Dance becoming data: version two

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DANCE BECOMING DATA: VERSION TWO

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Abstract

This chapter explores the transformation from dance to digital data in a series of research projects that explored the role software might play in the context of contemporary dance creation. The chapter looks at two aspects of these projects. The first involves descriptions of collaboration between people with software knowledge and people with dance knowledge. The second relates to what dance becoming data might mean considering advances in computer technology and questions that should not to be ignored when digitising dance. However, the conclusion affirms the positive value of creative collaborative approaches to exploring connections between dance and digital data.
In his introduction to *Documenting Performance*, the book’s editor Toni Sant makes a distinction between the “generic term documentation” and “systematic documentation, ideally through standard methods of archiving.” For Sant, systematic documentation points toward the need for “data management,” requiring specialist knowledge and skills to be obtained from fields such as “library and information science.” This is also not data in the generic sense, but data that “follow the logic of digitization after the emergence of modern computational machines” to borrow a description from digital philosopher Yuk Hui’s new book *Digital Objects*. *Digital Objects* is an investigation into epistemological questions brought about by the existence of data. And indeed every contribution to Sant’s 2017 edited volume makes reference to this kind of data, data that is available to computation, to be processed by today’s computers. These two recently published works, one from a performance studies scholar who specialises in “digital curation,” the other a computer scientist turned philosopher called “exceptional” by Bernard Stiegler, the French philosopher whose work has shaped current intellectual thought on digitisation, point toward the contemporary context for ‘Dance Becoming Data’ which is both the title of this chapter and a reference to a transformation from dance to data. What kind of dance and what kind of data will be clarified in the following pages.

There are two aspects to this idea of a transformation from dance to data. One derives from a series of research projects described in the following sections involving close collaboration between people with knowledge of computers and programming and people with knowledge of making dances. These collaborations brought a critical perspective to the transformation from dance to data in the context of processes of questioning, evaluating and iterating (designing together) toward a variety of outcomes. The other aspect relates to what dance becomes when it becomes data. Given advances in computer technology most forms of dance documentation, both time-based recordings and static objects such as photographs and documents, now originate in digital form. There is a need to manage these data appropriately, in part, as Sant proposes, by applying the evolving standards of information science. But for a philosopher like Hui, becoming data goes beyond engineering, or information science, which he writes “falls short in the sense that it
[engineering] limits its understanding […] to practical applications.” This idea of a limit is crucial. The notion that computer technologies are there to provide useful tools for individuals and society, from on-line shopping to smart phones with video cameras and driver-less cars, is incredibly persistent. Philosophers and artists are in the unique position to disrupt and push back on this assumption, against, for example, what constitutes most Big Data research. Until now, the projects referenced here within the frame ‘Dance Becoming Data’ have gone beyond these limits to understanding proposed by Hui, mainly through collaborations with artists working in software or creative coders. While creative coders ARE engaged in writing functional code, they do not seem themselves constrained by the requirement to produce practical applications as the main outcome of their work. In one description from artist, researcher and developer Anton Koch published recently in the online journal *Computational Culture*: “Creative coding, artistic practice and research converge in a constant oscillation between development, hacking, field testing and communication with partners across disciplines, while only following a very broad vision or intuition.”

**Software for Dancers**

Beginning in 2000, this series of research projects mentioned above explored the various roles that software and software development might play in the context of contemporary dance creation and performance. The inaugural project for which four choreographers, five software artists/developers and additional guests were invited to take part was titled *Software for Dancers*. The motivation for the project was the need to question more extensively the historical and cultural accumulation of bodily skills, sensory knowledge and tacit understanding, which would be the domain of dance artists, as a critical precursor to engaging with software. The title of the project came from the book *Software for People: collected writings 1963-80* of the American composer Pauline Oliveros. *Software for People* was originally the title Oliveros had given to a paper she presented at a seminar on ‘musical creation and the future’ in 1978. In the third part of this paper, she presents some of the “theory concerning my ‘software for people’” in which she aligns ideas from psychology and information processing to explain her model for the organisation of sensory attention.
Oliveros follows this by leading the audience in an exercise to help them “experience directly some of the theory I have been talking about.”

While not explicitly influencing the organisation of the Software for Dancers project, the content of Software for People suggested a metaphorical use of the word ‘software’ rather than taking it to literally mean computer software, a result of writing code. This gave a certain license to Software for Dancers to be primarily a conversation about practices and their histories, not only from the perspective of the dance artists, but also from the perspective of the invited software artists/developers. While the group ostensibly shared the task of developing concepts for rehearsal tool(s) for dance, there was the chance in this exchange to question assumptions on both sides, including the assumption that software has to be useful. Two pieces of writing emerged from the project, one is by dance critic Sanjoy Roy, who was invited to join the project and report on its outcomes. Roy’s article, published in Dance Theatre Journal, explores the results of the shared task of developing a rehearsal tool together, to make something functional for choreographers. The other writing, titled “Software for Dancers: Coding Forms” takes another perspective, contemplating the implications of software as a material and coding as a practice. This is more aligned with the approach of Software Studies as articulated in the introduction of Matthew Fuller’s edited book, published in 2008, where he writes: “programming is also a result of a live process of engagement between thinking with and working on materials.”

Coding as a Practice

The Software for Dancers project made possible a conversation about creative process in dance to take place between choreographers and coders; a conversation focused on methods, approaches, histories and contexts. This conversation remained the central feature in a cluster of four seminal research projects that would emerge over the next decade (2000-2010). Each of these projects took their starting point from a particular dance artist and embraced digital technology to document and communicate their unique choreographic approaches. Two of these artists, both London based, had participated in the Software for Dancers project; these were Wayne McGregor, who had the long-standing ambition to
create an artificially intelligent ‘choreographic agent’, and Siobhan Davies, who embarked on research into how to use digital media to translate the ‘liveness of dance’ making into archival material. Joining them were the Amsterdam-based choreographers Emio Greco | PC (Pieter C. Scholten) exploring how interactive technologies might support the notation and transmission of ‘inner intention’ and William Forsythe, based in Frankfurt, who had the aim to make the complex ‘choreographic organisation’ visible using computer-aided design. From these motivated starting points, four ambitious artist-led projects involving interdisciplinary research teams, inter-institutional support structures and significant funding emerged. Between 2005 and 2010, these four projects were under intense development as captured in two articles published in Performance Research. The first in 2006 opened with a discussion of the potential of dance documentation as exemplified by these four projects; the second was published in 2008 as an update on the developments of the last two years. In 2008-2009, researchers involved in these projects came together for a series of three workshops titled Choreographic Objects: Traces and artefacts of physical intelligence centering on the output of these four research teams bringing “choreographic ideas and processes into newly productive exchanges with both general audiences and other specialist knowledge areas.” These unique workshops offered a critical engagement with social anthropological perspectives on the implications of contemporary dance claiming to take part in ‘knowledge production’ and towards recasting relationships with audiences.”

As mentioned at the outset, Software for Dancers grounded its initial reflexive questions and concerns in deepening understanding of the embodied practices of dance artists and bringing this into a relationship with coding knowledge and practices. The quality of the social relationships that emerged from the Software for Dancers conversations underpinned the four follow up research projects mentioned above, with each taking those conversations beyond deepening understanding only amongst the choreographers and coders involved to collaboratively translating this understanding into new communicative forms. The Choreographic Objects meetings then drew these projects into a connection on the basis of their shared aims for making some of the fundamental but tacit principles of dance more explicit using the support of digital media. Because of how
they draw attention to a particular integration of practices and concepts involving these fields of practice, two of these projects are described below in more depth.

**Choreographic Agents**

The departure point for the project with Wayne McGregor was an idea he had for an artificially intelligent choreographic agent that would “generate unique solutions to choreographic problems and augment McGregor’s creative decision-making processes in the studio.” The collaborations which were to emerge from this idea began in 2003 and involved nearly continuous interdisciplinary research with cognitive psychologists focused on studying the ‘choreographic and physical thinking’ of McGregor and his company in the context of creation. The *Choreographic Agents* project went through two main iterations involving a significant amount of software development by digital artist Marc Downie/*Openended Group* working in collaboration with digital artist composer Nick Rothwell/*cassiel*. The first iteration was given the name *Choreographic Language Agent* (*CLA*). The *CLA* was designed for exploring variations in choreographic instruction, drawing inspiration from how McGregor and his dancers work with visual imagery to generate movement material. A key member of the team involved in building the *CLA* was Cambridge-based cognitive scientist Alan Blackwell. In writing about the *CLA*, Blackwell described it as a “programming language” that emphasised “transience, ambiguity and creative flow rather than the conventional requirements of (…) software engineering contexts.” It was designed with the aim of bridging “the intellectual and embodied improvisation aspects” by using language, grammar and syntax to build a complex 3D geometric form whose behaviour might not be entirely predictable. In this sense, the *CLA* functioned like a sketching tool, generating dynamic geometries as moving ideas for the dancers to work with in the studio.
The second iteration of the artificially intelligent choreographic agent was given the title *Becoming*.\(^{32}\) *Becoming* was created in close collaboration with social anthropologist James Leach, the Principal Investigator on the *Choreographic Objects* workshops mentioned above. Marc Downie and Nick Rothwell were also invited to work on this version, which again was implemented entirely in the *FIELD* environment. Similarly to the *CLA*, *Becoming* was to rely on the dancers’ abilities to work with moving images as inspiration for the creation of movement material in the studio. However, with this second iteration of the choreographic agent, the focus shifted to the creation of something that would have a physical presence in the studio and generate moving images autonomously. *Becoming* was again built around the manipulation of geometric shapes composed of points, lines, and planes (similar to the *CLA*). But rather than being programmed by the dancers and viewed on small computer screens at the side of the studio, *Becoming* had a virtual body the same scale as a human one displayed in portrait mode on a six-foot 3D screen. The movement stimulus for this virtual body came from an iconic 1980s science fiction film,\(^{33}\) parsed into its 1240 shots, sections of continuous film that exists between cuts, each
section was analysed using computer vision to extract geometry, colour and movement. Downie describes the actions of the virtual body as follows:

The abstract agent then enacts a heuristic search through the space of all the configurations and muscle activations of its own peculiar body to match the movement of each shot. It works out its approximations through a series of iterations, stopping only when satisfied that it has come as close as it can.\textsuperscript{34}

This description gives a sense of the autonomy of this particular iteration of the choreographic agent concept.\textsuperscript{35}

In summary, these two software iterations (both programmed in the same FIELD environment by the same digital artists) made manifest two distinctly different approaches to the idea of the thinking dancer’s body. The first was built on the concept of the thinking body as an instrument of cognition and the value of deliberative thought integrated with intuition as a means of perturbation, of shaking up habits of working. The second relied on an entirely different idea of the thinking body, emphasizing empathic relations between dancers (thinking bodies) in the space and the role that sensing and presence play in achieving social connection. This was less about breaking habits (deliberatively) and more about an elicitation of a
kinaesthetic response, through the sensation of movement. From the perspective of ‘Dance Becoming Data’ the significance of these projects has to do with the variety of outcomes resulting from engaging individuals with very different intellectual and artistic practices. For both versions of the *Choreographic Agent*, Downie and Rothwell needed to write functional code, but the *CLA* and *Becoming* were inspired by diverse modes of thinking with and about the body. In the iterative, continuous shaping of abstract ideas from different fields and their implementation in both code and the actions of dancers in the studio, the result is a kind of software arguably more like what Pauline Oliveros was thinking of when she wrote her essay in 1978, less instrumental and more from and for the imagination.

**Capturing Intention**

The research project with the Amsterdam-based dance company Emio Greco | PC (Pieter C. Scholten) emerged in the early 2000s from a background of questions the artists had regarding the documentation and transmission of their repertoire which at the time comprised six or seven major works. This was a process of searching for alternatives to existing approaches to the documentation and in particular notation of dance, and digital technology was thought to be one of the ways forward. A key driving question was: what kind of notation system\(^36\) can “capture inner intention as well as the outer shape of gestures and phrases?”\(^37\) This inspired the title of the research project *Capturing Intention* which began in 2004 and continued in its first phase through the launch of an interactive installation, book, film and DVD-ROM.\(^38\) The central line of enquiry involved the close analysis and articulation of a physical/mental training system Greco and Scholten had developed called *Double Skin/ Double Mind (DSDM).*\(^39\) The analysis of the workshop broke its structure down to several themes (e.g. breathing, jumping, expanding) and sub-chapters within each theme, and this was the basis for the development of an interactive installation\(^40\) that would communicate the principles of the *DSDM* training. Leading this enquiry was Research Coordinator Bertha Bermudez, who had been a dancer with Emio Greco|PC. Bermudez gathered a group of specialists in notation systems, cinematography, interactive media design, cognitive linguistics and computer-based gesture analysis to work on the project.
This included a close collaboration with Frédéric Bevilacqua, a member of the team at IRCAM researching gesture analysis and interactive music systems. For the purpose of the discussion about ‘Dance Becoming Data’, the role Bevilaqua played in the research with Emio Greco|PC on Capturing Intention will be the focus of the following brief exposition.

Since he joined IRCAM in 2003, Bevilacqua’s main focus has been on gesture analysis for the performing arts with the aim of being able to compute from gesture data ‘high-level parameters’ of movements […] that could refer for example to ‘movement qualities’ and would be thus more graspable by artists.
When he was invited to take part in the creation of the DSDM interactive installation, Bevilacqua brought his work on the so-called ‘gesture follower’ to the project. The ‘gesture follower’ uses a recognition scheme “based on a set of labelled examples that allows the computer to ‘learn’.” Following this approach, selected movement phrases from the DSDM workshop were recorded on video and combined with sensor data simultaneously collected from accelerometers attached to the dancer. These were used along with manual annotation to train the gesture follower in a series of experiments that generated ‘interaction paradigms,’ which were incorporated into the DSDM Interactive Installation.

Bevilacqua covers his motivations and methods of research in a chapter for the Capturing Intention book. This chapter gives insights into the continuity of the research supported by IRCAM and related communities into gesture analysis for the fundamental purpose of carrying out “research and development on interactive systems dedicated to music and performance.” Sarah Fdili Alaoui, another specialist in human computer interaction, joined the research team in 2008 for a new phase of research (Inside Movement Knowledge). Working within a more scientific paradigm than the CLA and Becoming coding projects, both Bevilacqua and Fdili Alaoui’s efforts were motivated by an interest in how “careful case studies will eventually produce general results in the field,” results that might provide the necessary standards to support scientific research with its requirement for verification and repeatability. Bevilacqua and Fdili Alaoui were also founding members of the annual International Symposium on Movement and Computing, a project that “references the challenge of representing embodied movement knowledge within computational models, yet it also celebrates the inherent expression available within movement as a language” and “seeks to explore an equal and richly nuanced epistemological partnership between movement experience and movement cognition and computational representation.”

This interest in seeking a new ‘epistemological partnership’ within the International Movement and Computing community (where scientific and engineering goals generate interesting friction with artistic ones) is similar to the goals of Software for Dancers. What has been distinctive about the Capturing Intention and Choreographic Agents research projects is how
they reflected a keen motivation on the part of these particular dance artists for a wide research landscape to pursue questions related to movement and meaning, writing and dance, documentation and notation, transmission and dissemination of dance knowledge. Both projects drew attention to the idea that the complex embodied creative process in dance is available to systematic interdisciplinary investigation and that collaboration with coding practitioners can be a part of this research. In this sense, both software and dance artists are contributing to and learning from the same research environment in ways that can be understood to be collaborative, but also distinct. From the perspective of ‘Dance Becoming Data’, these projects represent a decade when a certain kind of research project, emergent around a handful of key choreographers, is bringing specialists from other fields and involving coding artists and programmers in the work of deepening understanding of dance for the purpose of communicating some of its fundamental embodied principles. For these projects, dance was becoming data as a consequence of and enabler for collaboration, as dancers, coders and scientists worked together toward shared and divergent intellectual and artistic goals. One of the major contributions of these projects has been simply working on the challenge of translating tacit, collaborative and embodied forms of knowledge in dance into digital formats, and sharing both the successes and the failures of these attempts. But the conversation around ‘Dance Becoming Data’ has shifted, and the following description of two recent projects seeks to give a sense of where this tipping point lies.

Everything is Data

Firstly, for the two projects just described (*Capturing Intention* & *Choreographic Agents*), the management and storage of dance-related data, resulting from either production or coding, the two “dominant forms of digitization” according to Hui, and/or providing systematic access to this data, as proposed by Sant, was not such a concern for the artists and scientists involved. The coding work was generally focused on direct implementation, not on building frameworks; in some cases without much regard for future-proofing, data preservation or digital obsolescence. *Synchronous Objects for One Flat Thing, reproduced*, a web-based project led by William Forsythe, departed significantly from this approach. The
driving research aim for Forsythe and his collaborators at The Ohio State University was, as mentioned before: how to help audiences see complex choreographic organisation. Their source material for the project was a performance of the dance, *One Flat Thing, reproduced*, filmed in high resolution from the front and above. In their essay titled “Dance, Data, Objects,” Norah Zuniga Shaw, Forsythe and Maria Palazzi (co-creators of *Synchronous Objects*) explain how the dance was analyzed, decoded and quantified into the data to be used as material to generate the visual interpretations or what they refer to as “Objects” that exist on their website. Relying on manual annotation to apply coding schemes corresponding to three different types of choreographic structure (cues, alignments and thematic material) dancers and animators studied and processed the material into mainly two forms of data, *Spatial* (location coordinates of the dancers) and *Attribute* (built from the dancers’ first-hand accounts of the choreographic structure).
In parallel with the development of *Synchronous Objects* and following the launch of its website in 2009, Forsythe and others began work on a project with the title *Motion Bank*. The aim of this project was to explore how computer-aided design might aid in the explication (or publication) of choreographic ideas with a diverse range of dance artists, effectively requiring unique approaches for each. With funding from the German Federal Cultural Foundation and other sources, *Motion Bank* began its first phase in 2010. Building on the approach of *Synchronous Objects* to the idea of developing and working with dance data, the *Motion Bank* team in Frankfurt emphasized digitization as an integral part of *Motion Bank* from the start and designed recording setups to ensure that everything captured could be available to computation (processing with the computer). All recording situations were installed and calibrated to allow for as little ‘noise’ as possible, to help the software algorithms extract features and recognize relevant patterns in the data. This was combined with the use of a video annotation tool titled *Piecemaker*, a software project developed by The Forsythe Company member David Kern to support the organization and recall of materials created by Forsythe and his performers in the rehearsal studio (in use from 2007 to 2013), making it possible to tag, annotate and search across the many video recordings generated during creation. In the context of *Motion Bank*, this software was reprogrammed for use in the development of the on-line digital scores and as a standalone tool for use in the studio. Renamed *Piecemaker2* (PM2), it made it possible for annotation sets or markers to be easily related and provide access to multiple versions of the same event (e.g. video, audio, motion capture, scores, etc.). This enabled the building of connections that could generate visualizations or other representations both during and post-annotation that would help readers gain deeper insight into the source materials. As with the *Synchronous Objects* project, the quantification of the dances of the *Motion Bank* guest artists into data involved a combination of computational and manual work. This often required many hours spent on computer-based video processing, for example subtracting the background of the image leaving only the silhouettes of the performers, alongside watching the same video for many hours in order to manually annotate and describe time-based events the computer would not be able to recognize on its own.

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**Dance Becoming Data**
The work with guest choreographer Deborah Hay provides an important contrast with the descriptions of work with other choreographers (McGregor, Greco, Forsythe). Hay has a unique choreographic approach, which cannot be exposed by recording repeatable movement phrases, studying the way dancers generate such material or by analysing the choreographic structures in a single version of the work. The choreographer/dancers who work with her know how to interpret the written scores she provides them with; each score uniquely combines questions (referred to as ‘tools’ for the dancers) alongside images, reminders and instructions. Only very rarely is there something that might constitute a stage direction or body movement. These are all left up to the choreographer/dancer to discover as they practice the score for a prescribed number of days, individually, eventually arriving at their own solo adaptation. Body movements and timing are rediscovered each time they perform their adaptation. This means that there is a lot of variability to be found across performances of the same written score, each cannot be seen to be a repeat of the previous – although Hay is clear that “the movement may change, but the choreography itself does not change.”

Based on this choreographic approach (the structure of the written score remains the same, whereas performances vary in terms of movement and timing) as many versions of each adaptation were recorded as possible in order to compare them and look for other kinds of patterns in and across the performances. Five digital video cameras were used to record each performance (21 in total, seven times for each adaptation performed by three different artists Jeanine Durning, Ros Warby and Juliette Mapp). These recordings were then synchronised and annotated using PM2. The background of each recording was subtracted leaving only the silhouette of the solo artist. From this data the 3D pathway of each performer could be extracted. Thus, the dance data collected for Deborah Hay’s on-line score includes these 21 digital video recordings, extracted silhouettes, 3D pathways, the score text and the annotations. This material is used in the on-line publication of the Motion Bank score website for Deborah Hay, alongside extensive interview fragments organised in relation to six conceptual themes framing her choreographic methods. One of the main research results of the project with Hay was the identification of unexpected patterns across the various 21 adaptations, a discovery only
made possible using the computer to process the recorded data. *Motion Bank* continues to probe and explore this dance dataset, a total of 4TB, for example in the context of *Choreographic Coding Labs* and other research and creative contexts.

*Motion Bank* had as one of its goals the development of software that might be used by others to create their own on-line scores to add to the *Motion Bank* collection. This was achieved through the development of two systems. One of these is the reprogrammed version of *Piecemaker, PM2*, based on the original research of David Kern. *PM2* is currently in use by several organisations including the Pina Bausch Foundation; MA Contemporary Dance Education, Frankfurt University of Music and Performing Arts; Codarts, Rotterdam; and the International Choreographic Arts (ICK) Amsterdam. The other software is *MoSys*, the publishing system developed for the publication of the on-line scores. *MoSys* consists of an editor to browse collections of recorded, analyzed and annotated material and arrange it into ‘views’ as sets and a front-end to see the content. Each set comprises a grid-like system of cells that can interact with each other using a unique messaging system. Since 2013, an additional system, *Piecemeta (PMa)* has been in development. *PMa* is a platform for sharing and collaborating on dance-related data, e.g. the Deborah Hay dataset. It enables simplified data storage through a variety of import formats and
recording tools and offers the possibility to play back, remix and extend the stored data sets through the services’ programming interface. These data sets can be made public to be further analysed, transformed and enhanced by other researchers and artists. Currently, Motion Bank is developing a concept for a ‘Dance Data Network,’ which will feature local, affordable data storage at each network location and sharing methods and systems.

### Summary

The future trajectory for research into ‘Dance Becoming Data’ (the work Motion Bank intends to do) will continue to rely on critical conversations occurring at the meeting point of various disciplines where, as an enabler for collaboration, as described in the above projects, becoming data opens questions and enables connection at the intersections between artistic, scholarly and scientific practices. While the projects described above offer innovative and useful models for translating dance as tacit and embodied knowledge into digital data without losing context and meaning, that particular challenge still remains. And this challenge takes on added complications when it comes to scaling these activities to the wider field of dance, which means losing some of the intensity and customised approaches these particular projects were able to resource. At the same time increased access to digital recording and on-line storage means increasing amounts of heterogeneous dance data is on its way. Therefore, Sant makes the right proposals in Documenting Performance for more cooperation with the fields of library and information science to help organise, care for and make accessible digitised dance documentation. But in light of the rapid and continuous development in digital networked media, it might be argued that this cooperation can only go so far. In the increasingly connected milieu of intelligent machines, where ‘choreographic thinking’ encounters other forms of cognition in non-organic agents, there will be a need to keep going beyond engineering to the edge where software is not just a tool, where coding remains part of a process of discovery, communication and critique.
Notes

1 The first version of this article was originally published in the Comment section of “Computing the Corporeal”, a special issue of *Computational Culture, a Journal of Software Studies* edited by Nicolas Salazar Sutil and Scott deLahunta. computationalculture.net (accessed 17 December 2017). The Comment section includes an interview with Anton Koch, artist researcher and senior developer with Motion Bank.

2 Sant, “Documenting Performance,” 2.

3 Ibid., 15.


5 Sant, “Acknowledgements,” xxiii.


7 For more on these evolving standards, in particular those associated with the Semantic Web and W3C (World Wide Web Consortium) read Anton Koch in conversation ‘Dance Becoming Data Part Two’ (2017).


9 Koch, “Dance Becoming Data Part Two.”

10 There were three versions of the *Software for Dancers* project taking place from mid-2001 to early 2003. For reports and outcomes see: www.sdela.dds.nl/sfd/index.html (accessed 8 October 2017). It is the first version being addressed here with choreographers Wayne McGregor, Shobana Jeyasingh, Siobhan Davies, Ashley Page and software artists/developers Guy Hilton, Joseph Hyde, Bruno Martelli, Ade Ward, Christian Ziegler.


12 Oliveros, *Software for People*, 177.


14 Oliveros, *Software for People*, 188.
The early 2000s also marked a certain institutional entry point for ‘new media’ art. See: Tribe, Jana and Grosenick, Eds. New Media Art, 23. According to Manovich, the computer-based artistic field “began to really take shape only in the end of the 1980s” (“New Media from Borges to HTML,” 13).

A precedent for this conversation took place on 15 December 2000 as part of the Monaco Dance and Technology Festival where a group of software artists who collaborate in the making of dance works gathered to discuss their work. A full transcript can be downloaded here, accessed 9 October 2017, www.sdela.dds.nl/sfd/monaco.html.

One of the software artists who participate in Software for Dancers was Ade Ward who had just been awarded the first Software Art prize from transmediale.01 in Berlin for his work ‘auto-illustrator’ a parody of the popular Adobe Illustrator – rendering Illustrator “useless” in conventional terms.

delahunta, “Software for Dancers.” 96-102
delahunta and Shaw. “Constructing Memories: Creation of the choreographic resource” and “Choreographic Resources Agents, Archives, Scores and Installations.”

Choreographic Objects: traces and artifacts of physical intelligence.
Leach, “Choreographic Objects,” 458.
For an overview of this interdisciplinary research see documentation of the Mind and Movement Exhibition Wellcome Collection (2013), accessed 9 October 2017. wellcomecollection.org/thinkingwiththebody.
From the on-line description of FIELD, accessed 9 October 2017, openendedgroup.com/field.
See project materials on these websites, accessed 9 October 2017, openendedgroup.com/artworks/cla.html and waynemcgregor.com/research/choreographic-language-agent.
L. Church et. al., “Sketching by Programming.”

Ibid.

Developed as a follow up to the Choreographic Objects network meetings 2008-2009 (see footnote 10 above) with funding from the Arts and Humanities Research Council, UK. See Research Council’s Report, accessed 9 October 2017, gtr.rcuk.ac.uk/project/EF772A21-502F-4A7E-B105-A7B35407485C.

The source film was the original Blade Runner (1982)

Downie, “Thinking with the Body Exhibition Documentation”.


Specific notation systems have been developed for the scoring and documentation of dance since at least the 1600s, but only a handful are currently in use. For the Capturing Intention research project both Benesh (Eliane Mirzabekiantz) and Laban (Marion Bastien) notation specialists were engaged as part of the research team, see: deLahunta, Ed., Capturing Intention, 42-55.

deLahunta, Capturing Intention, 5.

deLahunta, Capturing Intention.


See short documentary film explaining the installation here on the Inside Movement Knowledge project website, accessed 9 October 2017, insidemovementknowledge.net.

More background on Frédéric Bevilacqua, accessed 9 October 2017, frederic-bevilacqua.net.


Bevilacqua, “Momentary notes on capturing gestures,” 27.

Bevilacqua and Muller, “A Gesture follower for performing arts.”


Bevilacqua, “Momentary notes on capturing gestures”.

Preservation of the *Becoming* project was accomplished through providing a description of the basic components and FIELD modules that could be accessed to reinstall the work. These are available online: [r-research.org/wp-content/uploads/2014/08/ECHO_implementation_hardware.pdf](http://r-research.org/wp-content/uploads/2014/08/ECHO_implementation_hardware.pdf) and [r-research.org/wp-content/uploads/2014/08/ECHO_implementation_software.pdf](http://r-research.org/wp-content/uploads/2014/08/ECHO_implementation_software.pdf).

For a distinctly data related focus, the *Choreographic Objects* project of Siobhan Davies involved the digitization and publication of a large amount of existing archival material which necessitated system and meta-data level implementation. Project website: [www.siobhandaviesreplay.com](http://www.siobhandaviesreplay.com).

Motion Bank Phase One (2010-2013) was funded by the German Federal Cultural Foundation, the Hessian Ministry for Science an the Arts, the Kulturfonds Frank-urt RheinMain and the ALTANA Kulturstiftung. Its partners included the Frankfurt LAB, The Forsythe Company, the Offenbach University of Art and Design, the Fraunhofer Institute for Computer Graphics Research, the University of Applied Sciences in Darmstadt, the Advanced Computing Center for the Arts and Design and Department of Dance at The Ohio State University, the Palucca Hochschule für Tanz Dresden, and Frankfurt University of Music and Performing Arts.

These paragraphs are adapted from a chapter by deLahunta, “Motion Bank: a broad context for choreographic research,” 128-137.

*No Time to Fly* (written score).

See project website, accessed 9 October 2017, choreographiccoding.org.

A next level of analysis will involve the extracting of pose data from the 2D videos, e.g. using OpenPose, see github for related library, accessed 9 October 2017, github.com/CMU-Perceptual-Computing-Lab/openpose.

The original version of Piecemaker, programmed by David Kern, was in use by The Forsythe Company from 2007-2013. Motion Bank is currently conducting research into this period of time with e-Heritage funding from the Federal Ministry of Education and Research.

This perspective is similar to the Loops project of the OpenendedGroup, making movements recordings of Merce Cunningham’s “dance solo for his hands” available for further artistic development, website accessed 9 October 2017, openendedgroup.com/artworks/loops_open.html.

Current international network partners include Hochschule Mainz University of Applied Sciences, Deakin Motion.Lab, Deakin University, Melbourne and Centre for Dance Research, Coventry University, UK.

References


Biography

Scott deLahunta has worked as a writer, researcher and organiser on a range of international projects bringing performing arts with a focus on choreography into conjunction with other disciplines and practices. His current interest is in how to communicate embodied forms of knowing in the absence of the body and the many issues that arise from this.

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