

# Interfacing Dance and Technology: Towards a Theoretical Framework for Dance in the Digital Domain

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## ABSTRACT

Towards contributing to understand and organize the multiplicity of production within what can be identified as contemporary dance and technology, *dancetech*, I want to propose a theoretical framework rooted in the notion of *interface*. This framework aims at analyzing the work being produced by this emerging field integrating it in distinct but not mutually exclusive types of interface. *Dance-tech interfaces* are then perceived as the modes of experience and representation involved in the interaction between participants and elements constituting the works. Adapting representational modes to the intermedia realm, my approach to *dance-tech* is based in the experiential engagement between the participants (including the audience and the technological apparatus), and the concepts and practices concerning (the treatment of) different mediated languages, especially the body. This theoretical framework takes a critical standpoint in the exposure and fostering of alternatives to the perpetuation into the realm of digital technology of reductive and conservative ideas and practices about bodies and embodiments. Therefore, what I am interested in considering by *interface* is not only its physical and literal meaning but also how it is used to communicate the experiences and representations it generates.

Incorporating various theoretical perspectives and my own experience in the field, in the development of this typology of *dance-technology* as *interface* I have identified prominent tendencies in contemporary artistic collaborations. Perceived primarily as a mode of experience and interpretation used to produce the work's meaning to artists and audiences alike, I utilize the concept of *interface* on a methodological level, as a way to bridge the gap between practice and theory as I engage with dancing and writing alike. *Interface* allows a complex fluid approach between semiotics and phenomenology, entangling

experience and representation in the involvement with the art works. Integrating late/tech semiotics and phenomenological aspects adopted by different authors such as Donna Haraway, and Amelia Jones, I perceive this approach as interconstitutive only dissociated by a surgical dissection. This semio-phenomenological analysis will then be applied to *Ghostcatching* by Riverbed/Bill T. Jones, and *T-Garden* by Sponge/Foam as examples of distinct types of *dance-tech interfaces*.

Furthermore, the notion of *interface* enables the cross polinization and mutation of knowledge and practice domains in increasing extrapolations such as between arts, science, and technology. After a long period of painful Western disciplinary specialization and dichotomization, it's time to invest in convergences integrating artificially isolated knowledges and technologies into more inclusive and posthuman constructions. It is in this direction that I perceive recent tendencies in *dancetech* attempting to challenge art forms' boundaries and hierarchies, to raise bodies' agency, exalt neglected senses, and actively engage audiences. Clearly inherited from the 60's artistic breakthroughs, however, the context in question in this alternative pursue is that of an increasing digitalization of life which discourse and practices needs to be taken in consideration as we enter the new millennium. The challenge is pursued through experimentation intersecting and interconnecting bodies and technological systems. Multifaceted and multiformat modes of production and signification resulting from the fast development of, easier access to and decreasing cost of digital systems --though still limited to privileged groups of people-- as well as accumulation of experience, are giving rise to increasingly complex and sophisticated work which begs for critical analysis and discussion.

But rather than a linguistic oriented discourse, the *dancetech Interfaces* framework will enable to concentrate on ways through which dance partnering digital technology can enhance a synesthetic engagement of artists and audiences by demanding a reflexive interactive experience including kinesthesia and emotionality. Therefore, along with issues of visual representation (semiotics), which elicit a more passive and distanced interpretative response, my approach is also directed to the multisensorial experiences that *dancetech* work engages

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with. Finally, with this paper I want to call attention to how the overlapping aspects of dance and digital technologies can challenge the perception of ourselves and others, offering examples to experience and represent through emerging modes of communicating using multiple forms of mediation.

## General Terms

Documentation, Performance, Design, Experimentation, Human Factors, Languages, Theory.

## Keywords

Dancetech, Body-technology Interface, Semiotics Phenomenology, Kinesthesia, Synesthesia, Corporeality, Interdisciplinary Collaboration, Media Choreography, Gender and Ethnic Performativity, Visual Representation, Embodied Virtuality

## 1. PAPER

*Ghostcatching* is a virtual dance installation, involving dance, computer graphics<sup>1</sup> and drawing, produced by Riverbed<sup>2</sup> visual digital team including Paul Kaiser, Shelley Eshkar, and Michael Girard, in collaboration with dancer and choreographer Bill T. Jones.<sup>3</sup> The audience enters a large empty room in complete darkness encountering a life size animated hand-drawn human figure moving in a 3D virtual space. Even if I had already seen the piece as a video about a dozen times, I was glad to experience it as Riverbed intended. Instead of the distanced effect of watching it on an average size monitor, the void depiction of the virtual space blends with the darkness of the room enhancing the three-dimensional ghostliness of the characters and it gave me the sensation of sharing an imaginary space.<sup>4</sup> In what looks like a typical modern dance situation, a volatile hand-drawn character goes about a series of abstract poses confined by a semi-transparent box. Materializing out of this body as its own projections or flashes of imagination, further ghostly characters start emerging. First being re-absorbed and then continuing on their own, these figures appear and fade away one at the time in surprising ways, recurring, interrupting and juxtaposing each other. I'm able to distinguish them primarily for their contrasting vocabulary and quality of movement, characteristic, behavior stereotypes, specific dance forms, and Bill T. Jones' identifiable style. These bodies trace lines in space with their movement building a dense web that fills the space that achieves to entrap them. On top, it also obstructs our perception of the characters. Progressing in a non-linear fashion,

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<sup>1</sup> Motion Capture and 3D Animation.

<sup>2</sup> Riverbed has recently become Kaiserworks. More information about *Ghostcatching* and other works by this team can be found at <http://www.kaiserworks.com/duoframe/duoart.htm>

<sup>3</sup> *Ghostcatching* premiered at the Houghton Gallery of Cooper Union, New York City, January 1999.

<sup>4</sup> Although this was no interactive virtual reality environment, the setting invited me as a spectator to kinesthetically empathize with the dancing figures.

the piece ends with a group of dancers (clones of the first) moving in unison with straight lines linking them together.

In contrast to *Ghostcatching*, another *dancetech* work, *TGarden* is a responsive play environment by two interdisciplinary collectives, Sponge and Foam<sup>5</sup>, where the visitors are invited to become the very performers of the work, audience and performer merging into one. Prior to their entrance in the space, up to four participants are assisted to put on exquisite costumes, accelerometers and wearable computers. Already informed about the responsive nature of the environment, the participants explore the physical space through their costume, several large balloon-like balls scattered around, projected sound and images, and each other, trying to make sense of the experience as it happens. In an indirect ongoing response to how the "performers" move individually and collectively through time, the space responds visually and aurally, creating different climates as an actualization of the participants' movements and gestures.

Searching for ways to differentiate these and dance productions in general, where digital technologies play an important role, I want to emphasize how distinct the relationship/interface between the body and technology can be. *Ghostcatching*, for example, renders the live body as an amazing visual representation. Presented as an installation, this work challenges the concept of dance, confronting the audience with virtual dancers moving in a virtual space, which they are able to look at repeatedly and derive their own interpretation. The emphasis is on the creation of a visual aesthetic output where the live performer is replaced by a visual representation.<sup>6</sup> Although this visual representation resulted from Bill T. Jones interface with the motion capture technology, his role is secondary, taken as movement data to be further mapped and choreographed into the 'real' virtual protagonists by the digital artists towards the final 3D animated dance. [7]

On a different pole, *TGarden* challenges accepted models of social/bodily interaction for its aesthetic research design of media spaces that reflect upon the body-technology interface itself and the audience experience as constitutive of the artwork. Compared with *Ghostcatching's* visual representation, *TGarden's* approach to the body is purposefully not clearly defined. Its focus on systems that convert individual and collective movement into indirect sounds and images is intended to produce mutating audiovisual states. Here the "performers'" movements are continuously actualized in unusual mixing of recognizable instruments and synthetic soundscapes, and in magnified colored images such as of cells, nature, and textures, which are computer generated in real-time. Enacting the work's aesthetic orientation,

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<sup>5</sup> More information about both collectives and *TGarden* can be found at <http://sponge.org> and <http://www.f0.am/tgarden>

<sup>6</sup> The way the relation between the live and the virtual dancer is constructed, reveals the artists' concepts about the body and technology towards or resisting their intertwining.

the layers of media choreography performed by the computerized responses enables their specific real time modulation by the participants in their attempt to make sense of the experience. Indeed, as an attempt to adapt the technology to the body rather than molding the body to technology, *TGarden's* research program has wearable computing as one of its key aspects.

## 1.1 *Ghostcatching*

As the *Ghostcatching* characters come off of one another, their subtle representation and the particular sequence of their appearance raises issues about gender, race and subject position. Interested in how the interfacing of body and movement with computer graphics contributes to theorizing gender and ethnicity visually in particular ways, I will focus on aspects of characters' hand drawn visual appearance,<sup>7</sup> their movement behavior<sup>8</sup> as well as the specific significance of their timed appearance. Although not too apparent, there are seven ghosts color-coded and with distinct repertoires. The first character inside the box is "the sculptor." Made of sketchy straight bluish lines like the box it performs abstract angular poses. As it goes from one pose to another in a slow monotone pace naming them with alphabetical letters: A B C, modern dance's analogy with written language, with its restrictive grammar of movement, comes to mind. Is this a metaphor for the disciplined universal body of modern western culture? While he loops the poses, the first of a series of ghosts<sup>9</sup> walks out of him mimicking the poses to rapidly be reabsorbed by the original. This was an exact copy, a clone. The second ghost is a different character. Its elegantly curved rosy lines and the delicate and undulating movements approach a female, or at least an effeminate subject, knowing Jones' gay identity and hearing his whispering voice. Before being also reabsorbed by the sculptor, 'she' graciously improvises between poses and alters their order partnering him. 'Her' tactical mocking performance seems a perfect example of iteration perpetuating and transgressing the norm represented by the poses. The patriarchal framework of western society is thus suggested, the sculptor representing the male universal out of which 'she' is the necessary deviation, the 'other', through which he defines himself but who also constitutes a thread to his authority. Or is this Jones' new way of dragging playing with the heterosexual norm?

<sup>7</sup> Examples of visual aspects are the color and shape of the splines constituting their bodies.

<sup>8</sup> Examples of behaviors are angular or curved shapes, and fluid or rough dynamics.

<sup>9</sup> I must make reference to Jean Baudrillard's theory of simulation in his book *Simulations*, Semiotext[e], Columbia Univ.: NY, 1983. The 3 orders where the first is the copy of the real body, the second is a copy of the copy of the real, and the third is the production of the virtual independent from reality and where reality imitates the copy of itself. Applying this theory to the ghosts on *Ghostcatching*, the first order is represented by the sculptor, the second by the sculptors' clones, and the third by the other characters which seem to come out of the virtual space itself.

The third character, "the soloist," leaps out of the sculptor making him disappear from site. This figure's body, attitude and movement approach not only a male but Jones himself. Blue lines delineate strong muscles and inclusively sketch out a penis<sup>10</sup>. His movements are ample and vigorous, enhanced by audible charcoal lines drawn by his hands and feet. He poses in long beautiful lines and continued with the ease and elegance of impulse and momentum while defining circles and arches. With this movement enhanced by the size of the figure this character conveys a vivid kinesthetic presence. Compared to the previous ghost, this fits the "breaking free" from strict modern dance forms in search for the looser embodiments within western dance.

Irrupting in space, a new character seems yet a further attempt to break free of conventions, maybe of western culture altogether. Not surprisingly, he is red. Made of very few lines. Screaming and then breathing loud, this character moves with chaotic energy, stomping on the ground, arms flexed, quickly filling the space with a web of red zigzagged lines reminding me of a monkey, or at least the stereotypical exoticized representation of indigenous behavior. (Figure 1) While this "indigenous man" wanders around, the effeminate character reappears calmly



**Figure 1. *Ghostcatching's* 3D animated "indigenous" character and lines in space drawn by its movements**

<sup>10</sup> I must refer to the story during the Q&A session of *Biped's* demonstration before its premiere in Berkeley in 2000, where Paul Kaiser mentioned the interest in including the capture of Bill T. Jones' penis movement in response to my question about the possibility of working with a choreographer who's work different from Cunningham's neutrality would address gender. I'm surprised and curious to know why this capture was not pursued as this capture is suggested by one of the life size photos showing the motion capture process of creating the virtual body where the markers are visible.

singing her movement. The delicateness and elegance of her short composition is now clearly balletic for the pointed footwork, *ronde-de-jambes-à-terre* and pirouettes. A green ghost emerges from above, hanging and balancing its limbs and falls to the ground squatting. How to look at this movement if not by drawing more associations with orangutans and the like, in a Darwinist reminder of humans' 'naturalized' animalistic ancestry?

This excerpted description of the first characters in this piece is enough to show the tone I see the piece evolving as a mounting play between the main western male universal in crisis of identity, the romanticized feminine, and the animist primitive. This way the characters impersonate distinct even if subtle orientalist and gendered stereotypes, showing their construction in their movement and alternative visual appearance. Therefore, the soloist is the most recurrent character who increasingly integrates the other characters, representing the embodied assimilation of the 'other' gender and race. Once including a mix of balletic quick footwork of 'entrechat-quatre' and pirouettes en l'air, a sort of African chicken walk, and an inverted suspension. And then, turned multicolor (multicultural?) singing his movement as an intricate blend of his continuously evolving choreographic style. Is this character representing the western postmodern dance? Or the mixed cultured, gendered, and racialized body marked by his African American heritage? Lastly, seven clones of the sculptor moved mechanically together following the choreographer's directions. Are we back to the master discourse's primacy of the distanced mind, exerting its authority over the disciplined body?

*Ghostcatching* seems to convey at a liminal level Riverbed's struggles within a series of binaries one recognizes or associates with stereotypical constructions characteristic of the Enlightenment discourse -- feminine/masculine, primitive/civilized, natural/constructed. However, for the multiplicity of ghost characters materializing from a single abstracted figure, I am brought to consider it as a rather transgressive mixed gender, racial and cultural identity, as all of them are aspects of Bill T. Jones movement choreographed virtually by Riverbed. The piece then, at the same time, achieves to conform and to transgress the norm, on one hand representing the conventions in a very subtle but fashionable way. On the other hand, perceived as the imaginary abstraction of one real person performing all these roles, it challenges these very binaries. Therefore, although reducing the body to a visual representation, *Ghostcatching* reveals how movement through motion capture technology performs identity as a way through which gender and ethnicity can be actualized in cyberspace. In this context it achieves to exemplify Judith Butler's conception of gender (and race) as performance out of the written discourse into the very realm of virtual dance. Adapting her feminist argument to this domain, the movement of the *Ghostcatching's* characters, because derived from the performance of a unique and marked African-American subject as, Bill T. Jones, questioned and complicated the heterosexual basis of traditional western conventions in its biologically determined sex/gender (and race). [2], [3] and [5] Thus, represented by visual abstractions without always a clear gender or ethnicity, the

movement provides another type of visual construction of these markers, rather than the ones taken for granted as the color of the skin, and body physiognomy including sexual organs. In a rather generalized manner, the artist's statement accompanying the work by its artistic director Paul Kaiser, describes the piece as "a kind of meditation on the possibilities and limitations of [representation through] motion-capture." And summarizing it succinctly, he states that "it's all about the notion of breaking free from your own representation and being caught up in it again."<sup>11</sup>

On another level, although *Ghostcatching* as installation conveys a certain level of kinesthetic involvement of the audience compared to the attendance of a live performance, *TGarden's* shifted emphasis from representation to performance where the audience itself becomes the performer of the work, clearly highlights this sense in a synesthetic interchange with others through their active physical participation

## 1.2 TGarden

During one of *TGarden's* public prototypes conceived as an open laboratory at the Ars Electronica Festival in 2001, people were invited to experience the environment and give user feedback in order to improve the work's public "usability." Assisted by the team of artists and attendants, a group of up to four people at the time passes through a first phase of transformation entering a dressing room, choosing and putting on a costume designed specifically for this experience. This transformational process is reminiscent of the one Noh theatre's actors traditionally go through as they embody their character previous to their performance. The costumes have different looks. Made of different fabric materials, including plastic rapping and tubing, they are intended to influence movement in specific ways. One, looking like an astronaut suit or an accordion brings a sense of space within the body. Another like an inverted larva filled with styrofoam balls adds weight to the body, making it heavy. In addition to this strong physical influence, the participants are also equipped with accelerometers attached to one of their limbs and head, and connected at the waist to a small wearable computer. These sensors measure the degree of acceleration and gravity produced by the body's physical movement – providing a continuous stream of acceleration data to be statistically analyzed by the central computational system.<sup>12</sup> After adapting their bodies to the costumes the participants are ready for the next transformation as they enter the responsive environment. This space is already alive, filled with sound and images projected on the floor. The audiovisual "climates" of the room are suggestive of various states, which can be warm, cold, energetic,

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<sup>11</sup> Kaiser, Paul interviewed by Kent De Spain. "Dance and Technology: A Pas-de-Deux for Posthumans" in *Dance Research Journal* 1999, (20). See also [4]

<sup>12</sup> The accelerometers' "data stream" is sent to the central computer by way of the wearable computer at the waist (i.e., a commercial IPAQ running the Linux OS and broadcasting the data through the 802.11b wireless Ethernet protocol.)

melancholic, etc, depending on the colors and textures of the images and sounds, as well as the participants movements and spatial position. (Figure 2) Besides the loudspeakers and video projectors, the space is also equipped with a ceiling mounted camera that dynamically tracks the participants' x/y position. Both position and gesture tracking of the participants influence the real time computer graphics as well as the musical composition, adding to the system's overall collective synthesis as well as the distinct individual responses. The "performers" tend first to move isolated and cautiously, trying to identify who is producing or influencing what sound or image before they start moving as a group. One of the participants recalling her experience referred to the freedom of movement that her costume allowed, as well as how initially she felt little connections between her movement and the room's media. The longer she played, however, she began to notice relationships emerging.



**Figure 2. TGarden's environment with four costumed "performers," balls, and computer graphic projections**

Aimed to invite a mode of play without strict rules, the team aimed to purposefully design the overall system to avoid a completely direct (i.e., triggered 1:1) response, and instead to generate more subtle choreographed layers of connectivity between the participants and the media that would nonetheless be coherent and accessible. Due to TGarden's emphasis on the physical bodily interaction with both media and other participants, the experience requires a certain level of effort and engagement over time in order to make the response relationships more evident. Interestingly, this correspondence between effort and media response was probably why to a certain extent there was a significant improvement in the quality of the experience when the participants were professional dancers, perceived in the way their movements 'made the costumes come alive,' and in the richer layered media actualization. But, on the other hand it also showed the controlling orientation of the dancers' performance, rather than allowing them to wander about with and be influenced by the media in a more playful manner.

Since TGarden is an ongoing research and production project, the team is currently investigating the multidimensionality of responsive environments. The most recent research advances in wearable computing and active fabrics, which embed sensing and electronics directly into the costume's fabric rather than use of cumbersome clunky pieces of electronics attached to the body. Other research arenas include the inclusion of more sophisticated real time manipulation of visual (video with computer generated images) and sonic material, enabling more vivid morphing projections and sound and their dynamic integration.

By generating such an unfamiliar but nonetheless meaningful situation, the work attempts to create a new type of public responsive imaginary space and language that brings together new relationships between embodied interaction, physical matter, and media. Challenging the participants to access non-verbal thinking communication that is normally taken for granted, and having individual and collective movement as catalysts for their 'translation' - 'writing' and 'tracing' - into sound and image, TGarden brings awareness to the very process of meaning production as it occurs through the interface of the participants and the work itself. TGarden challenges restrictive, one-dimensional, purely visually oriented, reactive, and individualistic uses of body-technology interfaces and design, toward multidimensional hybrid interaction centered in the agency of embodiment and dynamic synesthesia to generate meaningful experience. TGarden's political engagement with the social body contributes to dissolve the line between art and life, artist and audience, and towards a reinvention of public sphere within the present globalized information society. Thus, TGarden's shifting attitude and approach to technology from representation to performance integrating the virtual and visual into the multisensorial physical body of the audience, contrasts with Ghostcatching's questioning of representation through the very creation of other visual representations, emphasizing their separateness from physicality, and the division and hierarchy between the artists/work and audience, and between the artists themselves.

## 2. CONCLUSION

Attempting to become aware of distinct interfaces and underlying politics in the making of dancetech works such as Ghostcatching and TGarden, my analysis has aimed to contribute to identify what is at stake in these works, based on the distinct ways they perform and choreograph embodied virtualities. I focused on their experimentation with digital technologies on the concepts and practices as they are tested in this hybrid ground. I argue that it is important to understand how, compared to other dance forms, the distinct approaches to the use and function attributed to technology are informed by or help to conceptualize notions of embodiment, individual and collective identities, as well as technology and their relation. And, in the same way, depending on such intentions, the work can perpetuate the old Cartesian mind/body split or foster new paradigms for the sake of corporeality. With both Ghostcatching and TGarden, I've tried to exemplify that only with an ongoing non-hierarchical

interdisciplinary collaboration, including the interfacing body and technology as the center of the work, and a critical analysis including identity issues, can new conceptions and practices of embodiment and consequently subjectivity rooted in corporeality be able to proliferate. Towards such a critical analysis my theoretical framework of *dancetech* interfaces aims to be a way of discussing and documenting this cultural production as a process in continuous transformation, which otherwise will leave no trace as a global phenomenon at this particular moment in time. I therefore believe in *dancetech*'s capacity to participate in shaping society and contribute to raise the stakes of corporeality and agency in the information age, shaking the dominant tendencies to celebrate technology in a void.

### 3. ACKNOWLEDGMENTS

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