

No. 1

‘Virtual Ephemerality: the art of digital dancing’

This is the pre-translation version. The published version appeared as:

‘virtualna efemernost: emetnost digitalnega plesa’ in Maska: Užitek avtomata, May 1999, pp. 45-49. (See Appendix pp 371-375)

In January 1999, I received an invitation from philosopher and dramaturge Bojana Kunst, who was editing an issue for MASKA on the theme of the automaton and cyborg bodies. She gave me a very open invitation to write “something on dance and new technologies, how the technological development influenced the dance field, are there some new art forms and what is their future, what are the new possibilities of choreography in connection with technology, what is happening with dancing body (or is it something happening at all).”¹ At the time, I was Visiting Professor with the Institute for Dramaturgy Aarhus University working on the ‘Digital Theatre: an Experimentarium’ project.² I had given public talks in Paris (Dec. 1998) and Aarhus (Feb-Mar 1999) in which I presented many of the ideas I then wrote about in the article.

MASKA is a performing arts journal based in Ljubljana, Slovenia, published four times a year since 1920, according to its website. Each issue is dedicated to a specific theme and covers local and international contexts. Source:

http://www.maska.si/en/publications/maska_performing_arts_journal_from_year_1999_on/ (accessed 7 May 2010).

¹ Email to the author, 14 Jan 1999.

² Documentation website: <http://www.daimi.au.dk/~sdela/dte/> (accessed 7 May 2010).

Virtual Ephemerality: the art of digital dancing

(This is the pre-translation English version as submitted for publication in March 1999. The referencing system of the published Slovenian version is used.)

Background

Like all contemporary art fields, dance has several overlapping historical trajectories. One of these is a tradition of choreography, dance training and performing which can be traced to the influences in particular of Merce Cunningham (in collaboration with John Cage) and then Robert Dunn whose composition classes in the early 60s in NYC (influenced by Cage) laid the groundwork for the Judson Church experimentalists which included Trisha Brown, Steve Paxton, Simone Forti, Yvonne Rainer, Douglas Dunn, David Gordon, etc.

This list of names from the Judson Church has been canonized by writers and scholars such as Sally Banes who wrote about several of them in *Terpsichore in Sneakers: Post-modern Dance* in 1980.¹ What happened at Judson Church could be seen as a manifestation of the revolutions of the 60s, especially in the sense that the Judson experimentalists made manifest one of the tropes of the decade by bringing 'anything goes' into the praxis of dance making. However, this could be seen not as a rebellion against constraints, but as a continuation of a tradition of artistic insurrection as represented by the innovations of Merce Cunningham who had already been explicit about his desire to break with the artistic ideas of the earlier modern dance 'pioneers'. Early modern dance (Duncan, Humphrey, Graham, etc.) celebrated the expressive potential of a dancing body; Cunningham celebrated the emancipation of this dancing body from the need for expression or interpretation. As compared to the first pioneers of 'modern' dance, Cunningham was the first dance 'modernist'... who was emphatic about his dances being 'movement which is only about movement'.

Whether or not Judson Church was an extension of this modernist practice which some see in the further stripping down of movement to its 'essential' features (as in the use of pedestrian movement) or, as Banes saw it, a period of post-modern practices in the mixing and matching of forms is a hotly debated topic in the field of dance theory and scholarship. I do not intend to pick up this debate here, but to point out it is well recorded that the Judson experimentalists took their own type of rebellion as far as it could be taken – even removing dance as a necessity for dances. For them, anything could be dance – found and pedestrian movement, task dances, rule-based choreography, written dances, dances performed outside the theatre, dances performed by people who didn't know they were being watched, and the list goes on. A strong democratic ideology persisted throughout knocking 'high art' off its pedestal and making dance a non-specialist pursuit. Anyone and everyone could be a performer or a dance maker. The boundaries between audience and dancer, between dance maker and store clerk temporarily disappeared.

It is important to see that without this particular trajectory, from Cunningham through Judson Church – it would not be possible for me to speculate on some of the following relationships between dance and technology which depend on three KEY ideas related to this trajectory: one – the meaning of a dance can reside in the movement of the dancer alone; two – that dances can be performed by anyone and; three – ways of making and framing dances can be many.

Software for Dancers

In 1984, Pauline Oliveros published a book entitled "Software for People".² Oliveros is a composer who works with live electronics, computers, improvisation, and new modes of ensemble interaction. The book includes articles on new music, women as composers, sonic meditation, attention and awareness... and it also includes

algorithms for creating sound performances.

The most common usage of 'algorithm' is as a mathematical or computational term, and in Foldoc, the "Free On-Line Dictionary of Computing", its basic description is "A detailed sequence of actions to perform to accomplish some task", cited as being named after an Iranian mathematician, Al- Khawarizmi.³

A slightly more elaborate description, also culled from the 'internet'⁴, names four special characteristics of an algorithm as:

1. It is complete; all the steps are there, in the right order.
2. It is correct, it always gets the right answer.
3. It is finite; there is a stated way to know when it's done.
4. It is executable; all of the instructions can actually be carried out.

I have mentioned already that the Judson Church experimentalists worked with rule-based structures for making dances. Many of these structures could be seen as fitting these four special characteristics. Perhaps the best known choreographer basing her work on algorithmic procedures was Trisha Brown. Two such works were *Accumulation* and *Locus* – both made in the 1970s, and the 'algorithms' for these dances can be found in several sources, including *Contemporary Dance* edited by Anne Livet.⁵

The algorithm for *Accumulation* is as follows:

"The accumulation is an additive procedure where movement 1 is presented; start over. Movement 1; 2 is added and start over. 1,2; 3 is added and start over, etc., until the dance ends. Primary Accumulation accumulates thirty movements in eighteen minutes. The 29th and 30th movements each cause the figure to revolve 45 degrees, making a 90-degree turn with each completion of the sequence. Therefore, a 360-degree revolution occurs in the last two minutes of the dance, giving the audience three alternate views of the dance before finally stopping."⁶

The point is that this dance precisely fits the definition of an *algorithm* as stated above: it is complete; it is correct; it is finite; it is executable.

Algorithms are like recipes, and their usage as a dance making strategy during the 60s and 70s was also part and parcel of the prevalent democratic arts ideology of the time. Brown and others worked with these dance making devices in part so that they could be performed by anyone. The dance algorithm allows a 'non-dance specialist' to create and make a dance – one does not require any training in order to make and perform 'accumulation'. The usage of rule structures for dance making is also an extension on the chance procedures employed by Cage and Cunningham – chance procedures also 'always get the right answer'.

I would like to make a link to the work of William Forsythe, choreographer for the Frankfurt Ballet. Paul Kaiser, co-director of Riverbed, a multimedia company which has collaborated with Robert Wilson, Merce Cunningham and Bill T. Jones on 'virtual performance' projects, has interviewed Forsythe about his process of making dances.⁷ Part of the discussion focussed on the making of the piece *Alien Action*, and Kaiser says that Forsythe's comments remind him of recursive algorithms, where "procedures call themselves, modify the results, call themselves again, and so on". Forsythe responds:

"In fact, *Alien Action* was the first time that I actually began to produce movement based on recursive algorithms. However, they were fixed variations that we created through a long, painstaking process, not unlike that of computer programming, where every step has to be repeated ad infinitum."

On some level, Forsythe is carrying on the tradition of dance artists taking on metaphors which are cross-disciplinary – the method of montage as it might be drawn from filmmaking comes to mind. In other interviews, Forsythe refers to his 'database' of movement vocabulary and 'cutting and pasting' as an editing strategy. But the algorithm is much more a process than a metaphor... and represents the

region where ways of constructing things in the field of mathematics and computer science overlap with dance making.

Migratory Bodies

In the south of France, Nicole and Norbert Corsino have a dance company, but they make dances for the screen and other media spaces, not for the 'real' stage. At a recent Paris conference on 'dance and technology' Norbert Corsino referred to the dancing body as a 'migratory' body – as opposed to a 'nomadic' body.⁸ This dancing body doesn't carry its home with it wherever it goes, but makes whatever place it lands in its own.

This is a particularly appropriate metaphor for dance – a 'migratory body' – especially used in relationship to the screen. It suggests that the dancing body is at home there, and I believe this to be the case. The relationship between dance and the screen originates most potently in 1945 with "A Study in Choreography for Camera" one of the dance films made by avant-garde filmmaker Maya Deren. Though she made only seven films, Deren is often credited as being the first dance filmmaker... in other words to make dance specifically for the space of the screen. In her own program notes about the film she writes: "This is, in a sense, a duet between space and a dancer—a duet in which the camera is not merely an observant sensitive eye, but is itself creatively responsible for the performance."⁹

This work by Deren stands at the beginning of what mushroomed in the last two decades into its own genre as evidenced by the growing number of festivals, competitions and events specifically set up for 'videodanse', 'dance for the camera', 'dance and screen', etc. In an issue of *Tanz Aktuell/ Ballet International*, Elisa Vaccarino cautiously suggests that the name 'videodanse' might have been coined in 1988 for a showcase at the Centre Pompidou.¹⁰ Dance made it to television in the 1980s in Britain with Michael Kustows' series on Channel 4 and the United States

on PBS [Public Broadcasting Service]. Commissions and grants became available for these works, which stood in their own separate category.

This history is well documented and it is only my intention here to point towards the solidity of this relationship between dance and screen. Dance is very comfortable on the screen. Merce Cunningham has been exploring the relationship for years with video and filmmakers such as Charles Atlas and Elliot Caplan. The question to ask in the context of this article is what the potential is now that the screen is evolving from the fixed classical space of the cinema to the more interactive possibilities of the computer interface.

In 1996, Lev Manovich published an essay entitled “An Archaeology of the Computer Screen”.¹¹ His starting point – the ‘classical screen’ – is the painting in its most general sense. Something which is framed, flat and rectangular and functions as a ‘window into another space’. This is followed in his genealogy by the ‘dynamic screen’ – the cinema or video screen.

Next in Manovich’s order is the screen of ‘real time’ – which, he writes, first emerges during WW2 with the invention of the radar. This is a radically different screen because it is constantly updating in relationship to an outside referent. A short time later this ‘real time’ screen becomes used for the input of data (as well as output) and evolves into what we now know as the computer screen.

There are some dance artists exploring the possibilities of making dances for this interactive screen. Three projects have originated in the United Kingdom in the context of Digital Dancing, an annual event organised by Terry Braun of Illuminations Interactive.¹² Mark Baldwin and Richard Lord are choreographers involved in two of these projects. Lord has made interactive dances for the web which can be found on his site <http://www.bigroom.co.uk>. The other project comes

from the collaboration between digital artist and choreographer, Bruno Martelli and Ruth Gibson.¹³ They have recently completed a CD-ROM entitled “WindowsNinetyEight” where there are many opportunities for the user/ viewer to interact with the dancing taking place on the screen. One sequence in particular uses ‘sprites’ which are small looping video clips of a short dance phrase performed by Gibson. These ‘sprites’ appear between 12-16 times in several different locations on the screen repeating the same looping phrase. With the mouse, one can click on them and move them into different spatial relationships with each other. Clicking on them also causes the timing of the loop to be slightly interrupted and within a short time the ‘user’ is able to create intricate choreographic patterns on the screen. Thus, bringing the viewer into the position of choreographer – to paraphrase Maya Deren — themselves creatively responsible for the performance.

Choreographic Gardens and Exquisite Corpses

In an attempt to indicate a relationship between technological/ computer and dance making processes, I have mentioned earlier is work of Trisha Brown and William Forsythe. There is a more direct relationship with dance making to be found in the choreographic tool called ‘LifeForms’.¹⁴ LifeForms was developed starting in the late 1980s in collaboration with Merce Cunningham who had, as early as 1968 expressed an interest in seeing if the computer could assist him in making dances.¹⁵ Merce has always been explicit about how he sees the impact of technology on his work – it has given him new ways of seeing, thinking about and making up movement.

“... it presents possibilities which were always there, as with photos which catch a figure in a shape our eye had never seen. On the computer the timing can be changed to see in slow motion how the body changes from one shape to another. Obviously it can produce shapes and transitions that are not available to humans, but as happened with the rhythmic structure, then with the use of chance operations, followed by the use of the camera on film and video, and now with the dance computer, I am aware once more of new possibilities with which to work.”¹⁶

By implying that “technology shapes us as we shape technology”, Cunningham invokes the patron saint of our digital age, Marshall McLuhan, who was of course following in the footsteps of a host of cultural theorists like Walter Benjamin who writes about how our perceptions of art and art related processes are radically altered by technological invention.^{17 18}

Arguably, LifeForms is really the ‘only’ software of its kind for choreographers, but it is not used very much by dance makers. Besides the matter of computer access and the time and effort it takes to learn to use the program, LifeForms ‘embodies’, if one could say that, the dancing aesthetic of Cunningham. The program easily represents limbs moving oddly out of coordination with each other combined with rather impossible shapes and difficult movement transitions. It allows the instant replication of a single dancer as many times as desired anywhere on the representation of a 3-Dimensional stage which can be rotated for viewing from absolutely ANY angle, from the bird’s eye view to the subterranean. Perfect for Cunningham, but of limited use to choreographers whose movement vocabulary and aesthetic is directed along another line. The most extreme example might be something like Butoh, where the surface of the skin and movement of internal body organs are more important to the choreographic strategy than where an arm or leg is in space at any given moment.

But this partly assumes that LifeForms is only a tool for the choreographer to help him or her in their physical studio based work. But LifeForms is a piece of software. As such it is comprised of digital material, and this opens up a range of possible applications. I will mention two here.

One)

In the summer of 1998, digital artist Guy Hilton sent out a call for participation in a project he called “interference: a performance experiment in Internet Choreography”

which would be performed in Manchester, UK as part of the Digital Summer programme, “with a simultaneous webcast embracing a global audience. It is a dance trio created electronically by forty choreographers worldwide.”¹⁹

Hilton based his project on the “Exquisite Corpse” a Surrealist Game which involved players who complete a sentence without seeing what has been done already. The following are some of the instructions for Hilton’s project:

“You will receive by e-mail a Life Forms file containing a single starting keyframe. You are invited to devise a movement sequence of between 30 seconds and one minute’s duration, commencing from the supplied keyframe. Your sequence is then returned by e-mail, and the final frame of your sequence forwarded as a start position to the next participant. Together, the 40 phrases created in this way will form a sequence (‘cadavre exquis’ style) which will be interpreted for performance by live dancers. You may devise any movement you see fit, and may choose not to observe gravity or the limitations of the human body if you wish.”

When completed Hilton’s project comprised a dance piece lasting approximately 30 minutes long with over 50 contributions from Europe, North America, Australia and Hong Kong. The opening and closing fragments were contributions courtesy of Merce Cunningham. As planned, live performers attempted to learn the choreography, a great challenge because several of the contributors created material which was physically impossible to replicate precisely on the stage.

Two)

The following two paragraphs quote extensively from the websites related to this project:

At the University of Colorado Computing Science Department, Elizabeth Bradley is leading a team of investigators asking the question: “Can Computers Learn to Dance”.²⁰ They are interested in redefining the computer’s role in dance which, they state,

“The computer has, to date, been primarily external: as a tool for representation (e.g., using Life Forms to render a dance as an animated sequence) or embellishment (e.g., hooking a dancer's heartbeat to a synthesizer). We are interested in a wholly different type of computer tool: one that plays an active role in the creation of dance sequences”.

Bradley's team is working on the implementation of two computer programs that get "inside" the dance – one that operates as a "shuffler" of movement phraseology in a manner akin to certain postmodern choreographic strategies, and the other that "learns" from a corpus of dance phrases (and here a library of LifeForms phrases might be used) to create completely original movement sequences that retain the stylistic stamp of the given material. The first program, called Chaographer, uses the mathematics of chaos to first divide an animated movement sequence into sub-sequences and then shuffle them. The results of this approach, they write, “are reminiscent of some of Cunningham's aleatory processes”. The second program, MotionMind, uses machine learning algorithms to capture the stylistic rules implicit in a given body of dance phrases. MotionMind then uses that knowledge to automatically generate innovative and stylistically consonant movement sequences between arbitrary starting and ending postures.²¹

While it is, of course, not likely that MotionMind will replace the choreographer – in my opinion, and as in evidence from their statements, these practices within the Computer Science field are a direct extension of Cunningham and some of the Judson Church experiments. Informed as it is by these choreographers, Bradley's work, or work like it, will in turn have an influence on the dance making of the future.

Motion Capture: where animation and choreography converge

One could say that the history of motion capture stems back to the 19th century with such mechanical inventions as the apparatus constructed by scientist/ engineer Etienne-Jules Marey to measure the trajectory of the bird's wing in free flight. In his own words, Marey built a device which “could transmit to a distance any movement

whatever, and register it on a plane surface".²² These early registrations of movement were designed with the advancement of scientific knowledge in mind and resulted in a registration which was more information than likeness, more measurement than representation.

Following developments in digital technologies, motion capture has been transformed into a mechanism whereby one's movements can be captured and transmitted to the computer for a process of analysis similar to, but much more complex than that mentioned above. This provides quantifiable research benefits to the medical, sports and military establishments. But digital technologies and motion capture have also grown rapidly in the area of special animation effects utilized by the entertainment (movies and computer games) and advertising industries. In this area of development special computer graphics software is able to import the movement data into a 3-D virtual space where objects and figures of any imaginable type may be animated by this motion.²³

This is where two major 20th century art forms – animation and choreography – overlap. But digital motion capture was rarely used in a more purely artistic context because the costs were prohibitive and outcomes unclear for artists. However, in the last few years, we see more performance and digital artists working together on a regular basis with these technologies (e.g. Susan Kozel and Kirk Woolford, Sally Jane Norman, Richard Lord and Christian Hogue, Paul Kaiser and Merce Cunningham/ Bill T. Jones, Bruno Martelli and Ruth Gibson, Yvonne Fontijn and Karin Post, etc.). They represent an evolved 'critical mass' of work... whereby this technology is steadily becoming more integrated into the dance field.

Paul Kaiser and Riverbed have been mentioned earlier and their motion capture projects with Merce Cunningham and dance artist Bill T. Jones have received strong critical acclaim. But rather than write about these works which can be investigated in

much more details via the Riverbed website <http://www.riverbed.com>, I would like to describe here the work of Dutch artist Yvonne Fontijn for whom currently one will not find a website, nor much international press coverage.

Fontijn and Dutch choreographer Karin Post have been collaborating on motion capture and animation projects for a few years now. Fontijn works as an animation artist for Motek, an Amsterdam based commercial motion capture house.²⁴ This affords her unique access to the technologies necessary to for her projects and gives her the opportunity to experiment and explore over a longer period of time. Approximately one and a half years ago, they did a motion capture session in which the movement of the torso and arms was captured from one dancer (Karin Post) and the movement of the pelvis and legs from a tap dancer.

This data sat stored in the computer for several months before Fontijn decided to use it in creating an animation for the “Traces of Science in Art” exhibition at Het Trippenhuis in Amsterdam in late Spring 1998. In order to get as far away from the representation of a human figure as possible while still retaining the special movement quality of motion capture... she superimposed the upper torso from Post directly on top of the lower half from the tap dancer.

What you see in the animation is a series of abstract figures, which are animated with human movement. Once you are informed that it has been motion captured, it is possible to identify in the shifting forms the occasional and recognisable rhythm of the tap dancer’s feet. If uninformed one would likely only see the film as an ‘animation’. Other artists, like the Riverbed collaboration, are exploring choreography, motion capture and animation with more recognisable human forms.

Animation briefly defined is “giving motion to a thing” and choreography might be defined as the “composition of moving bodies in Cartesian space and time”. Prior to

the invention of this possibility of animating with digital motion capture technologies, classical animation artists had always used the careful study of people moving in order to draw the motion of cartoon characters as accurately as possible. Master animator Virgil Ross who died in May 1996, was considered a legend in the profession. His 60 year career was honored by awards, many bestowed on him because of his amazing ability as a dance specialist. From Bugs Bunny tap-dancing down the street or cakewalked on the vaudeville circuit it was Virgil's drawing ability that created the illusion of human movement.

Now, that illusion comes more directly from the source – the dancer – and this affords us with a very large range of new possibilities in the future where we will see animation and choreography continuing to overlap.

[I have avoided providing technical details about motion capture technologies because this information is easily available from other sources, including some of the websites listed in the citations below.]

Conclusion: Dramaturgs Required

One can hardly come to a conclusion at the end of an article based on such widely scattered examples and observations on the art of digital dancing – but I would like to close with a final speculation as follows:

The dramaturgy of a dance performance which involves technology is a mathematical dramaturgy. It relies on a clear understanding of the necessity of precise calculations which will enable the artistic ideas to be realised. It requires the employment of the optical science of the Renaissance perspective, the restrictive design laws which are the legacy of the Bauhaus and sympathy towards the required reductionist thinking of a computer programmer. Some of my artist colleagues like to state that we will be getting somewhere when Dance and

Technology is no longer Dance AND Technology, but is simply 'dance', but this should not be the case. As has so often been expressed in this century, the way of the future STILL lies in the ability for artists, engineers and scientists to bridge but not erase the gaps between their respective disciplines to bring creativity to empirical, positivistic thinking and a diminishment in the mysticism which is still romanticized by the artistic enterprise.

Scott deLahunta

Aarhus, Denmark. 1999

Endnotes (accessed March 1999)

¹ Banes, Sally. *Terpsichore in Sneakers: Post-modern Dance*. Wesleyan, CT: Wesleyan University Press, 1980.

² Oliveros, Pauline. *Software For People: Collected Writings 1963-1980*. Baltimore, MD: Smith Publications, 1984.

³ <http://wombat.doc.ic.ac.uk/foldoc/foldoc.cgi?query=algorithm>

⁴ http://www2.baldwin.edu/~rmlolmen/150dir/150mt_written_rev.html

⁵ . Livet, Anne, ed. *Contemporary Dance*. New York: Abbeville Press, Inc. 1978.

⁶ Trisha Brown interviewed in *The Drama Review*, Post-modern dance issue, T- 65, March 1975. p. 29.

⁷ <http://www.riverbed.com/duoframe/duoforsythe.htm> (main Riverbed Site – <http://www.riverbed.com>)

⁸ Conference on "Danse et Nouvelles Technologies". Cité de la Musique, Paris, France. 3 December 1998.

⁹ Quote comes from the cover of the widely-distributed video entitled *Maya Deren, Volume One Dances For The Camera*. The text is also on the following site –

<http://www.dla.utexas.edu/deQpts/ams/Deren/camera.html>

¹⁰ Vaccarino, Elisa. "Dance and Video", *Ballet International/ Tanz Aktuell*. Issue 8/9, August 1997. p. 59.

¹¹ Manovitch, Lev. "Archaeology of the Computer Screen" reprinted in *Cain, Abel or Cable*, ed. Thomas Elsaesser. Amsterdam and Ann Arbor: Amsterdam University Press / Michigan University Press, 1998.

¹² <http://www.illumin.co.uk/>

¹³ <http://www.shoevegas.com/windows/>

¹⁴ <http://www.credo-interactive.com/>

¹⁵ Cunningham, Merce. *Changes: Notes on Choreography*. Ed. Frances Starr. New York: Something Else Press, Inc., 1968 (no page number).

¹⁶ http://www.merce.org:80/technology_lifeforms.html

¹⁷ McLuhan, Marshall. *Understanding Media: The Extensions of Man* (new edition with Introduction by Lewis Lapham). Cambridge, MA: MIT Press. 1994.

¹⁸ Benjamin, Walter. "The Work of Art in the Age of Mechanical Reproduction". In *Illuminations*. New York: Schocken Books. 1962. pp. 217-251.

¹⁹ Hilton, Guy. (Electronic Email Posting) "INTERFERENCE calling (again)" gjhilton (orangemouth@geocities.com) Fri, 31 Jul 1998 14:15:11 +0000 (available in the Dance-Tech list archive: <http://www.art.net/Resources/dtz/archive/DanceTech98/0597.html>)

²⁰ <http://www.cs.colorado.edu/~lizb/papers/idat99-paper.html>

²¹ <http://www.cs.colorado.edu/~lizb/chaotic-dance.html>

²² Braun, Marta. *Picturing Time; The Work Of Etienne-Jules Marey (1830-1904)*. Chicago, IL: University of Chicago Press, 1994.

²³ A selection of Motion Capture related Websites:

<http://www.qualisys.com/>

<http://www.televirtual.com/>

<http://www.riverbed.com/>

²⁴ <http://www.motek.org/>