, “is original, just as an improvising artist is original. Jeremiah is literally “reproduced again” and not “represented.”[4] To this extent, it has an agential power within the performance itself. Jeremiah’s agential power leads us to consider how agency and limitation, creativity and technics are key to the

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[2] Broadhurst, 2002: p. 159

[3] Broadhurst, 2002: p. 159.

[4] Broadhurst, Susan, Machon, Josephine. *Performance and Technology. Practices of Virtual Embodiment and Interactivity.* Palgrave-McMillan: London, 2006: p. 144

comprehension of any performing element, human or non-human alike, which brings our understanding and treatment of 'performer', including their relation in duet, in to a posthuman performance paradigm.

An interesting aspect of *Blue Bloodshot Flowers* for the arguments of this thesis is that the unpredictable qualities of second-generation interactive technologies have important consequences for the aesthetic outcome of the artwork. If the reactions of the technology cannot be totally controlled by the makers, how can one guarantee that the technology will behave in ways that suits the dramaturgy of the artwork? Indeed, Broadhurst writes that Jeremiah's capacity of demonstrating random behavior led to certain instances in which Jeremiah's reactions did not suit the dramaturgy of the performance, which was experienced as "fairly disruptive" during certain moments in the performance"; for example, when Jeremiah "decided to display inappropriate behavior, such as demonstrating happiness at an intense moment of the performance."[5] Such moments of deviation from the dramaturgy of the performance led Broadhurst to take ad hoc decisions on how the performance should proceed, For instance, Broadhurst, to avoid the unpredictable behavior of Jeremiah during demonstrations, decided to actually turn the technology off during the presentation of the artwork to the audience. This example points to contradictions in the desire for truly performative technologies and it raises ethical questions on the right to intervene during the performer's execution of his role onstage.

Blue Bloodshot Flowers is useful for underlining how the notion of technological performance will be relevant for artworks created with second-generation interactive technologies and beyond. The more technologies generate unprogrammed or unpredicted behavior will inevitably draw stronger critical attention to what technological performance actually is and can be. Also for Broadhurst, the most important contribution of digital technologies to art practices is this kind of "enhancement and reconfiguration of an aesthetic creative potential which consists of the interaction and reaction with a physical body."[6] Agreeing with Broadhurst, I understand these insights and re-formulate them through my own concept of interperformance, developed in chapter five, where I concluded that the most important contribution of digital technologies to art practices is the reconsideration of the relationship between humans and technologies and the new kinds of questions that it raises from the perspective of the posthuman paradigm.

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[5] Broadhurst, 2002: p. 162

[6] Broadhurst, 2002: p. 162.

In sum, *Blue Bloodshot Flowers* allows to extend the work I have done in this thesis: theorizing technological performance and interperformance for staged digital dance created with first-generation interactive technology not only fills a gap in the theory of digital dance of this moment but also can contribute to the conceptualization of later digital dance practices, including those created with second-generation interactive technologies. Let us think of *Blue Bloodshot Flowers* as a kind of artificially intelligent apposite to Merce Cunningham's acclaimed *Biped* (1999), which was the starting point in the introduction of this thesis. I chose *Biped* because of its renowned critical acclaim – the way in which it negotiated the interactive motion capture technologies of the period to a new aesthetics of dance. I took dance researcher Kent DeSpain's article as key to identifying the questions raised by *Biped* within dance discourse whether it is possible for the audience to be affected by virtual dancers (created by motion-capture technologies) portrayed in its choreography and whether it is possible to consider such a new meaning or category of performer. Of course DeSpain's thinking, I have noted, remained binary in its divisions of human/technology, actual/virtual and have been much less concerned with policing the borders of the human than of embracing non-human performance here.

Developing and reframing this notion of performance technology, and by addressing my case studies in terms of interperformance, I have captured new ways of thinking about digital dance as a type of choreography in which different performing elements ontologically different performing entities interact. Applying my own concepts of technological performance and interperformance to other types of digital dance practices beyond staged digital dance practices created with first generation interactive technologies, such as I have done in this conclusion to *Blue Bloodshot Flowers*, I have shown how my theoretical insights and tools can be applied to emerging next generation of digital dance performances. It is in this respect that the examination of the notion of interperformance and the positioning of staged digital dance within the posthuman paradigm in this thesis provide innovative perspectives for the understanding of digital dance as a whole, in so far as human-technology encounters are concerned.

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Appendices

1. Changes in European theatrical presentation [1]

c. 1650–1800	c. 1800–1900
The actor was raised on a platform in the same architecture space as the audience	The actor was raised on a platform in a different architectonic space from that of the audience – beyond a proscenium arch
Costumes served as a codified 'trade uniform' of acting with a charade-like indication or emblem of character and historical period.	Costume was consciously researched and designed, and tried to fully realize the dramatic character and the historical period.
Actors and audience shared an intense awareness of its individuality and of itself as a group	Actors occupied a brightly illuminated acting space with a corresponding reduction in light on the audience
The actors had an intense awareness of the presence of the audience	Actors had less awareness of the audience
Scenery was drawn from stock-used over and over again-painted by artists as generic scenes	Scenery was custom design and made for the production. It was considered disposable when the production was removed from the repertory.
Technology was on display and enjoyed as part of the spectacle – scene changes were visible.	Technology was still enjoyed as part of the spectacle, but was hidden behind architecture and scenes illusion. Scene changes were hidden.
Scenery served as an apposite, decorative background to the performance-it did not provide an embracing, physical environment for the dramatic action.	
The mode of theater was presentational and rhetorical. The audience shared in the experience of performance; they laughed and wept together with the actors.	The mode of theater tended towards the representational; the audience witnessed a harmoniously conceived 'other' world; they were invited to be transported to become absorbed, anonymous spectators.

[1] Baugh, 2005: p. 13.

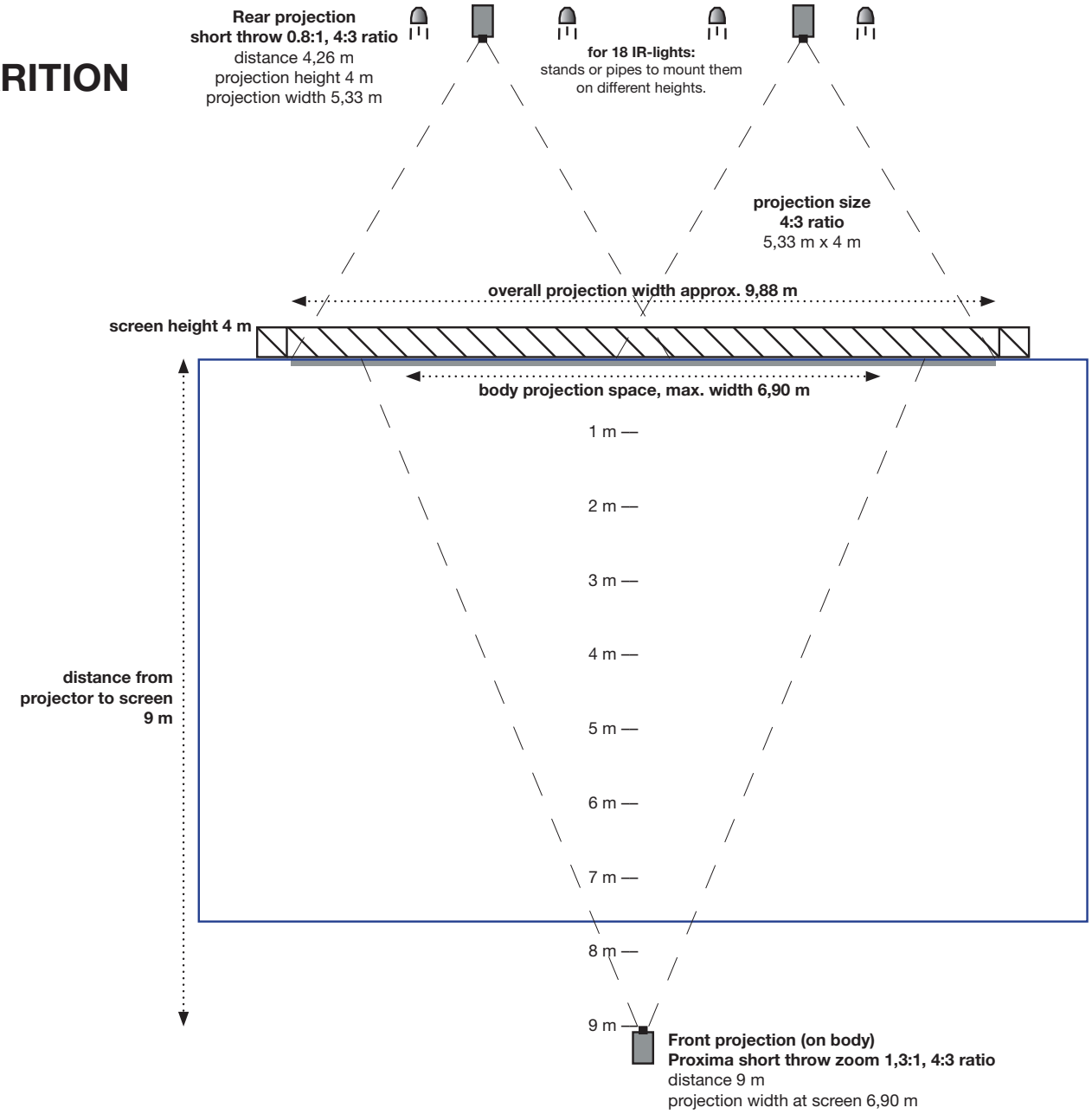
2. Changes in European theatrical dance presentation [1]

18th century: from Court to Theater	19th century: Romantic to Classical Ballet
At the beginning of the century, dance was an integral part of the court. Towards the end of the century, dance shifted from court to theater and from a constant preoccupation in court to a profession performed by professional dancers. The end of the century witnessed certain reforms within the status of ballet as an art form, such as unison of elements in the story, introduced with the ballet d'action.	The ballet d'action of the eighteenth century provided the source from which ballet became a stand-alone art form, supported by music, décor, and costumes. Each element, such as music and costumes, was designed to complement and feed into the others with a unity of form and style not found in the eighteenth century.
Theatergoing was extremely popular with all of society, and the size of the auditorium expanded to accommodate the growing audiences. One evening's performance included varied types of sensational dramatic fare.	Romantic ballet provided escapism from the realities of war, economic upheavals, and the drudgery of life. The dances were full evening length performances.
The dancer performed mostly on a relatively narrow area that crossed the stage in front of the audience. The stage was raked. Theater and assembly rooms were the common performance spaces.	The dancer was raised on a platform in a different architectonic space from that of the audience – beyond a proscenium arch. Theaters were the common performance spaces.
Scenery was painted using perspective, so the dancers had to remain downstage in order to appear taller than the paintings.	Stage design showed a tendency for simplicity. Painted scenery became the dominant stage design, which created a sense of interiority.
All change of scenery was made in view of the audience. The wings and shutters that made up the scenery were moved on-and offstage by means of a chariot system	Technology was part of the performance, but it was not visible for the view of the audience. Also scene changes were hidden. 'Flying machines' helped to create the illusion that the dancers were flying.
A huge chandelier hung over the center of the stage, and candles with reflectors hung on the wings for illumination of the stage area	Gaslighting replaced candles.
Costumes and footwear changed dramatically over the century: from exaggerated and heavy costumes to simple, muslin light dresses. Masks were discarded and shoes with heels were replaced with shoes without heels. This led to greater freedom of movement.	Pointe shoe technique was introduced and advanced. The long, white tutu became a symbol of the ballet of the romantic era. The female dancer became prominent.
Audiences were rather noisy and made comments during the performance. Dancers had to retain the attention of the audience.	Scenic design and architectural reforms emphasized the degree to which audience and performers now assumed separate functions. Theatre remained an ideal place for audience members to see and be seen, but their socializing became restricted to before and after the presentation. Viewers felt less a part of a spectacle and more a voyeuristic presence that looked in upon it.

[1] Kassing, Gayle. *History of Dance. An Interactive Arts Approach*. US: Human Kinetics, 2007: pp. 107-142, Bland, Alexander. *A history of Ballet and Dance in the Western World*. London: Barrie and Jenkins Ltd, 1976: pp., Cohen, Jeanne, Selma. *Dance as a Theatre Art*. Dance Books Ltd: London, 1974: pp. 38-86, Foster, Leigh, Susan. *Choreography and Narrative. Ballet's Staging of Story and Desire*. Indiana: Indiana University Press, 1996.

3. Stage plan of *Apparition*

APPARITION
page 2



4. Dixon's model of interactivity [1]

	Navigation	Participation	Conversation	Collaboration
Parties involved	Single user	Single user Many audience members	Multiple interactors	Multiple interactors
Type of art form	CD-ROMs Interactive cinema Online narratives Computer games net.art and hypertext narratives	Interactive cinema Interactive installations	CD-ROMs Interactive installations Video-disc installations Immersive environments	net.art Online narratives Interactive installations
Type of technology	Interactive DVD's and CD-ROMs Game engines	Interactive DVD's and CD-ROMs Motion-sensing technologies	Telematics Telerobotics Motion-sensing technologies	Web-based technologies Motion-sensing technologies
Agency of interactor	Limited	Limited	Unrestricted to a certain degree	Unrestricted
Type of communication	Closed	Closed	Open, to a certain degree	Unrestricted
Change in the artwork	No	No	Yes, to a certain degree	Yes
Narrative	Yes	Yes	Yes	Yes

[1] This table summarizes Dixon's description of the four categories of interactivity in Dixon, 2007: pp. 559-643.

Summaries

English summary

This thesis extrapolates from three exemplary practices of staged digital dance created with real-time interactive technology operating with motion-tracking software, to consider theoretically such practices' destabilization of human-centered conventions in dance. Dance's assumed heritage of human-centred conventions are those which set up a hierarchical mode of perception that positions the human performer at the center and the technology at the periphery of attention. This thesis theoretically challenges and elaborates on the notion of performance in order to 1) re-examine the role of technology in dance theory, by developing a framework of 'technological performance' that can account for the active contribution of technologies to the choreography itself 2) re-evaluate the relationship between the human performer and the technology as 'interperformance,' that is, as choreography that emerges from the interrelationship between two different kinds of performance: human and technological. The thesis concludes that staged digital dance marks an exemplary shift towards the posthuman paradigm in dance, and offers up insights of interest to scholars invested in post-human dance practice theory.

In chapter one, I examine the development of the position of technology in dance and theater in the (late) nineteenth century, showing how specific artistic and infrastructural changes in this era led to the establishment of a hierarchy of perceptual importance, which positions the human at the center of attention and the presence of technology and its aesthetic effects at its periphery. Understanding these conventions as staged digital dance's conceptual and infrastructural heritage, I show how the reduction of technology to assisting devices is also perpetuated by the cultural practices of dance, during the creation and perception of the choreography.

The second chapter explores changes that staged digital dance has brought to the cultural practices and conventions of dance, via the case study *Apparitio*n. In order to demonstrate these shifts in dance as a cultural practice, I examine changes to first, the professional roles and expertise of those involved in the creation of a choreography, and second, the audience's perspective, which is represented by dance critics' reviews of my case studies of staged digital dance works. More specifically, this chapter shows how the integration of the interactive system and its aesthetic effects into staged digital dance destabilizes the hierarchy of perceptual importance explained in chapter one. It also underlines that the notion of performance can be applied to the actions taken by the interactive system.

While questions surrounding the use of technology are very much built into the choreographic concepts of staged digital dance in practice, the role of technology in digital dance tends to be given limited theoretical attention in digital dance literature. The third chapter examines recent literature on digital dance to show that the notion of technological performance is missing from this discourse. Here, I underline how digital dance literature tends to fall into three categories ('from frozen to live media', 'metaphysical extension', 'body and technology in dialogue') and show how each category extends the hierarchy of perceptual importance in one way or another. As my review on the literature on digital dance in this chapter will show, although there have been some attempts to recognize the technology as an element of the choreography, I argue that these tend to be reductive and simplified in to certain programmatic, non-nuanced ways of thinking about technology as an agent of performance in its own right.

Extending the notion of performance to the actions taken by the interactive system constitutes the focus of the fourth chapter. In this chapter, I draw from the arguments of Jon McKenzie's *Perform or Else* (2001) to demonstrate how a more expanded and interdisciplinary observation of the various uses of the notion of performance results in quite different understandings of this term and its evaluative criteria. McKenzie has made a rather radical break with performance theory to consider the notion of performance within the domain of techno-research (e.g. computer science, rocket science) - as technological performance. His innovating frameworks of analysis allow me to consider how the performance of technology in dance might be more suitably theorized with the aide of technological performance paradigms. This chapter translates the model used for evaluating technological performance within the field of techno-research in order to apply this to staged digital dance; using the case study of the opening scene of *Glow*, it applies the model to the actions of the interactive system in this dance work.

In the final chapter, I take the notion of performance further as *interperformance* to understand choreography in staged digital dance as that which emerges from the relationship between human and technological performance concepts. Discussing the notion of agency and approaching the notion of performance in terms of technical capacities, in this chapter, I argue that, although being different performing elements, human and technology can be brought together through common concepts of performance and techniques. Illustrating this argument in a close reading of *16 [R]evolutions*, this chapter ends by pointing out that staged digital dance marks the entry of the art form of dance into the posthuman paradigm.

Nederlandse samenvatting

Dit proefschrift bouwt voort op drie voorbeeldige praktijken van digitale dans die gebruik maken van real-time interactieve technologie en motion-tracking software, om op theoretische wijze te analyseren hoe deze praktijken antropocentrische conventies van dans destabiliseren. Een algemeen geaccepteerd dansbegrip plaatst de menselijke danser in het centrum van de aandacht en verplaatst technologie naar de zijlijn. Dit proefschrift maakt gebruik van de theoretisch notie van performance om 1) de rol van technologie in danstheorie te herzien en een kader van 'technologische performance' te ontwikkelen die de actieve contributie van technologie aan choreografie onderkent, en 2) de relatie tussen menselijke performer en technologie als 'inter-performance' te denken, dat wil zeggen: als een choreografie die voortkomt uit de relatie tussen menselijke en technologische vormen van choreografie. Het proefschrift concludeert dat digitale dans de verschuiving laat zien naar een posthumanistisch dansparadigma en nieuwe inzichten biedt voor onderzoekers die geïnteresseerd zijn in posthumane danstheorie en -praktijk.

In het eerste hoofdstuk breng ik de ontwikkelingen in kaart van de rol die technologie speelde in dans en theater in de (laat) negentiende eeuw. Ik laat zien hoe specifieke artistieke en infrastructurele veranderingen in deze tijd leidden naar een totstandkoming van een hiërarchie in perceptueel belang, die de mens in het centrum van aandacht plaatste en de aanwezigheid van technologie en zijn esthetische effecten naar de zijlijn. Deze conventies blijken de conceptuele en infrastructurele erfenis voor digitale dans. Ik beargumenteer dat dit begrip van technologie in haar ondergeschikte rol ook voortleeft in actuele culturele danspraktijken, met name gedurende de ontwikkeling en perceptie van de choreografie.

In het tweede hoofdstuk onderzoek ik de ontwikkelingen in danspraktijken die veroorzaakt zijn door digitale dans. De *case study* voor dit onderzoek is de choreografie *Apparition*. Om deze veranderingen in kaart te brengen, onderzoek ik ten eerste de verschuivende betekenis van professionele rollen en expertises van alle betrokkenen in de ontwikkeling van choreografie, en ten tweede het perspectief van het publiek, vertegenwoordigd door kritieken van dansrecensenten. In specifiekere zin laat dit hoofdstuk zien hoe de integratie van het interactieve systeem en zijn esthetische effecten de hiërarchie van perceptueel belang destabiliseert. Het onderstreept daarnaast dat de notie van performance toegepast kan worden op de acties genomen door het interactieve systeem.

Hoewel de vraag rondom het gebruik van technologie nadrukkelijk aanwezig is in de praktijk van digitale dans, wordt ze slechts een beperkte rol toegekend in theorievorming. Het derde hoofdstuk bestudeert recente literatuur van digitale dans en laat zien dat de notie van technologische performance ontbreekt in het discours. Ik benadruk hoe de bestaande literatuur over digitale dans de neiging heeft in drie brede categorieën te vallen ('van statische tot live media', 'metafysische extensie', 'lichaam en technologie in dialoog') en ik laat zien hoe elke categorie de hiërarchie van perceptueel belang in stand houdt. Hoewel er pogingen bestaan om het belang van technologie voor choreografie te onderkennen, beargumenteer ik dat deze te vaak versimpeld worden in programmatische, ongenuanceerde kaders. Dit weerhoudt theorievorming van digitale dans om recht te doen aan de actieve bijdrage van technologie.

In het vierde hoofdstuk breid ik de notie van performance uit naar de acties die genomen worden door het interactieve systeem. Ik bouw voort op de argumenten die Jon McKenzie maakt in *Perform or Else* (2001), om zo aan te tonen hoe een uitgebreider en meer interdisciplinair perspectief op de verschillende gebruiken van performance kunnen leiden tot zeer verschillende begrippen voor deze term en zijn evaluatieve criteria. McKenzie breekt radicaal met performancetheorie en onderzoekt de notie van performance binnen het domein van techno-onderzoek (zoals computerwetenschappen en raketwetenschappen). Zijn innovatieve analyse helpt mij aan te tonen dat de performance van technologie in dans beter beschouwd kan worden als een ondersteuning van technologische dansparadigma's. Ik vertaal het model dat gebruikt wordt in de evaluatie van technologische performance binnen het veld van techno-onderzoek naar uitvoerende digitale dans. Ik pas dit model vervolgens toe op de openingsscène van *Glow*, waar de nadruk gelegd wordt op de acties van het interactieve systeem.

In het afsluitende hoofdstuk herzie ik de notie van performance als *interperformance*, om zo choreografie in uitvoerende digitale dans, die voorkomt uit de relatie tussen menselijke en technologische performanceconcepten, beter te kunnen begrijpen. Hoewel mens en technologie verschillende elementen in performance zijn, kunnen ze samengebracht worden met gemeenschappelijke concepten van performance en techniek. Voor dit argument maak ik gebruik van de notie van *agency* en beschouw ik performance als een technologische capaciteit. Ik illustreer mijn argument met een close reading van *16 [R]evolutions*. Het hoofdstuk concludeert dat digitale dans de toetrede van danskunst in het posthumane paradigma inluidt.