Performance Technologies and the Social

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"Technology is therefore social before it is technical" (Deleuze 1986: 34).

1. Introduction

Performing with technologies is a common experience in the 21st century for everyone engaging with artistic and mediated practices that are linked to the social dynamics of communication and cultural production. The social itself can be considered that which is mediated through communicable forms expressing, reflecting and generating material realities, lives, protocols of organization, intersubjective relations, cultivations of values. In our late modern age, we have seen the constant growth of new machines, computational processes, mobile interactions and networked mediations in the social field; the aesthetic, which is today considered equivalent to the notion of the *performative,* therefore cannot be imagined outside of the techno-social development and organization of late capitalist societies. The "object" of performance, however, if we think of dance or music, has a more complicated and ambivalent role to play in a discussion that investigates the social circulation of live, embodied performance events and their traces, or that endeavors to parse the relation of aesthetic experimentation (dancing with technologies and recording/screening dancing, for example) to the social.

In the following, I will primarily look at the evolution of aesthetic experimentation in the field that has come to be known as dance tech, pointing to its historically overlapping embeddedness in the performing arts and new media arts sectors as well as the evolving research contexts of art and science, interaction design and digital media, network communications and games industries. The proliferating outcomes of performance experimentation now stretch across many borders, and new terms such

as audio-visual performance, generative process art, mobile social media or "social choreographies"[1] indicate a shift which troubles the entrenched dialectical relations between high culture (cf. theatrical stage dance or concert dance) and popular culture I grew up with some decades ago when the concept of "social networks" was not yet known in the sense in which it is implanted today in the era of internet platforms, metaverses such as Second Life, Facebook, Twitter, smart phones, etc.

My initial training was in theatre and dance, before I began adopting video, electronic music, sensing and projection technologies and interactive computer software design into collaborative work processes that altered my understanding of choreography considerably. As a contribution to this book I propose to delineate a brief historical perspective on the changes I experienced in the formation of *work* – and the constitution of an international exchange of dance tech *workshops/laboratories* – on and beyond the theatre stage. I take my cues from the guiding categories on the conference agenda for "Dance Technologies and Circulations of the Social, Version 2.0" at the MIT Media Lab, which stretch from (1) historicization and (2) theoretical imagining to (3) politics of digital aesthetics and practice; (4) mass media and culture industries; (5) pedagogy and institutional locations; and (6) the social. The "social" still figures as a separate category here, which I believe was not intended.

These categories also seem to re-emphasize concerns that the conveners broached in the first encounter ("Emergent Global Corporealities: Dance Technologies and Circulations of the Social," 2009).[2] Investigations of the global "social" dimension of dance technologies indicate a significant challenge to the discursive formations of the field; such explicit concerns were largely absent in the more technically oriented pioneer stages of the early adopters. Questions regarding the politics and ideology of choreography, and of technologies *for* dance, also have had much less currency in

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[1] Susan Kozel has addressed the term "social choreography" in a recent essay on locative media ("Mobile social choreographies: Choreographic insight as a basis for artistic research into Mobile Technologies," PADM 6:2 [2010], pp. 137-48) and is preparing a book on Social Choreographies: Corporeal Aesthetics with Mobile Media (expected 2012).

[2] This first symposium was organized by the World Performance Project and SLIPPAGE at Yale University in October 2009 (I did not attend nor know about it at the time).

Western publications[3] than they have, for example, in journals appearing in Eastern Europe (*Maska, Frakcija*).

I will sketch a brief historical look back at the years of early adoption of dance technologies,[4] linking the historical contexts as I remember them to the questions formulated by Thomas DeFrantz and Harmony Bench under Section 6 ("the social"), namely

(1) What is the role of contemporary technologies in redefining or reconfiguring dance as a social practice?

(2) How do we conceive social dimensions of audience in this paradigm?

(3) How is the social circulated in emerging dance technological exploration?

As a point of departure I mention an international workshop-symposium and exhibition platform – the ARTAUD FORUM – which I just coordinated at the university where I work.[5] This event was intended as a continuation of the transcultural cooperation and coproduction I had started with my London-based DAP-Lab ensemble in 2008, partnering with Japanese artists and creating a choreographic installation, *Ukiyo-Moveable Worlds*, which was shown in several iterations in London and in Slovenia. The collaboration with butoh dancers who had studied with the late Kazuo Ohno led us to reflect upon the historical trajectory of butoh as well as the convergences between Japanese contemporary dance and European physical theatre traditions inspired by Artaud and his vision of an "affective athleticism."[6] Methodologically, the FORUM was primarily based on physical laboratories investigating techniques (and technologies) of the body that involve fundamental principles of somatic, kinetic and perceptual awareness (breathing, muscular system, body organs, and the Qigong/Five Elements method that our Japanese guest artists

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[3] Randy Martin's books are an exception, however, and Andre Lepecki guest-edited several essays on critical theory and dance philosophy for TDR (50:4, 2006 and 51:2, 2007).

[4] A concern with historical and locational contexts runs through my recent books and articles, most of which derive their critical and theoretical reflections from direct encounters with performances that I have seen or produced, or with the collaborative research contexts within which I experienced the adoption of dance technologies for creative and conceptual purposes. See especially, Birringer 2001 and Birringer 2008.

[5] "ARTAUD FORUM 1: The World from Within and Without" was held at the Artaud Performance Center, Brunel University, London, on April 4-5, 2011.
See:http://people.brunel.ac.uk/dap/artaudforum.html.

[6] Cf. Artaud 2010, pp. 93-99.

had learnt from their master Hironobu Oikawa's teaching of the "Artaud Method").[7]

This physical approach to working through performance *techné* is characteristic of all of my laboratories, for example the independent media lab (Interaktionslabor) I founded in a former coal mine in southwest Germany in 2003, the Environments Lab created at The Ohio State University Dance Department from1999 to 2003, and the earlier Lively Bodies Lively Machines workshops conducted in the mid-1990s. Other workshop approaches may focus more on tool knowledge, programming, and instrument/systems design. Technical labs, like studio-based training, are a prerequisite for the development of any knowledge of invention or intervention into the repertoire of aesthetic possibilities. Indeed I would posit the history of peer-to-peer *workshops,* along with the constitution of performance platforms for dance tech, as a crucial phenomenon in the evolution of the Art and Technology movement in general, having emerged since the 1970s and comprised a heterogeneous collection of artistic, technological and scientific disciplines and inter- or transdisciplinary collaboration over these past decades.

Working both inside and outside of educational institutions, and networking with art organizations and research labs internationally, has been a continual, organic experience shared by many of the practitioners gathered here in this book. A study published in Rotterdam in 2005 confirms this trajectory:

> Somewhere between culture, science, industry and design practice, an active interdisciplinary field has thus arisen, out of which work comes forth that addresses itself on the one hand to activating the audience, and on the other to experimenting with human-machine interactions. Since the rise of the Internet and the World Wide Web, a whole new range of digital art forms has arisen

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[7] The DAP-Lab ensemble met Oikawa-san in his Tokyo-based Maison d'Artaud Studio in 2009; we were introduced to a fascinating fusion of butoh movement underlined with buddhist philosophy, Chinese medical cosmology, Artaudian metaphysics and contemporary mediation technologies (camera/telematics) that seemed without precedent. Traces of such creative fusion techniques are visible, however, in Saburo Teshigawara's choreography or the more punk-style aesthetics of Yoko Higashino as well as numerous other contemporary Japanese and East-Asian artists. Regarding the global circulations of socio-anthropological as well as spectacular/aesthetic dimensions of dance forms (and butoh has spread all over the world since the 1980s), it would be well worth comparing butoh's notions of corporeality (both initial strands: Hijikata's Ankoku butō – the theatre of the body-in-crisis – and Ohno's transgender poetics) with Japanese underground music's "cracked media" approach and the Western artists' incorporations of sonic/computational experimentation into hybrid intermedial performance techniques.

which takes advantage of the cultural shifts that have been a consequence of the flourishing of these networks and the globalization associated with them. Computers have not only produced different work – different in terms of media use and content – but also facilitated a new way of working, that is, by collaborative groups of artists, designers, technicians and scientists.[8]

The new ways of working were developed in research laboratories and studios, and thus it could be argued that the new technical skills cannot be associated with choreographers alone (e.g. Merce Cunningham, Trisha Brown, William Forsythe), even if their choreographies have had an impact on the dance forms. The "different work" underlining them must be traced to labs or organizations (e.g. MIT Media Lab, IRCAM, Banff Center, ZKM, STEIM, V2, WAAG, ars electronica, Shinkansen), and thus to the role of software developers, designers, engineers and curators that facilitated the kind of labor necessary for aesthetic innovation which took place inside the dynamics of media industries and popular cultures. The social organization of artistic innovation would then have to be examined in the light of the broader channels or sectors of display, i.e. the mainstream institutions (galleries, television networks, commercial markets, schools) and alternative platforms through which the work became accessible, distributed, and reiterated/collected/curated and taught. Unlike new media art works, exhibited permanently for instance at ZKM, ars electronica, or ICC, dance tech performances of course have not been collected. One would have to argue that it is as yet a living, evolving archive.

Inquiring about the role of technologies in redefining or reconfiguring dance as a social practice, one needs to refer to the new modes of production that emerged in the collaborative working models devised by artists and engineers/technicians (and here the early impact of electronic music and video art is particularly important as recording and production technologies enabled a new dialogue with commercial broadcast culture), while stage dance itself underwent radical redefinitions through the avant-garde practices of the 1960s and 1970s (in fact throughout 20th century modernity) which not only challenged the idea of medium-specificity but were themselves pressured by the technological development in changing social and

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[8]Brouwer et al 2005, p. 6.

political landscapes. A wealth of historical information is becoming available as museums stage retrospectives of early performances (their traces) and material objects (e.g. *9 evenings reconsidered: art, theatre, and engineering, 1966*, LIST Visual Arts Center, 2006; *Nam Jun Paik*, Tate Liverpool and FACT, 2010; *Off the Wall*, Whitney Museum, 2010; *Laurie Anderson, Trisha Brown, Gordon Matta-Clark: Pioneers of the Downtown Scene, New York 1970s*, Barbican Centre, 2011) which can now be compared productively with the specific history of exhibitions that positioned "New Media" or computer-based art into a paradigm beginning in the 1960s to respond to the challenges introduced by media not compatible with the contemporary art world[9] (from the influential 1968 "Cybernetic Serendipity" at ICA London to regular annual festivals such as ars electronica, SIGGRAPH, transmediale, Kinetica Art Fair, Boston Cyberarts, etc). Trisha Brown's early engagement with media ("equipment pieces" such as the film projector dance *Homemade*, 1966) and urban spaces (*Roof Piece*, 1973), thus, could be revisited in the light of Happenings and the development of the "downtown" New York scene, but also in the context of more engineering-oriented cybernetic systems projects for transactional "movement" – involving interactive devices, feedback mechanisms, relays/delays, algorithmic features, and robotic, kinetic, holographic and telematic components (as for example in Paik's electronic music/electronic television installations, Steina and Woody Vasulka's video synthesizer performances, or early interactive installations by Myron Krueger, Edmond Couchot, Roger Malina, Harriet Casdin-Silver, Roy Ascott and others).

The history of dance tech is intricately connected to this history of "technological art," yet the increasingly prominent features of transactional movement in digital environments, which encompass *connectivity*, *immersion*, *interaction* (as a direct or indirect principle affecting the behavior of forms and the forms of behavior), *transformation*, and *emergence* (cf. Popper 2007: 79-80; Birringer 2008: 119ff.), have been arrived at and played with variably in different socio-cultural production contexts, and choreographies of transaction, therefore, have different meanings in different circumstances. If we argue that using or connecting with "technology" is not some culturally neutral act, then we also need to question universal terms such as "body" or "embodiment," as they are bound to depend on specific ideological

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[9] See Quaranta 2011.

relations of aesthetics to politics (and to categories of social consequence such as gender, race, class, age and ability). What we can posit, following Deleuze, is that technology embodies social relations, always including cultural, aesthetic, economic and political relations. Such relations construct technology, affecting its shape, content and power in the transactions programmed by particular cultural imaginations of the producers.

The catalysts for my involvement in the emerging dance tech community were two workshops organized by Scott deLahunta at the School for New Dance Development in Amsterdam: "The Connected Body?" (1994) and "Connecting Bodies: Dance and Digital Media" (1996). They were foundational, enabling me to design my own workshops and plot collaborative projects with peers in the emerging network, and I wrote an account of how I experienced this period of gestation and technical/aesthetic experimentation (Birringer 2008: 60-74), so I don't want to repeat it here. What I did not spell out, perhaps, were the circumstances for the lack of critical movement studies or critical choreography during this period of gestation, as the discursive formation of the New Media Arts was already becoming subsumed under a "postmedia perspective" (Quaranta) that presumes there is no unmediated reality and no social life (no dancing?) without computers and mobile technologies.

The discursive formation of 90s dance tech is a strange phenomenon, since it now clearly appears as a time-bound anecdote, dancers learning from computer culture inside lab-based clusters where new tools and gadgets were shared and tried out, sensors, camera-vision and motion-capture tested, with digital editing and real-time processing for the screened bodies, and all dancing thus mixed up with *projections* of moving data images/animations and graphics. Dance tech without LCD projectors is unthinkable, and of course it evolved alongside the growth of videodance/dance for the camera productions that found their platforms and festivals in the 80s and 90s, and now already seem swept aside in the 21st Century by wider cultural phenomena that are differently marked (in different locations of the globalized economy of symbolic capital): Social networks and YouTube, Parkouristes of relational aesthetics and performative labor, mobile and locative media, participatory design, live blogging and data choreography, to name just a few of these phenomena. What, then, was the referent of dance tech, what did it bring into being?

2. Formations of Work: Historical Time and the Social (the 1990s)

The decade of the 90s impressed on our cultural imaginary the impact of revolutions that led to the fall of the Berlin Wall and the disintegration of the Soviet bloc. A entire socio-political system collapsed, and migrations and economic transformations ensued, while a democratic uprising in China was crushed on Tiananmen Square, and communities in the United States and across the world witnessed the increasingly dire consequences of the AIDS crisis while the first oil war in the Middle East was waged with the U.S. attack against Iraq. On the home front in the U.S, multiculturalism and identity politics forced the issue of democracy as well, as community activists stumbled through the choreographies of resistance that were owed to the civil rights, post-Malcolm X Afrocentrist, Chicano, feminist and queer movements.

After filming the disappearance of the Wall in Germany and traveling to Cuba during the "special period," I joined the "border workshops" that happened in the U.S., encountering a lively activism in the southwest and in racially divided cities (such as Chicago) that experienced (again) *unreconciliation* in the continuing aftermath of colonial history, a history of festering discontents. In live art experiments at the time, "border crossings" were performed in many configurations, and I witnessed a powerful one in Guillermo Gómez-Peña and Coco Fusco's *The Year of the White Bear* project, which among various components (performances, radio programs, writings, installations, community workshops) featured their touring exhibition of *The Couple in the Cage: A Guatinaui Odyssey*. They performed themselves as fictive "primitives" displayed as captured freaks in public spaces or "moved" inside hegemonic institutions (e.g. natural history or science museums). Their use of technologies, objects, costumes and gestures was riveting, always purposefully tuned to turn the gaze of the audience against itself, producing anthropological havoc.

Fig. 1 Guillermo Gómez-Peña/Coco Fusco, *The Couple in the Cage: A Guatinaui Odyssey* (1992)

Fig.2 Merce Cunningham Dance Company, with Paul Kaiser/Shelley Eshkar, BIPED (1999).

The two works that epitomize the 90s for me were Gómez-Peña/Fusco's cage performance in 1992 and Cunningham's *BIPED* in 1999, the latter an ethereal dance performed in combination with Shelley Eshkar and Paul Kaiser's motion-captured "ghosts" of the dancers projected into the stage landscape of abstract movement. Abstract expressionism, the contested "American" domain of post-war art, here returned with a vengeance, distilled into its most inconsequential dance tech spectacle of digital manipulation of graphic forms (revisited six years later by Trisha Brown's company performing *how long does the subject linger on the edge of the volume...?*,

again in collaboration with Eshkar/Kaiser, and computer scientist Marc Downie who had written the artificial intelligence software code for the "creatures" that appeared as projected geometric abstractions derived from data of human bodily movement. The data-based abstractions and re-animations (LifeForms) of the human form had been a source of fascination to dance tech experimenters throughout the 90s, and Cunningham technique often served as an inspiration for a kind of "perceptual training" echoed also in William Forsythe's release of his CD-Rom "Improvisation Technologies: A Tool for the Analytical Dance Eye," designed at ZKM over a period of five years, 1994-1999 (Birringer 2002).

I mention the Latino artists' border work as an example of performance activism that uses embodiment as a social choreography directed at perceptions of the "other" – the "exotic" or the "disabled" – thus directly confronting the politics of multiculturalism at a time when disability/disenfranchisement was vigorously contested in the arena of "performativities" (then theorized by the discursive formations of feminism, gender studies, queer and postcolonial writings drawing on Judith Butler, Gayatri Spivak, Homi Bhabha, Paul Gilroy, Douglas Crimp, and others). Gómez-Peña/Fusco's *White Bear* project was implemented as an elaborate participatory community event involving a range of local minority arts organizations and volunteer workers, and also including local radio workshops. In Chicago's Mexican Fine Arts Center Museum they constructed a fictionalized collection of artifacts (this method became the basis of the later Pocha Nostra workshops) mimicking Western scientific displays of the "exotic," except that all of the artifacts were either inauthentic or mass-cultural hybrids and "reconversions" (e.g. Mexican "socialist-realist" velvet paintings of Madonna or kitsch murals of Mickey Mouse sculptures). During their site-specific installation at the Museum of Natural History, they exhibited themselves as "Two Undiscovered Amerindians" on display in a gold cage, performing "aboriginal" postmodern everyday life-styles, complete with body-building, laptop computer and video equipment, surrounded by confused and wide-eyed museum visitors who had arrived unawares. Many of them thought the couple was "real" and behaved as if the exhibition of aboriginal peoples in cages was hardly inappropriate in a Museum of Natural History. Many did think it was inappropriate to "abuse" their faith in the authority of the museum (cf. Birringer 2001: 82).

> Most of the work we do is highly specific; perhaps one of the political powers of *performance*, defined as a social experiment, is precisely its possibility of working with context, and therefore developing these other layers of political meaning. So the work we do inside museums very much comments on the history of representation of other cultures and notions of the primitive, otherness, etc. The work we do in the streets is very much meant to activate historically or politically sensitive *sites* and to establish historical connections between intercultural practices that have been formed, the European and North American mentality about the Other and contemporary political incidents… We're also very much interested, along the same lines of using performance as a social experiment, in just pushing the boundaries of performance and venturing into other territories: ethnography, social science, education, political activism, media. We work a lot with the methodology of recyclement… (Guillermo Gómez-Peña/Coco Fusco in Birringer 2001: 71-72).

There are few images imprinted in my memory that match such politicized performance art turning the ethnographic camera against the audience; in stage dance the only comparable incident happened with Bill T. *Jones's Still/Here* (1994), a work engaging issues of illness and well being, moving constructs of death and dying in a world of HVI/AIDS and other terminal illnesses to the foreground, and in fact displaying (in the second half, *Here*) close up face shots of terminally ill patients on video monitors that were moved around the stage by the dancers. These testimonies appeared in a visual score made from edited interviews during Jones's "survival workshops" which he had conducted across the U.S., while the choreography emphasized a restrained exuberance of physically well bodies gesturing at alternate discourses to (st)illness and dying. The black choreographer's (dis)appearance in *Ghostcatching* (1999), Kaiser and Eshkar's digital transformation of Jones's motion-captured movement data, never received the ideological critique it deserved, perhaps largely due to the fact that Jones himself seemed to embrace the new abstraction technologies and their potential to "spawn" newly configured traces of the movement characters he had performed.
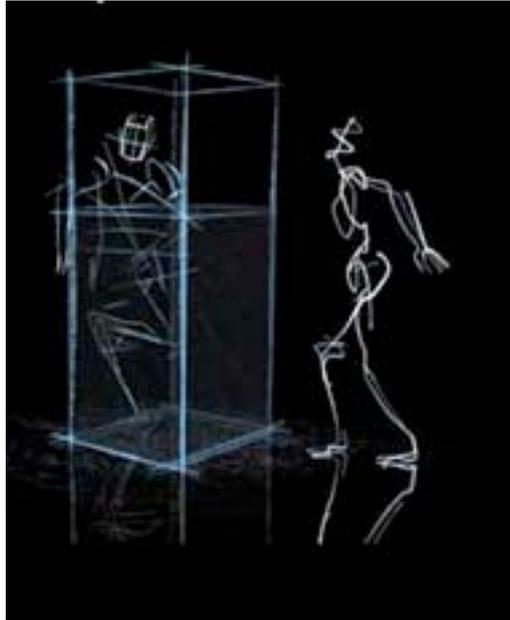
Fig.3 Bill T. Jones/Paul Kaiser/Shelley Eshkar, Ghostcatching 1999.

Fig 4 Ruth Gibson wearing Gypsy motion capture exoskeleton Animazoo; Workshop "Sharing the Body," Monaco Dance Forum. Photo courtesy of Bernd Lintermann.

As a compressed kaleidoscope of the 90s, there are repeated images of dancers in labs wearing motion capture exoskeletons (as Ruth Gibson tried them on in her early adoption of such technology), stepping into space wired with sensors generating data from gestural movement of hands and legs (as Troika Ranch and Palindrome

demonstrated in choreographies that relied on the new Isadora and Eyecon softwares developed by Mark Coniglio and Frieder Weiss), or moving in front of their distorted and distended doubles projected onto screens – it was the era of 2D/3D interaction in spaces that vibrated with flickering projections and apparitional video ghosts. Almost all the presentations at the IDAT festivals (for example at Arizona State University in 1999) included audio-visual syntheses (real-time digital signal processing) and graphic projections based on the kind of patch-based programming environments available at the time (Max/Msp had quickly become a favorable software used by musicians as well as dance tech artists, the latter intent on also using visual output derived from systems such as STEIM's BigEye, David Rokeby's Very Nervous System or other custom designed softwares).[10]

Fig. 5   Lisa Naugle, *Split,* 1999, International Dance and Technology Conference (IDAT) at Arizona State University. © Photo: Johannes Birringer

[10] Space doesn't permit a fuller technical description of some of the software systems that were used in performance, but I want to mention some of the developers: VNS (David Rokeby), BigEye and Image/ine (Tom Demeyer, STEIM), EyeCon (Frieder Weiss, Palindrome Inter-media Performance Group), MAX/MSP (David Zicarelli at al., Cycling74.com), Nato (Netochka Nezvanova), ChoreoGraph (Nick Rothwell, Barriedale Operahouse), EyesWeb (Antonio Camurri, Laboratorium für Musik-Informatik, Genua), Isadora (Mark Coniglio, Troika Ranch), and Keystroke (Eric Redlinger, Sher Doruff, WAAG). An overview of software development for performance is given by Scott deLahunta: <http://huizen.dds.nl/~sdela/transdance/report/>. deLahunta later organized the path-breaking workshop "Software for Dancers" at Sadler's Wells Theatre in London (October 2001). It was followed by "Performance Tools: Dance and Interactive Systems," a think tank I organized at Ohio State University in January 2002; cf. <http://www.dance.ohio-state.edu/workshops/ttreport.html>. IRCAM's website has an overview of research in interactive systems: www.notam.uio.no/icma/interactivesystems/dance.html.

As I learnt in the workshops I attended in the 1990s, lab-based experimentation involved new learning curves, the testing of software applications for dance and the connectivity between sites (in the telematic performances across continents pioneered, for example, by Company in Space), the strapping-on of prosthetic devices, and the first steps of discovering how to interact with cameras monitoring/capturing motion, translating the data into graphic or sonic outputs, and providing the initial experiences of *immersion* in 3d virtual environments (explored, for example, at Banff in a heavily research grant supported test bed environment described by Diane Gromola, Yacov Sharir, Thecla Schiphorst and others).[11] In these lab performances, which seldom led to fully developed works that could tour or be presented to wider audiences, we were to a large extent infatuated with the thrill of sensorial expansion or the characteristics of dynamic systems of human-computer interaction rather than with modifications of consciousness, reflecting on the military-industrial past of capturing/surveillance technologies or interrogating their ideological functions in broader cultural contexts. We used the sweetly named "BigEye" software but didn't bother about the increasing presence of surveillance cameras in the streets and public squares. Those who bothered, like Sher Doruff, used public webcams to devise flash-mob like dances.[12] And yet, the physical experience itself – becoming conscious of the deep structure of computer interfaces and learning how to *navigate* expanded spheres of movement requiring a reordering of the senses due to the increase in telematic or virtual interaction – should have been a crucial component for a critique of the futurist ideology driving dance tech.

3. Constructions of Embodiment: Historical Time and the Social (the 1980s)

> My methodology of "social choreography" is rooted in an attempt to think the
> aesthetic as it operates at the very base of social experience. I use the term
> social choreography to denote a tradition of thinking about social order that
> derives its ideal from the aesthetic realm and seeks to instill that order directly

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[11] Moser and MacLeod 1996.

[12] Cf. Sher Doruff, "Collaborative Culture," in *Making Art of Databases*, ed. Joke Brouwer, Arjen Mulder, Susan Charlton, Rotterdam: V2_ and NAI Publishers, 2003, pp. 70-94. See also her "WebCam Performance and Dramaturgy," http://interactionslabor.de/lab06/webcam.htm.

at the level of the body. In its most explicit form, this tradition has observed the dynamic choreographic configurations produced in dance and sought to apply those forms to the broader social and political sphere. Accordingly, such social choreographies ascribe a fundamental role to the aesthetic in its formulation of the political. I attempt to reconnect to a more radical sense of the aesthetic as something rooted in bodily experience…(Hewitt 2005).

In the years before the emergence of dance tech, one could observe a considerable emphasis in "choreographic configurations," produced in (post Judson) postmodern dance in the U.S and in tanztheater/physical theatre in Europe, that reflected a rather less abstractionist commitment to the development of languages resonating with an awareness of historical limits. While Hewitt focuses on early modern dance (for example in his analysis of Isadora Duncan's "antiauthoritiarian" impulse to realize a specifically conflicted "American" modern dance), a brief look at the Judson era might reveal that the avant-garde in downtown New York was a very site-specific phenomenon, unparalleled anywhere else, exploding with energies and cross-over impacts (nowhere more visible than in the 1966 collaborations on *9 Evenings: Theater and Engineering*, organized by Bob Rauschenberg and Billy Klüver) that left a lasting, if not always recognized, impression on the art and technology (EAT) movement and subsequent multimedia stagings in dance. Lucinda Childs toured her film-dance piece *Dance* in the early 80s*,* Bob Wilson, Meredith Monk, Laurie Anderson, and a few others premiered their intermedial performances[13] around the same time, and surely it depended on the venues you frequented whether you would see live audio-visual media performances.[14] In Europe, however, while video and conceptual performance art developed at the same time as the downtown New York scene – and social choreography found a spokesperson in Joseph Beuys's much disseminated ideas of the "social sculpture" – dance experienced a more vigorous transformation through Pina Bausch and her influential Wuppertaler Tanztheater. I find Ramsey Burt's recent review quite telling, and cite it here as anti-nostalgic

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[13] Chris Salter, interestingly, speaks of the body's limits when discussing technology that could "overcome its own physiological limits," and he mentions some of the same director/choreographers (did we all see the same works?) deploying an "external technoscenographic surround of sound, image and architectonic space" that placed performers' bodies into "precarious states of physical disorientation and risk." Cf. Salter 2010, p. 255.

[14] I had begun reviewing such work for Performing Arts Journal, and encountered many of the companies I wrote about at the BAM Next New Wave festivals, the Kitchen, PS 122, DTW, or the Kampnagel Factory in Hamburg. Some of the venues (such as Frankfurt's TAT, where I saw a riveting dance piece with moving video monitors, created by S.O.A.P.) don't even exist anymore. Nor do some of the companies, for example the multimedia ensembles of the 1980s Italian transavanguardia.

evidence:

> A pervasive air of nostalgia surrounds the current visit of Pina Bausch's Tanztheater Wuppertal to Sadler's Wells Theatre (2005). Many of the critics have dredged up yet again the old rhetoric about Bausch's cruel world of victims and abused women while the souvenir programme is full of reminiscences by eminent British actors and directors about the impact Bausch's work had on them when they saw her company during its first London season back in 1982. And here we are 23 years later with the London premier of the piece she made that year, *Nelken*, with its now famous set of a field of plastic carnations that, as the evening progresses, are gradually trampled down by dancers, security guards restraining uneasy Alsatian dogs, and stunt men. And here at last is Dominique Mercy shouting 'What do you want? What do you want?' and pushing himself to perform the bravura ballet feats he has been showing in this piece for over two decades – 'Is this what you want?' When it was new, Mercy's solo was part of Bausch's radical critique of the social construction of the dancing body. It was not just that dancers talked, but the fact that they talked about their roles as dancers in ways that troubled and disturbed aesthetic norms. In the early 1980s Bausch told Raimund Hoghe – then her dramaturg, now much in demand as a dancer and performance artist – none of the company were against dance: 'But what I consider beautiful and important here, I do not want to touch for the time being – because I think it is so important. You have to learn something different first, then perhaps you can dance again.' (Burt 2005)

Resisting dancing is a polemical strategy of the contemporary European Konzepttanz, soon to be viewed nostalgically, for sure, once you remember having faced Jerôme Bel's provocative non-dance dances and wondered about the excruciating self-reflexivity and questioning of the dance apparatus they ceremonially put up front. For Pina Bausch's dancers, in the early 1970s/1980s, learning something different was also excruciating, as it meant rehearsing a form of deconstruction[15] that cut close to the bone, re-examining basic emotional needs, obsessions, anxieties and scars that are viscerally inscribed in the flesh, encoded by cultural practices, social and racial constructions as well as gendered conditions of use. In many of their early works, these constructions of embodiment were remembered, articulated, repeated and exhaustingly acted out by the Wuppertal dancers, and many in the company would do

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[15] In the context of our historical track back, deconstruction (arriving via Jacques Derrida and French poststructuralist writings) without doubt signalled the most radical and uncompromising literary theory to be slowly/hesitatingly adopted by some in the academy, vilified and contested by many others in the conservative establishments; parallels in the performing arts (and other cultural sectors such as the music and film industries) could be found as well, and would contribute to a critique of the gate keepers, in the producing/curating field and in academic/discipline training (how many dance tech curricula have been developed since the 1990s, how many intermedia arts and digital arts programs have been cut and lost their funding during recent economic downturns?).

so for many years (e.g. *Café Müller, Nelken* and *Kontakthof* are of course still in the repertoire, even as some of the initial cast are now in their 40s and 50s, and Bausch continued to work with them as well as creating a version of *Kontakthof* with non-professional dancers over 65 years of age).

Fig. 6   Pina Bausch Wuppertaler Tanztheater, *Kontakthof* [1978], presented with non-professional cast aged 65 and over, Barbican Theatre London, 2010 © Photo courtesy of Vanja Karas.

We would not think of these performances as enacted "technologies of self" (Foucault), but indeed their work pointed emphatically towards a tendency in tanztheater, back then, surely encouraged by feminist probings into gender constructions and power relations, to challenge the disciplined Fordist bodies performing for audiences ("What do you want? What do you want?") and to unearth, from re-membered fractured stories told and danced, the pervasive, repressive constructions of sexuality and normative behavior in a post-war bourgeois culture riddled with self-denial (I am referring to Germany but wish to keep Hewitt's notion of social choreographies, and the fundamental role of the aesthetic in its formulation of the political, in play, as such physical theatre practices also happened elsewhere, in the UK, Spain, the Netherlands, Yugoslavia, South Africa, Brasil, etc.).

In fact, different technologies of self also became clearly visible in the early 1980s in black expressive culture, moving into the streets with the beginnings of break dancing happening precisely alongside the technological developments in music and the slowly surging popularity of hip hop in popular television, film and music video (cf. de Frantz 2004, pp. 77-80). In France today, "urban dance" (hip hop) draws larger audiences than concert dance, and while this was yet unthinkable in the 80s, the seeds of deconstruction were planted: the peripheries (the streets in the South Bronx; Mangueira; Wuppertal) contested the metropolitan centers of dance and thus the idea of a "choreographic center" – legacies that continue to receive major state support in most countries supporting high cultural traditions and/or national ballet companies. (Butoh functioned in the same contestatory way in Japan, with Hijikata's "dance of darkness" provocatively staging a kind of monstrous vision of deformed, marginalized bodies of north-eastern regions remembering trance rituals and peasant ceremonies linked to a cold, starving countryside.) Tanztheater and physical theatre proffered new ensemble working methods as well, changing the politics of production and encouraging collaborative creation; the process of working from the personal to the political changed hierarchies and enabled experimentation. The increasing availability of accessible tools (camera, recording/editing devices) also made it easier for artists to redefine their vocabularies or the relationship of the spectator to the performance. The 1980s also saw the emergence of an exponentially growing number of screen dances (video dance), with public television showing a stronger interest in dancing and commissioning video dance.

Hip hop and techno raves (DJing/VJing) contributed to the formation of live media performance cultures that emphasized collective sensory immersion experiences, the coming-together of bodies (or the "social kinesthetic")[16] to the streaming rhythms and beats. However complex the differentiations amongst "connected bodies" within globalized youth cultures would have to be (if one parsed the radical political and the

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[16] Cf. Martin 2004, p. 54. In this context, see Michel Gaillot, *Multiple Meaning: Techno. An Artistic and Political Laboratory of the Present*, trans. Warren Niesluchowski (Paris: Éditions Dis Voir, 1999). For a history of screen dance, see Judy Mitoma, Elizabeth Zimmer, Dale Ann Stieber, eds., *Envisioning Dance on Film and Video (*New York: Routledge, 2002); see also Frances Dyson, *Sounding New Media: Immersion and Embodiment in the Arts and Culture (*Berkeley: Univ. of California Press, 2009).

regressive commodified versions of hip hop's preferred techniques and vocabularies in the manner of Paul Gilroy's analysis of black atlantic culture),[17] the connecting oppositional energies, and not the later mobile privatizations of consumerist capitalism, arguably mobilized the physical, oral and aural practices of a generation born during the upheavals of the 1960s.

4. Digitally Born: The New Globalized Social (the 2000s)

> Choreography has been adapted and introduced into the fabric of social reality as a kind of temporal and spatial form of thought, a perceptual framing device, a self-actuating template for an ecologically reconfigured experiment in contemporary subjectivity. The cognitive scientist Francisco Varela has said, 'The blind spot of contemporary science is experience.' Social Choreography has opened an arena of cultural interplay between artists and audience, a lived and interconnected world of relationships, patterns and dynamics, a region of new and subtle observational capacities in which a deeper level of interdependence, an implicate order of mind and nature, has emerged as a model for a new and regenerative social reality. (Klien & Valk 2008)

The generation of "digital natives" knows no life without ubiquitous computing and network technologies, and emerging artists today will have been thoroughly familiar with the interactive design and the transcoding of diverse data streams that my generation had to learn to adapt to older but still supple forms of analog-digital assemblages introduced to choreographic/compositional methods of working. Working after the turn of the century meant confronting the increasing spectralization of corporeality in the electronic configurations tested in new media arts and installations, new softwares appearing at every corner, games and virtual environments overtaking the mass appeal of film and television, social mobile networks re-patterning what Klien and Valk optimistically think of as our global ecology of interconnected relationships. The blind spot indeed is "experience."

Gilroy skeptically speaks of the new "cultural software" of sampling and downloading, producing a "manufactured immediacy" in the "aesthetics of the mashup" (Gilroy 2010: 128), his critique being directed at postmodern consumer culture and its endless technological resources that have transformed the public sphere

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[17] Gilroy 2010, esp. pp. 127-77.

and the mechanisms of social memory. I would follow Gilroy, along with Toni Negri, Paolo Virno, Boyan Manchev and current Marxist critiques of the neocolonial vampire forces of the "Babylon System" (Bob Marley), in being less sanguine about the myths of interactivity. In my more limited historical look back, I would first of all remember the last decade as one that was marked by the promises of the interactive paradigm, and the commonly accepted collusion of the real (the here) and the virtual (the there) through distributed networks/telecommunications. I remember that our work in the creative studio or techno-laboratory was largely dedicated to making sense of interactivity and real-time signal processing demanding proficiency with a keyboard (programming a patch environment and learning how to manipulate incoming data from cameras, sensors, microphones, and mocap systems) and improvisational performance learning how to behave/navigate in responsive systems and explore the sensorial or perceptual adjustments we had to make when "dancing" with gesture-controlled environments.

I will come back to the persistence of gesture at the end (contra Agamben who has claimed that the social-gestural of ritual behavior has been diminished). Admittedly, the mappable and unmappable qualities of gesture in computer-dance interfaces were rather exciting, forcing us to investigate how technological systems operate prosthetically and also making us aware of the concepts of "environments" (system behavior) and information processing that linked programmable features with newly blurred boundaries of practice (dance) and vocabularies derived more frequently from music, film, animation, games and computing sciences. The web environment was quite new, and in 2001 I was invited to join a collective of eight groups from different locations in the US, Europe, Brazil, and Japan, eager to do research in telematic space. Together we formed ADaPT (Association of Dance and Performance Telematics) in order to build a shared platform for networked collaborations with live streams that allowed us to transport our newfound knowledge to the larger ecology of WorldWideWeb.[18]

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[18] Earlier pioneers of the development of alternative telecommunication contexts (satellite transmission), such as Kit Galloway and Sherrie Rabinowitz, had worked with such collaborative and transcultural concepts already since the late 1970s and 1980s. Discussing *Hole-in-Space, A Satellite Communication Sculpture*, Galloway describes their interactions as the development of a "social situation with no rules," using performing arts as "modes of investigating the competence to achieve, sustain, invent and approxímate new ways of being in the world." Cf. Chandler 2005, pp. 166; 172.

Initially, our collaborative work experimented with connectivities, infrastructures, and languages we could use. We had to decide on shared software and agreed-upon protocols before improvising dancing together, following the model of free jazz or hip hop jams. *Flying Birdman* (2002), a collaboration I directed, proposed a dramaturgy built on cybernetic principles of the feedback loop and the poetic structure of a *renga*. As "roles" were passed on, from site to site, the behavior of the *digital objects* became unpredictable and thus affected the behavior of the system as a whole. The loop narrative of *Flying Birdman* was translated into streaming video and audio, and different components of the story were developed by the participating sites. The narrative became a Roshamon-like spiral, distributed among the participants. Each site would experience something different. The dramaturgy only referred to the time frames of each level of the game and the equal distribution of roles/media, not to the evolving content. One of the challenges in such telepresence performance is the incorporation of the camera interface into the performance, with dancer and camera operator working very closely together in a restricted area that has to be well lit. Camera and microphones are the key interface between performer and network technology: they are the basis for linking the different site-environments into meaningful relationships between the visual and kinaesthetic forms and digital outputs. Another challenge is the strategic use of the small delays in internet transmission and the degradation of image and audio transfers. Depending on the choice of thematic content, the potential break-ups and fragmentations of the video stream become part of the aesthetic contingency. What is contingent is the transmission, on the one hand, and the evolving interplay of the autopoietic creative behaviors.

The interactive paradigm we had first explored in the dance studio, and which showed up in numerous staged performances by dance tech artists who pioneered the use of real-time processing (e.g. Troika Ranch, Company in Space, Susan Kozel, Kirk Woolford, igloo, kondition pluriel, Wayne McGregor, Shobana Jeyasingh, Pablo Ventura, Christian Ziegler, Frieder Weiss, Lisa Naugle, Gideon Obarzanek, etc), was here transferred to the architecture of networked environments, both on the formal and the technical level of mixing the streams and producing distributed content. I had been unaware of such telematic performances until I experienced Company in Space presenting *Escape Velocity* at the fourth "International Dance and Technology"

(IDAT) Conference at Arizona State University (1999). In today's world of Skype teleconferencing and locative media (using sophisticated GPS Systems), the bridging of distances might look commonplace, but a decade ago the merging of a real and a virtual dancer was riveting as it also contributed to the conceptual imagining of mixed realities of shared presence: A shared presence through movement translated into data streams but re-presented televisually/telekinetically.[19]
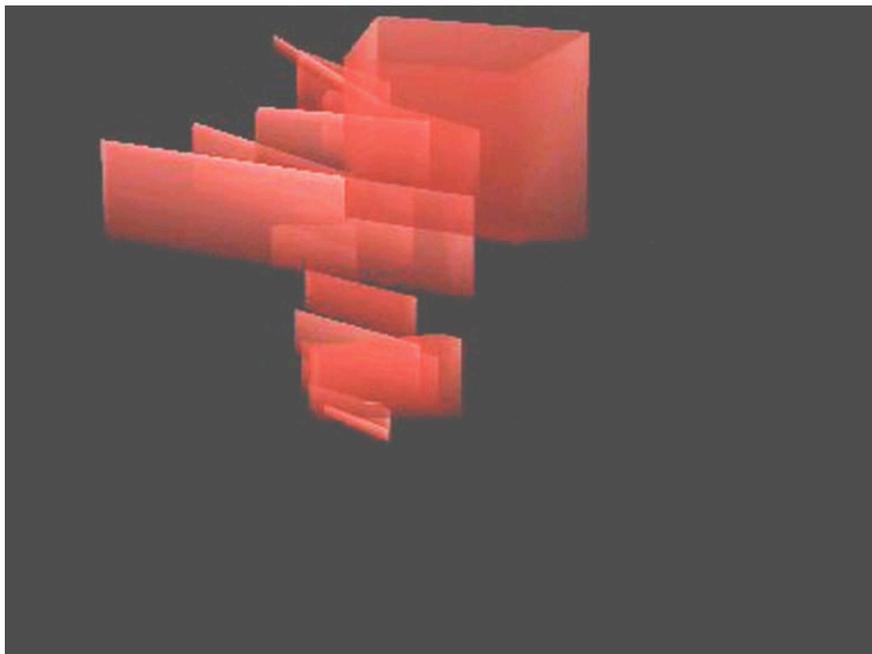

Fig.7. Hellen Sky and Ruth Gibson dancing together telematically. *Sentient Space,* tested at Digilounge Chelmsford, UK, February 2004. Photo: Johannes Birringer.

The involvement of the public both on-site and online, however, and the transcultural integration of different platforms and behaviors, were more complicated back then, and continue to be so. As a social process, it is difficult to make any claims for the reception of the translocal events. Streams, and projected images in general, are not actionable. The local visitors we had invited to the studio witnessed the actual processing of distributive content, the expressive construction in front of their eyes, which became the webcast on the screen mixed with the rhythms of other incoming streams. I believe it was rather more difficult for online audiences to feel the

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[19] *Sentient Space* [Fig. 7] reveals a more complex form of telekinetic merger, as movement data, captured in real time from Sky and Gibson (in exoskeletal motion sensing suits), were transmitted and processed to create "soft bodies," i.e. no attempt was made to work with figurative and representational bodies, and the data were not mapped onto animated figures but stretched, folded and manipulated to create "space-models." The merged images act like the congealment of the space in-between the two dancers performing in distributed locations.

resonating synergies of these constructions or recognize the energies and skills involved, dancing and acting becoming a live filmic practice through the phrasing and framing of the action, choice of camera angles, camera movement, and in-camera editing or mixing. All this is now challenged again by 3d design and AI programming possibilities (using re-engineered game engine software) allowing a moveable camera inside a virtual environment to be "controlled" by performers/users interacting with immersive and mixed realities.

What is implicit in my account of this work in the first years of the new century (2001-2005) is the inevitable concern that evolved for shifting "interactivity" away from the trained performer (acting as if on a stage) to the audience and the "user" of participatory/interactive systems. Choreographers involved in recent research projects have shifted their attention to audience empathy and direct engagement, and Emio Greco | PC's installation *Double Skin/Double Mind* (2007) is one example of a company opening their physical movement practice to audiences invited to learn or enact some of the principles of choreographic, generative processes – inner intentions as well as the outer shape of gestures and phrases. The company installed an

Fig.8 Emio Greco | PC, with Bertha Bermúdez, *Double Skin/Double Mind,* installation (2007). Photo: Courtesy of the artists.

interactive system in the foyers of theatres where Greco's work was shown, inviting audience members to dance with the "living archive" of Greco's principles of movement, in front of the digital mirror created through video, computer notation graphics and other co-descriptions. A similar, even more extensive (online) exhibition project for "sharing questions of movement" (deLahunta 2007, p. 70) was developed into William Forsythe's *Synchronous Objects*, in collaboration with the Dance Department and the Advanced Computing Center for the Arts and Design at Ohio State University. This archive features a large set of data visualization tools for understanding and analyzing the interlocking systems of organization in the choreography of Forsythe's *One Flat Thing, reproduced* (2000). The systems were quantified through the collection of data and transformed into a series of "synchronous objects" that work in harmony to explore those choreographic structures, reveal their patterns, and re-imagine what else they might look like. "Our goal in creating these objects," the authors explain, "is to engage a broad public, explore cross-disciplinary research, and spur creative discovery for specialists and non-specialists alike." (http://synchronousobjects.osu.edu)
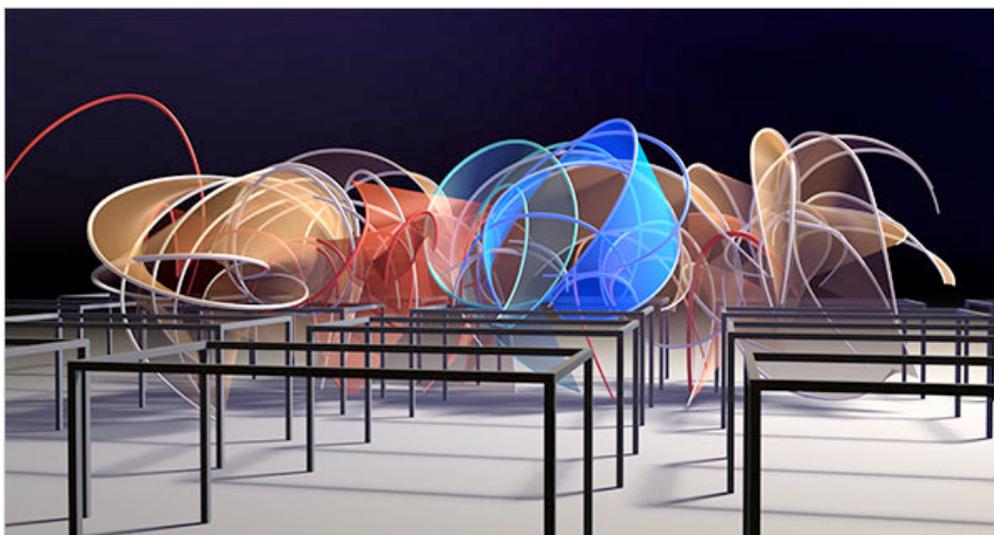

Fig.9 *"3D Alignment Forms,"* Animation of dancer's traceforms in *One Flat Thing, reproduced* mapped to 3D space. © Synchronous Objects Project, The Ohio State University and The Forsythe Company.

The graphic co-descriptions and topologies shown on the website are complex, introducing particular choreographic vocabularies (alignments, cueing, hook-ups, agreements, isometries, counterpoints, etc.) that, for example, show how dancers give

and receive visual cues to and from each other or how alignments occur in every moment and are constantly shifting throughout the group. Norah Zuniga Shaw, who works on the OSU research team, suggests that alignments are in fact a concrete phenomenon in dance and also useful for thinking about understanding complex relationships in many arenas and specifically in interdisciplinary collaboration. The "objects" – animations, graphics, computer applications – are exploratory, reflecting and embodying, as Shaw claims, the intersecting and transformative disciplinary relationships the researchers experienced making them. The objects are not a substitute for live performance but offer alternative sites for understanding Forsythe's work and seeing its choreographic structures unfold. (Shaw 2009)

While this archive reflects advanced research happening now in the dance tech community at large, often grouped around choreographers' initiatives to work directly with research teams (or vice versa) to preserve their work or make it more widely accessible, the festival platforms for showing such work have slowly disappeared (IDAT never resumed its international meetings after 1999 although I sought to carry on the "tradition" when I organized "Digital Cultures"[20] at Nottingham in 2005; Monaco Dance Forum stopped its digital dance showcase, curated by Philippe Baudelot, in 2006; DanceDigital in Essex recently lost its funding, and London's ICA also discontinued its new media performance programming). This might simply indicate that there was no more need perceived among curators or producers to highlight/separate out the "digital" from contemporary performance. Dance companies around the world may integrate projections, robotics and computational interfaces as a matter of fact, as it happened with Cena 11's production of *Pequenas frestas de ficção sobre realidade insistente* (2007), Wayne McGregor's recent Random Dance Company works, or Australian Dance Theatre's *Devolution* (2006, choreographed by Garry Stewart, with Louis-Philippe Demers' prosthetics), or use a complex digital interactivity in one piece (e.g. Chunky Move's 30-minute *Glow,* choreographed by Obarzanek with programming by Frieder Weiss) but not in the next. While experimentation with performance technologies continues to expand, with

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[20] For an extensive online archive, with research library, of the 2005 "Digital Cultures" festival, see http://www.digitalcultures.org. See also the special issue on "Digital Cultures" in *PADM* (*International Journal of Performing Arts and Digital Media)*, 2:2 (2006).

younger, digitally born artists writing their own customized software (cf. the Portuguese group SWAP or the Croatian collective BADco) or hacking into game controllers to devise new wearables (wireless sensors, microcontrollers, transmitters), there has also been a growing focus over the past decade on installations with participatory media which engage audiences in play, social ritual, and interactional behavior not centered self-reflexively on "technologies" (which is the critique Quaranta levels against the failed niche culture of new media art exhibiting its complicated toys) but on the psycho-physical, emotional, and even spiritual dimensions of "fateful actions" that might have consequences, as Erving Goffman had argued in his socio-dramaturgical description of human interaction.[21]

But what are the consequences for audiences moving around an interactive installation that responds, as a living-technical organism, to behavior through state shifts and changing properties of the system? What are low-level (reflexes) and high-level responses from a dynamical system (with intelligent agents), and what response values are experienced by the human inter-actor? While some critics have stressed the connection between interactive installations and "relational art" (Bourriaud 2002; 2009), noting that the postmedia art which is "most aware of the cultural, social and political consequences of the new media is in line for a position of key importance and unexpectedly reacquires a social function: to combat the flattening of culture with complexity, numbness with sensation and standardization with critical thought" (Quaranta 2011, p. 11), I often wonder whether dance can muster such critical energy when it gets "installed" as DIY playground, catering to the latest participatory fetishisms of the museums, as I experienced it in *Move: Choreographing You* (Hayward Gallery, London, October 13, 2010 – January 9, 2011). *Move,* like other recent exhibitions in globalized metropolitan museums, writes dance into the world history of visual art and exhibits "choreographic objects," such as Forsythe's *The Fact of Matter*, a large installation of gymnastic rings suspended at varying heights from the ceiling that invited you to climb into and clamber through, reminiscent of other "transitional objects" for users to get entangled in, such as Lygia Clark's *Elastic Net* (1973), also shown there alongside Franz Erhard Walther's fabric elements

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[21] Cf. Goffman 1967, p. 164.

(reproductions of *1. Werksatz*, 1967) inviting two visitors to hold each other's balance (alignment?) as they lean backward with the stretched canvas wrapped around them. Simple objects become instruments for simple action, not quite like the kind of perceptual challenges Chris Salter sees in performative installations that harbor narrative theatrical dimensions or address behaviors in situations designed to elicit perceptions of what a living system, or "technical being," does or becomes, how actions and dynamic exchanges are understood or known, to what extent technical ensembles or environments influence the social conventions of performativity (the

Fig.10 Public visitors playing/exercising inside William Forsythe's *The Fact of Matter*, 2009. Photo: Alastair Muir/Courtesy of Hayward Gallery.

enactments of the performer-spectator), and to what extent responsive hybrid media environments can respond to participant behaviors or be perceived to have their own agency or autonomy (cf. Salter 2009). On the other hand, I hesitate to judge simple actions/exercises, as they may not be as simple as they appear.

5. The Gestures of Relational Performance

The reorientation toward participatory relations in "choreographic systems" is a significant development in the performance and media arts over the past decade, and the steady growth of hybrid works/working methods also reflects the rise of social

networks[22] and open source,[23] and thus a wide, variegated community of internet users. The term "community" is of course largely uncritical, and would need careful analysis, since social networks do not necessarily constitute community. While trans-local collaborative creativity has been furthered by the internet, it also has to be noted that a new vernacular, such as YouTube with its "viral video," cannot replace physical rehearsal and the face-to-face – and thus the attention we need to give to how our gestures relate to the political economy in which we work as producers or users/downloaders.

Finally, I return to the question of the political gestures in dance in the era of social networks which is also the era of globalized standardization, control and censorship, terrorism and the autoimmunity crisis of biopolitics, disenfranchisement and unequal access to the means of production and identity construction. The cutting-edge experiments of dance tech in the late capitalist West always bought into the technological associations with futurist ideology, expecting a new synthesis while neglecting to remember the failed models of "integration" – in dance and in social organization of community (or "immunity," as Esposito calls it) – that haunt modernity's technoscientific rationality. The cyborgian dances and mocap animations (developed by Yacov Sharir, Ruth Gibson/Bruno Martelli, Paul Kaiser/Shelley Eshkar/Marc Downie, and others), which gained a certain amount of recognition with

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[22] Amongst others, www.dance-tech.net has built a platform developing an international online community with thousands of members, exploring the use of the Internet and Web 2.0 technology for generating innovative and sustainable ways of producing/disseminating knowledge, sharing information and debate, and recently adding collaborative journalism projects, interviews with practitioners, and the shared management of the dance-techTVLive channel. The platform was initiated in 2007 by dancer/on-line producer Marlon Barrios Solano to "provide dance and new media artists, theorist and technologists with the possibility of sharing work, ideas and research, generating opportunities for interdisciplinary and collaborative projects that explore innovation and the impact of new technology on the performance of movement and human creativity" (http://www.dance-tech.net/profile/network_producer).

[23] For example, Arduino, an open-source micro-computer, has been used frequently to create hardware and software that can interface and interact with the physical world, objects and performance environments. Due to the combination of open design, easy-of-use, affordability and, typically for open source, the knowledge-sharing that has arisen from its on and offline community of users, the Arduino has become attractive to interaction designers. During the 2010 Live.Media and Performance Lab I directed with Mark Coniglio at EMPAC, Victoria Gibson's *Bandwidth* – a triptych projection work of abstract moving graphics "dancing" to the music she had composed – was controlled by her in real-time, using a proximity sensor and Arduino microcontroller to affect, with the motion of her hands, the size and dynamics of the visuals. Following her presentation, she demonstrated the interface she had created over just a few days, explaining her plan to perform her compositions wirelessly (as it was done in the early Theremin performances by Clara Rockmore), moving the visuals on stage as if she were doing an instrumental performance.

Hand-drawn Spaces, *BIPED*, and *how long does the subject linger on the edge of the volume…?* seemed to gesture towards a transcendental sublime, in the familiar romantic tradition. These cyborgs are part of our unrepenting nostalgia, symptomatic of the West's yearning for a spirituality that is lost (world music has tried to do the same, deploying its hard and soft corporate power to transport its appropriated soundtracks to globalization, mimicking ethically infused aspiration under a marketing category). The digital stage dance reflected serious high-cultural pretension, inadvertently remaining indebted to its relentlessly Western/US-inflected abstract modern dance vocabulary, without any of the parodic trickster elements that qualified, for example, Guillermo Gómez-Peña's "high-tech Aztec" performances, Robyn Orlin's grotesquely comic choreographies confronting South African reconciliation, Lia Rodrigues's expressive evocations of life in the Brazilian favelas, or Jayachandran Palahzy's patient efforts to create carefully modernized and digitally expanded interpretations of classical Bharatanatyam and Kalarippayattu.

But Western digital dance also appeared alongside the uncanny clattering motions of robots and movatars (Stelarc), and the awkwardly dexterous moves of avatars and manga characters – disseminated via the burgeoning popular game cultures and Japanese anime, and soon discussed in the framework of "posthumanism." Slowly, neuroscientists and biologists got interested in motor-sensory research with dancers, some choreographers wrote program code for industrial robots, and others built interactive installations for autistic children. Palahzy, who directs the Attakkalari Center for Movement Arts in Bangalore, recently implemented the first Diploma program in Movement Arts and Mixed Media in India, a program seeking to traverse beyond outer forms of diverse physical traditions to the very sources of movement principles embedded in physical traditions, focussing on their complementarity while also drawing upon the conceptual tools of digital technology.[24]

Each of the choreographies and lab experiments I have mentioned carry specific gestures, of course, and it is perhaps misleading to ask whether dance tech

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[24] Palahzy's *Nagarika* ("Integrated Information System on Indian Physical Expressions through Technology")*,* a DVD created in collaboratiion with Christian Ziegler and ZKM, is his initative to creating a new digital resource in India in the field of the performing arts. In India, Raqs Media Collective has been particularly prominent in their socio-political activism, drawing attention to economic and urban issues as well as promoting open source in their performative collaborations.

experimenters worried about the social content of their work and how they measured the importance of their actions and inventions within the social structures of their creative networks. Much too frequently, however, dance tech performances were configured as showcasing "new technology," rather than as artworks that transformed our knowledge about the deformation of bodies in image worlds, about seeing and hearing the world out there – and problematizing what our sensors can or cannot "see" inside us, parsing the visible and invisible, i.e. characteristics that our performances have in common with projects of domination or emancipation. And, interestingly, what are the contradictions between the arcane research manifested in *Synchronous Objects* and the gratifyingly enjoyable exercise workout Forsythe installed with the popular *The Fact of Matter*? Or are there no contradictions in working both ways? After the exercise work-out, turning around the corner in *Move: Choreographing You,* one encountered an on-site piece commissioned from OpenEnded Group, filmed in 3D and projected as a triptych onto different wall levels of the stairwell. An OpenEnded collaboration with choreographer Wayne McGregor, *Stairwell* had a muted, eccentric presence, at least in my observation it seemed puzzling to the visitors – a futuristic computational artwork of cascading, floating imagery that traces McGregor's movements but nearly dissolves the human form into perplexing galaxies of light pixels, lava streams of a body without organs, sinewy grids whirling through a holographic cosmos. No explanation was given why this particular (non-interactive) piece was chosen to choreograph you.

Fig.11 A visitor "interacts" with OpenEnded Group's digital 3d installation *Stairwell* in *Move: Choreographing You*. Photo: Alastair Muir/Courtesy of Hayward Gallery.

The computational mediality is addressed by Boyan Manchev's pertinent question, namely whether contemporary dance gestures at resisting "pure mediality" (Agamben) and the politics of potentiality or whether it buys into them? Manchev believes that "the society of the spectacle undoubtedly complies with technology-based, post-industrial capitalism, its logic of production as well as the modern logic of representation: it is the outcome of hyper-technologization and functionalization, codifying life and prescribing processes of subjectivation, which are nothing less than forms of subjugation. The new model up for debate, as it surpasses the model of developed modernity, introduces a completely new commodity to the game: the forms of life itself."

The performance of forms of life, he argues, goes beyond the staging of representations or the spectacle (images of life). In the larger economic sense, "performance" has to be considered perverse:

> In its movement it neither liberates suppressed organic forces – and with it labor force and the subject – nor the object. It rather opens a sphere of unlimited modifiability – which will be described as *per-version*…The use of technology and media hyper-technology to experiment with the potentiality of the body seems unlimited. Beyond the 'banal' heroism of the standardized organic working body in industrial production, think of the media performances of inorganic bodies, which could be subsumed under the slogan: 'there are no limits to physical performance.' Transhuman bodies, cyborg bodies. The potentiality of the body is always a plastic potency. Thus the politics of plasticity considers the body an object (in a passive sense) of multiple types and codifications of development – the body is modifiable with the sole aim of reproducing an archetypal form. Perverse capitalism de-substantializes this archetype by presenting it as the mould of a 'never-before-seen-form,' which in turn is necessary to keep the perverse cycle of the market going. The perverse politics of plasticity shapes vectoral techniques of the development of the body, which is perceived as the available and malleable plastical substance of life forms (Manchev 2010).

There is no shortage of perspectives that address the political economy, but if the shift to relational forms of labor is as radical as some have suggested – for example Paolo Virno[25] – then all work now is performance, which implies that the means of relation, where the "vectoral techniques of the development of the body and its prosthetization

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[25] Virno's *A Grammar of the Multitude: For an Analysis of Contemporary Forms of Life* offers a provocative theory of contemporary production, arguing that the emergence of the post-Fordist mode of production implies the increased value of relational communications, and suggesting to use the category of "virtuosity" to analyze the characteristic labor process of post-Fordism.

have now become a site of political engagement," are critical. What does it mean, for us, to claim, and reclaim, aesthetic autonomy on the level of gesture, of inter-action, or to dance the boundaries of our bodies? To dance them showing that bodies cannot do everything?

If the transformative promise of play, and the transcendental technological sublime, runs through all major avant-garde movements of the 20th century, then how can play or experiment, as an unruly principle of the political, fuel "autonomous" practices of disruption or disorganization – Manchev's hope for the "resisting dance" – rather than being appropriated into bio-capitalism's modifiability of life's conditions? "Play" and "modifiability" seem to be underlying ideologies of the dance tech movement, and they paradoxically both act as the counter-principle of (productive) labor *and* concur with perverse capitalism, feeding into the discourses of innovation, competition, excellence. A great number of us have been offered positions in institutions of higher education or research clusters because of the knowledge/expertise we claim on the codification of bodies, of movement. From the 1970s to the 2010s, performance technologies have contributed to the formation of new *virtuosities* (exactly the opposite of what the Judson era dancers and artists, if we believed Yvonne Rainer, postulated). However, if we follow Virno's understanding of late virtuosity in the post-Fordist world (he extends the label to any form of action that is socially oriented and does not result in an "end product"), then the process-oriented work we do, in all its exuberant, brittle, awkward, misdirected and exhausting ways, may somehow contribute to impeding the sampling and commodification of life in perverse capitalism. Dance tech has now reached the end of some of its pretensions; it can also build on many of its cooperative strengths and eccentric virtuosities.

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