<u>Sing the Body Electric: Dance and Technology</u>
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Digital technology and the internet, testament to the Information Age, are as revolutionary now as Johannes Gutenberg's (1400-1468) movable-type printing press was to the largely illiterate Europe of his time. Television and computers have become the principal socializing agents of the early 21st century; the mediation of human by machine has spawned a new aesthetic. The world wide web has redefined our habits of communication. Modes of production never before available to individual consumers are now readily accessible and relatively inexpensive. Digital interactive multimedia and virtual reality have blurred boundaries between consumer and producer, audience and performer. We have embraced information technologies in varying degrees of saturation, and dance, as an expression of our society, is affected.

In our discussion of dance and technology, we need to establish a common vocabulary. Random House Dictionary (1967) defines technology as "the branch of knowledge that deals with industrial arts, applied science and engineering ," or "the sum of the ways in which a social group provide themselves with the material objects of their civilization."[1] Technology, then, is both an abstract concept and the socially constructed material of that abstraction. Dance is concerned with the abstraction of the body, both conceptually and materially, *and*, the always tensive balance between subject and object. The body is, and has always been, the primary technology of dance.
The technologies that concerns us here, however, are not the material extensions of the body but, rather, the digital or virtual extensions of the body. The pointe shoe, for example, is a defining technological extension of the style of dance known as ballet yet few authors in the 21st century would consider this specialized footwear as *dance technology*. *Dance technology* in the 21st century is the transmutation of the corporeal art of dance into the non-corporeal virtual space/time dimension. The aim of this essay is not to refute or champion *dance technology* as a viable discipline, nor is it meant to list the groundswell of digital art actively being produced. Given the current rate of product development that would prove a Sisyphean task, ensuring that this article would be obsolete before it is even published. What concerns the authors most are the provocative questions stemming from *dance technology*:

- If dance requires the human body moving through space and time, can it speak to an age that has become fully mediated by the machine - the *posthuman* -where all interactions are mediated by the machine, where human interaction has been substituted by virtual (re)presentation of machine interface?
- Does dance technology require the human body or, as proselytized by cyborg performance artist Stelarc (b.1946), has the body become obsolete?
- Is mediated dance "dance" or a new hybrid form that takes on characteristics of both dance and media?
- What are we saying about our identity as corporeal dancers if we morph our identity to be defined by non-corporeal dance?

- ❧ Is there such a thing as cyberdance, virtual dance, and dance robotics, or are these just cybernetics, animation, and robotics that utilize dance principles?
- ❧ Can mediated forms of dance (and performance) create the same sort of direct performer/audience interaction that is requisite for a live performance to exist? What does this say about the efficacy of performance as transformative event?
- ❧ Can live performance be substituted by virtual performance? What does this say about dance as expression of a cultural identity?
- ❧ Can dance, which is based in movement as the primary extension system of the human body in space and time, create cultural expressions that are relevant in a society that is (re)presented by digital extensions of the mind existing in virtual, non-linear expressions of space and time?

The authors do not claim that technological invention and utilization are outside of direct human experience; technological invention is socially constructed. What separates humankind from animals is the ability for abstract conceptualization and the ability for praxis. Biologically, we are relatively inferior: we have little hair to protect our bodies from the environment; we have no fangs or claws with which to hunt and kill for food or protect our clan; we are locomotively slow, inhibiting pursuit of prey or flight from danger. Yet, we possess a superior brain that has the capacity for abstract reasoning. In order to survive, we developed complex extension systems that increased our range of human capabilities: movement, gesture, and language; shelter and clothing; tools, weapons, and technology; politics, economics and government; religion and art.

The Industrial Revolution drastically altered the cultural landscape from traditional agrarian societies. Communities were redefined as they moved from spacious, rural locales into cramped urban centers. Capitalism, Fascism, and Communism vied for hegemony with the working masses caught in the middle of the struggle. All three systems adopted the machine model as ideal paradigm: Capitalism utilized the machine in its division of labor and the objectification of the worker to maximize profit; Fascism revered the machine for its speed and efficiency, always striving towards the ideal of purity; and in Communism, the machine personified unity of effort, empowering the collective while maintaining order.

In the early 1950's, military spending funded research into the burgeoning phenomena of nuclear physics, cybernetics and information theory. Cyberneticists and information theorists postulated that human communication systems and human information neurological processing networks could be reduced to mathematical formula. The ultimate goal was to create an artificial intelligence or artificial life form that evoked the ideal as imagined by the early modernists, that is, machines that could speedily and efficiently maximize profit, while maintaining complete control, obliviating human worker deficiency or deviancy altogether. The problem inherent in these theories, however, were and still are in the human brain's capacity for abstract reasoning; in other words, our ability to learn and creatively solve problems.

The act of digitizing reduces communication through movement of the body to information code, that edits out, for sake of efficiency, any confounding variables. The three-dimensional, embodied life of the physical form is compressed one-dimensionally into a stream of "1's" and "0's". Digital media creates an electronic virtual space, requiring an outlay of mental activity with little to no physical involvement. Dance is a physical activity in real space that combines physical and mental acuity. The creation, execution and interactive participation in digital dance is essentially disembodied. It is not a far stretch to suggest that we have fully embraced Cartesian philosophy ("I think, therefore I am") that perpetuates the mind/body split as the ultimate realization of mankind. The machine, as a further abstraction of the word is a continuation of the mind/body split. We continue to move further and further away from our own corporeality. Technology, in its most extreme mediation, has merged with the human physical body to create a posthuman *machina sapiens* .[2]

Dance technology falls into two main categories: 1) live dance performance that is affected through the use of various technologies; 2) technologically mediated (re)presentations of dance. The impact of technology upon dance is not a new phenomenon. Dance performance has made use of available technologies to extend theatrical illusion since pre-historic shamans donned masks and costumes and made dramatic use of fire. The Romantic ballet had fairies flying in harnesses, and ushered in the pointe shoe in the early 1800s to imitate Marie Taglioni's (1804-1884) incredible strength of feats. Loie Fuller (1862-1928), fascinated with lighting and hundred foot fabric extensions, enthralled early 20th century audiences with never before seen special effects. Leni Reifenstahl (b.1902), a dancer in movement theorist Rudolf Laban's (1879-1958) early German movement choirs, utilized her choreographic skills in the propagandist Fascist classic film <u>Triumph of the Will</u> (1936). Some of the most brilliant virtual dance can be found in the analog Warner Brothers' cartoons of the 1950s, Disney's <u>Fantasia</u> (1940) or film musical star Gene Kelly's (1912-1996) foray into dance technology in <u>Invitation to the Dance</u> (1957), a hardly seen gem that predates most dance technology. Director/choreographer Busby Berkeley (1895-1976) and dancer/singer/actor Fred Astaire (1899-1987) created wonderful movement works with film, as did film directors Fritz Lang (<u>Metropolis</u>, 1926), Sergei Eisenstein (<u>The Battleship Potemkin</u>, 1925), Dziga Vertov (<u>Man With a Movie Camera</u>, 1927) and more recently Godfrey Reggio (<u>Koyannisqatsi</u>, 1983), Terry Gilliam (<u>Brazil</u>, 1985) and Akira Kurosawa (<u>Ran</u>, 1985; <u>Akira Kurosawa's Dreams</u>, 1990).

Choreographer Alwin Nikolais (1910 - 1993) whose dance lineage can be traced to movement theorist Rudolph Laban (1879-1958), was famous for his technological invention and the dance. Nikolais, credited with the 1950's "invention" of multi-media performance, composed computer music, painted slides and choreographed visual feasts through the interaction of light, set, costume and dance. Although criticized for his "de-humanizing" kaleidoscopic spectacles, the human body was always essential to his work. Dance critic and historian Don McDonagh (1976) described the first act of "Imago" (1963), perhaps Nikolais' best known work:

> The group looks like a gaggle of busy robots in Regency striped
> costumes and small cylindrical hats. The accompanying sound
> resounds like a cosmic Ping-pong game [. . . . in] a cute and perky
> dance that suggest little static flashes on a video screen [. . . .]. [F]ive
> men [. . .] move like ponderous links in a long genetic chain. They
> each have long extensions which lengthen the reach of the arms
> [. . . .]. The projection of an enlarged cobalt blue crystal makes this
> appear to be a glimpse into a submicroscopic world of creatures or
> elements [. . . .]. [A] dance [. . .] between the lines of elastic tapes
> stretched from one side of the stage to the other. They look almost
> like notes cavorting on a musical staff.[3]

To accentuate the physical virtuosity of the human body, choreographer
Elizabeth Streb (b. 1950) is paradoxically almost entirely reliant upon technology
and technological apparatus. On a very fundamental level, many dance artists
cannot perceive of performing their choreographic musings without the
assistance of lighting and stage technology. Other choreographers have begun
experimenting with digital triggering devices, various high-tech motion sensors
that allow the dancer to "interact" with computer-controlled lighting, sound and
robotics. Sound scores and light plots can be randomized facilitating
spontaneous interaction within the performance event. These evoke "action
artist" Allan Kaprow's (b. 1927) Happenings or musician John Cage's(1912-1992)
aleatoric Events of the 1950's, 60's and 70's.

Video dance has been around as long as there has been reel to reel video tape.
New York-based media artist Charles Atlas' first video collaboration with
choreographer Merce Cunningham (b. 1919) was "Westbeth" in 1975. The
Cunningham Dance Foundation (1995) provides this description:

> A collage of six sections, it is based on the recognition that
> television changes our way of looking and distorts our sense of
> time. Dancers introduce themselves in the first section by staring
> directly into the camera. In section II the camera obscures the
> dancers relationship to space through the use of close-ups. In the
> third section, the viewer's attention is continually re-centered upon
> a new dancer who has entered the group. Section IV investigates
> the possibilities of deep focus and its relationship to movement.
> Section V employs an elaborate use of multiple cameras. In section
> VI separate movement segments were joined together in the editing
> process.[4]

Almost every college and university dance department has at least one
camcorder, a video tape machine and a TV monitor. Some departments even
have some editing equipment. The reduced costs of digital camcorders and
digital editing software, makes possible the acquisition of very sophisticated
camera and editing systems. Yet access to technology has not led to the wide-
spread development of Dance Video as a specialized form. There are few dance
artists or educators who have ever edited video beyond copying one tape to
another through a simple dub, know how to make a story board, or understand

how different angles and shots can be used to create totally different effects. A fully realized expression of Dance Video as specialized art form requires a thorough understanding of the technologies of dance, cinema and video, and an artistic vision that is equally informed by the tradition, history and aesthetic theories of these forms.

At first blush, it appears we are still caught in "the society of spectacle," [5] where the flash of lights, spectacle and illusion thrill us more than the organic kinesthesis of the performing body. The Dance Technology degree program at Ohio State University has explored an "interface project with Stelarc,"[6] the cyborg artist whose website boldly proclaims, "The Body is Obsolete."[7] Some artists have gone beyond Merce Cunningham's example of using the 3-D character animation program, *LifeForms Dance* as a choreographic tool, deleting the human body from what they call dance. For these artists, choreography and dance has been redefined; no longer requiring interpersonal interaction between human beings. Rather, the dancer is reduced to code, eliminating confounding properties such as physical and psychological limitations, and reducing human uncertainty to two-dimensional imitations of three-dimensional corporeal reality on a virtual stage in a virtual environment.

Though powerful, *LifeForms Dance* is still relatively crude, creating geometric outlines of figures that execute codified Cunningham or Ballet steps without a hint of humanity. It is probable that computer applications will be developed that utilize Laban effort/shape motif writing to synthesize virtual dancers that are indistinguishable from films and videos of actual human performance. Animation can be choreographic and computer animators are becoming more and more skilled at creating realistic facsimiles of the human body, but they are not directly working with the finite possibilities of the body. Is this dance technology or is it animation?

Merce Cunningham's use of *LifeForms Dance* avoids this conundrum because his dancers turn the virtual images generated through animation into dance performed by human beings. Digital motion capture, the technological advance of the rotoscoping techniques pioneered by animators in the 1950s where films of human models' movement were drawn over cel-by-cel to create a realistic animation of human movement, reverses this process. Choreography performed by humans is the initial data that is translated into a new media. The process of motion capture involves the human body, but the end product does not.

Film, video and computer (re)presentations of dance do not directly involve the body; the characteristics of the media that represent the body dominate the elements of dance. In order to be fully conversant in mediated dance forms one must be fully conversant in the chosen media. Fred Astaire's lasting impact in the RKO and MGM musicals of the 1930s through the 1950s is due in large part to his and choreographer Hermes Pan's (1905-1990) understanding of how to best utilize film to capture Astaire's elegant talent. All mediated dance is as much about the media as it is about the dance. In the 1980s, the dance community eagerly awaited lucrative contracts and increased demand for dancers and choreographers from the popularization of music videos by the MTV network.

This did not come to fruition because very few dancers became proficient in video and videographers did not become educated in dance. With a few notable exceptions, like self-proclaimed "King of Pop," Michael Jackson's (b. 1958) "mini-musicals," dance in videos devolved into interchangeable bump and grind quick-cuts sprinkled within off-kilter clips of sex and violence and lip-synching band members.

Any attempts at *dance technology* must be approached as a collaboration of two equally important disciplines. The failure to recognize the need for an equal understanding of all elements in any collaboration inevitably leads to a process that does not reach the full potential of the interaction of the individual elements, and oftentimes the resulting whole is less than the sum of the parts. As has been true with dance and video, there will be a few who become truly conversant in all aspects of the interdisciplinary approach and create wonderfully unique digital dance projects, but most will only scratch the surface.

Dance technology is essentially a hybrid form, a "new" medium which, like video dance or film dance, owes as much to the constraints of the particular technological medium as it does the physical limitations of the dance. The training required to learn the technology and the aesthetics of the medium are in a different field than dance altogether. The technology artist is required to work long hours sitting and clicking a keyboard, a mouse, or manipulating the post-editing console. The process of creating electronic dance is the polar opposite to the process of creating dance. The former is human-machine exchange mediated by code, the latter is direct corporeal interpersonal human experience.

The processes of dance and technology are diametrically opposed: dance requires long hours of sweaty physical exertion while digital media requires long hours of near immobility. It is the rare individual who can muster the dedication and time commitment for both. After a long dance career that was reluctantly abandoned due to injuries that made it difficult for him to walk, Merce Cunningham embraced the physical passivity of *LifeForms Dance* in order to continue his career as choreographer. Cunningham's other explorations into dance technology have been as a dance artist collaborating with artists specializing in other media. His 1999 "Biped" featured multimedia artists Paul Kaiser's and Shelley Eshkar's "[c]omputer manipulated images of dancing recorded with motion-capture sensors attached to dancers' bodies [which were] projected on the screen in front of the dancers on stage."[8]

This essay is not meant to dissuade exploration into these technological techniques. To ignore the impact of digital technology would diminish dance's relevance into arcane fantasies and nostalgic yearnings. We also cannot ignore the reality that as dance artists we will do whatever it takes to get audiences into the theater, and students into our dance programs. Compared with industry standard sophistication of 3-D modeling and animation software that are being developed for and utilized by the multi-million dollar film, television and computer gaming industries, it is unrealistic to imagine that there will be a plethora of dance-specific computer software. At best we can hope for a niche market that maintains *LifeForms Dance* a specialized, less powerful version of the

industry standard 3-D character animation program, *LifeForms Studio*, as well as *LabanWriter*, developed at Ohio State University as a "word processor" for Labanotation.[9] Most *dance technology* will be made by applying non-dance specific applications to mediated dance projects.

Like the poetry of "I Sing the Body Electric" from Walt Whitman's *Leaves of Grass*(1855), dance is a celebration of what it is to be human because its primary medium is the body. Dance embraces the power and limitations of our animal form. In the digital domain, the body is reduced to sign, commodified by contemporary culture's narcissistic addiction to image. Perhaps within the next ten years, virtual reality may be able to provide full sensorial body experience, or holography will be diffused. Although ultimately virtual, the electronically disembodied may bridge the corporeal by fooling sensorial and neurological impulses sent to the brain. This mediated virtual dance will no longer celebrate what it is to be human but, rather, through simulation, celebrate the unrestrained image of body created in the post-human marriage of mind and machine. The body, both as performer and creator, will be fully mediated by the machine as an *Electric Body* rather than the *Body Electric*.

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[1] The Random House Dictionary of the English Language New York, 1967 (p. 1458)

[2] Winograd, T. (1991). Thinking machines: Can there be? Are we? In J.J. Sheehan & M. Sosna, (Eds.), The boundaries of humanity: Humans, animals, and machines. (pp. 198-223). Berkeley: University of California Press.

[3] McDonagh, D.(1976) The Complete Guide to Modern Dance New York, Doubleday & Co. (p. 305)

[4] Cunningham Dance Foundation (1995) www.merce.org/filmvideo_danceforcamera.html

[5] Debord, G. (1983). Society of the Spectacle. Detroit: Black & Red.

[6] http://www.dance.ohio-state.edu/Dance_and_Technology/

[7] http://www.stelarc.va.com.au/

[8] McGrath, C. (1999) Lenoxian Magazine http://www.berkshirelinks.com/lenoxian/merce-moca.html

[9] http://www.dance.ohio-state.edu/labanwriter/