Gestural materialities and the worn *dispositif*

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1. Moving with a body/moving through data

How deeply can you move through or with data? Or, as Nicolas Salazar Sutil asked in an early outline for this book on *digital movement*, how deeply can you live within data? While it would be presumptuous, though obviously not without political implications in an era of paranoid security, to make any unscrupulous claims about how living is correlated to digital data and those sensing technologies believed to offer potentials of motion capture/analysis, it is true that the performing arts – music and dance in particular – have been attracted to sensing technologies ever since gestural expression was linked to the notion of a "controller" or actuator enabling the playing of an instrument that can generate data in real-time – and in extension to performing *as* an instrument in real-time. If it were true, however, that performance might be intrinsically connected to forms of controlling movement and bodily/gestural activity – while also measuring such activity to convert its data into useful information for various commercial, scientific or artistic purposes – then some fundamental questions can be raised regarding the need or desire for capture (or control).

Initially I had planned to write about wearable technologies, but I feel an urgency to reflect on control systems – the *dispostif* or arrangement of such control in contemporary and earlier modern performance environments – and the affective experience or digital affectivity of such "control" if the latter were re-articulated by the performer.(1) From the outset, then, I wondered whether performers worried about controllers and control systems. Why do we hear so little about this matter? A question might be posed to a dancer, namely whether she felt her gestures (as data) transmuted something in the audiovisual/kinematic/choreosonic environment, or whether she was muted? Whether the sensors worn on the body changed, enhanced or reduced her movement techniques and sensations, and enabled new expression and physical responsiveness?

In a discussion forum on dance-as-philosophy, André Lepecki ventured to call choreography itself a disciplined "apparatus of capture" troubled by movement's imperceptibility (escaping

the partitioning of the sensible, those forms of sensing and sense-making that are recognizable):

> To see choreography as an apparatus – moreover, to see it as an apparatus that captures dance only to distribute its significations and mobilizations, its gestures and affects, within fields of light and fields of words that are strictly codified – is to delimit those hegemonic modes of aesthetically perceiving and theoretically accounting for dance's evolutions in time. (Lepecki 2007, p. 120)

This argument follows Deleuze in assuming that such an apparatus always foregrounds perception as tied to modes of power which distribute and assign to things – matter – either visibility or invisibility, significance or insignificance. When reading this, I asked myself how it might relate to gestural interfaces for digital media, especially in cases where the transmutation of data, from/within the gesture, is imperceptible and therefore renders the gesture potentially insignificant or intransitive.

My own experience in the theatre tells me that performers do not live deeply within data at all. Many of those who have worked with sensors (myself included) complain that calibrational difficulties make the work exasperating and the aesthetic gain minimal, although the sense of limitation may be different when working, say, with Microsoft's Kinect camera system or other newly developed systems like RAM (prototyped by Yoko Ando at Japan's leading experimental media arts center, YCAM: http://interlab.ycam.jp/en/projects/ram) which promise better reciprocity and real-time feedback. The limitations we take for granted. The (re)compositional and interweaving possibilities in the singular, real-time event of the dance still arouse curiosity, as does the elusive feedback and the matter of enjoyment disguised by interactivity (as Mladen Dolar noted, we delegate our *jouissance* to the machine [2008, p. 136]). I have lived with machines and software in dance now for twenty years, looking for room to maneuver, for a way out of the tools' modalities to constrain, regulate and command.

On the surface, questions of control were, for the most part, negligible in the history of modern and contemporary dance. Beyond the traditions of instrumental music, the idea that the dancer's body could be explicitly understood as an instrument was perhaps first introduced into the discourse of modern dance by Mary Wigman and other pioneers of German Ausdruckstanz, who saw the *Tänzermensch* as someone who chooses the body and its movements as one's instrument of knowledge, expression and thought, as one's own

vision of corporeality and sensorial/corporeal technics. Watching Valeska Gert's gestural eccentricities and misalignments, performed in her cabaret acts, reveals a significant displacement of the control protocols that resided in the 19th century codified balletic traditions. Anita Berber, performing her dances of ecstasy mostly nude and under the influence of hallucinogens, cared very little about the capture of choreography. Codification of technique and notation systems, from Feuillet to Stepanov, gained an influential twist, during the interwar years, through Laban's Choreutics and expanded analytics of steps (*pas*), arm movements (*ports de bras*), spatial directions and organizing principles – here modern dance (and Wigman had just opened her own school) strove towards its own professional legitimization, gradually wanting to elaborate on the effort, weight, flow, and able-to-be-sensed vectors of movement/gestural body language. Laban remained indebted to the idea of a harmonic system even as he expanded the "scales" and "spatial tone rows," if we bear in mind the musical analogies that Laban, a close contemporary of Schoenberg, worked with at the time of his choreological research (cf. Louppe 1994, pp. 117-18).

The correlation between dancing body and musical instrument remains problematic as the creators of early modern dance in the West (new dance or absolute dance, as they called it) tended to divest movement from any already established codes (ballet technique, musical or verbal code), or the instrumentalizing and rationalizing biomechanics of the kind Vsevolod Meyerhold devised at his Petersburg laboratory, to have a clearing for a new poetics of invention. Wigman, though having attended Émile Jacques-Dalcroze's Hellerau workshops on eurythmics and vitalities of inner musicality, performed her early solos in silence, and many of the great modern choreographers from Duncan to Hawkins, Graham and Cunningham (and the later Judson Church avant-garde) avoided following any score given in advance. Laurence Louppe, in her eloquent *Poetics of Contemporary Dance,* calls this the "extreme nearness" of modern dance to itself: "The dancer has nothing exterior or supplementary to the matter/material of the self with which to build a signifying universe, an intelligible imaginary" (2010, p. 23). Louppe uses the term "instrument" in the Wigmanian sense, suggesting that "contemporary techniques, no matter how scientific, no matter how long it takes to acquire them, are before anything else the instruments of a knowledge leading the dancer to this singularity" (p. 23).

In her chapter on "Choreographic Works: Forms of Appearance" (pp. 202-29) Louppe does eventually address the "supplementary" objects conjoined with choreographic practice – and

in postrevolutionary Russia the constructivist artists Varvara Stepanova or Luibov Popova, working alongside Meyerhold, had been eager experimenters designing technical apparatuses and devices, as did Oskar Schlemmer with his sculptural costumes, appendages and figurines for the Bauhaus dances. It is these material phenomena and interfaces that interest me here, since tools and appendages are amplificatory choreographic and scenographic elements that may become fundamental for the plasticity of articulation of movement and movement relations to space. When I first visited the Festspielhaus Hellerau in the early 1990s, after it had been reopened to the public following the departure of the Soviet army (the site had been occupied as a military facility since the end of World War II), memories of Adolphe Appia's path-breaking stage and lighting designs for dance were evoked in the vast, empty
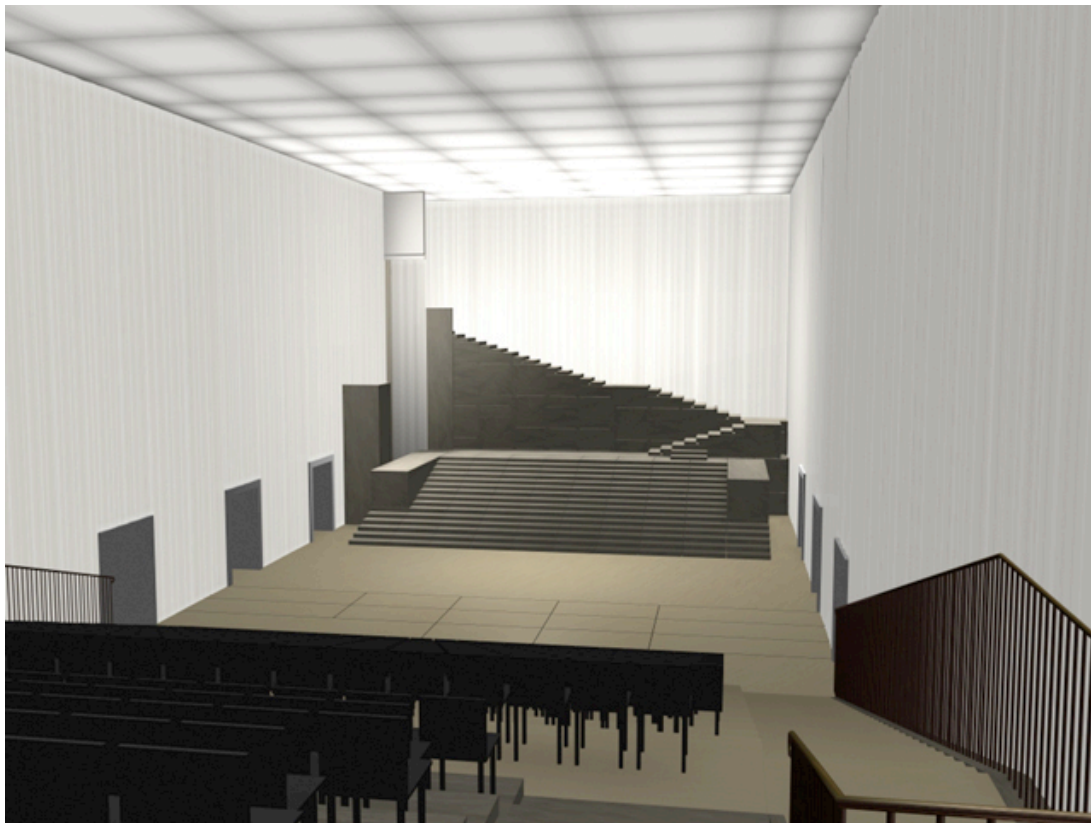

Fig.1 Richard Beacham's computer 3D model/reconstruction of Appia's *mise en scène* of Rhythmic Space for the 1912 *Orpheus* production at Hellerau Festspielhaus, created at the King's College Visualisation Lab, based on the original design by Appia using modular units. Reprinted with permission. Beacham 2006b.

architecture of a hall that once housed Dalcroze and Appia's staging of Gluck's *Orpheus and Eurydice* in 1912, in a bare hall illuminated by elaborate special lighting (indirect, behind translucent linen) and equipped with modular elements of staircases, steps that provided upward, downward and sideward motion possibilities for the dancers and chorus.(2)

The set, and the lighting, in this case, provide the multidimensional arrangement for the movement choreography which Appia understood to be rhythmically embodied in a light-producing, radiating space full of pulsating energies that were partly in-formed by his animated modular (moveable) architecture of the staircases for the choral passages. Illuminating convergences could thus be found between dancer Loïe Fuller and her use of light and cloth, Appia's designs for rhythmic movement, the Constructivist stage machine designers around Meyerhold, Tretyakov and Eisenstein, and the Bauhaus designers and visual artists (Schlemmer, Kandinsky, Moholy-Nagy) in these early decades of the 20th century. Appia's spectacular lighting and spatial designs for Dalcroze's eurhythmic performance of *Orpheus* at the Hellerau Festspielhaus also anticipate later kinetic and op art which made moving light a medium for "visions of motion" and virtual volumes, as Moholy-Nagy had suggested with his moving light/film sculptures that seem inspired by Étienne-Jules Marey's earlier graph-writing machines.(3) Dalcroze called the union of music and movement, of internal experience and external expression, *plastique animé* – a remarkable notion which projects the tactile, sensorial understanding of enveloping spatiality or animate design we now find in the architectural work of Greg Lynn, Diller + Scofidio, Peter Eisenman, Lars Spuybroek, and the Hyperbody Group for Digitally Driven Architecture.(4) Nimish Biloria, who directs Hyperbody and with whom the DAP-Lab is collaborating on the EU-funded *METABODY* project, describes his interest in pro-active environments in a way that resonates with Appia's rhythmic spaces, yet his work investigates spatial affordances through *computational algorithms* which model ambiguous topologies of movement, mutations of the densities of space that can generate different mental and physical associations and, thus, behaviors.(5) The algorithms precede (anticipate) the physical 3D prototypes and interpenetrations of bodies: computer processing simulates how vectorial forces can deform grid lines of a spatial field through temporal unfoldings and dilations.

One of the *METABODY* leitmotifs of investigations is the idea of dis-alignment – dis-aligning perception from the centrality of linear vision or any dominant perceptual paradigm, and generating boundary perceptions at the frontier of the intelligible – which would relate to the deformations of a stable (geometric) grid or architectural framing. Eisenman's *Diagram Diaries* hint at such virtual permutations modeled by the computer; seeing virtual modeling projected around two onstage performers in *Cinématique* (Cie. Adrien M, 2009) is partly confusing, however, since the performers are not modeling behavior (or are they?). They act as if they were not in a projected and moveable space but a real space – literally stumbling

into the digital warps and cracks opening up. Yet the *faux* movement is perceived to be an effect of the "shifting ground," and the bodies become parapractic.
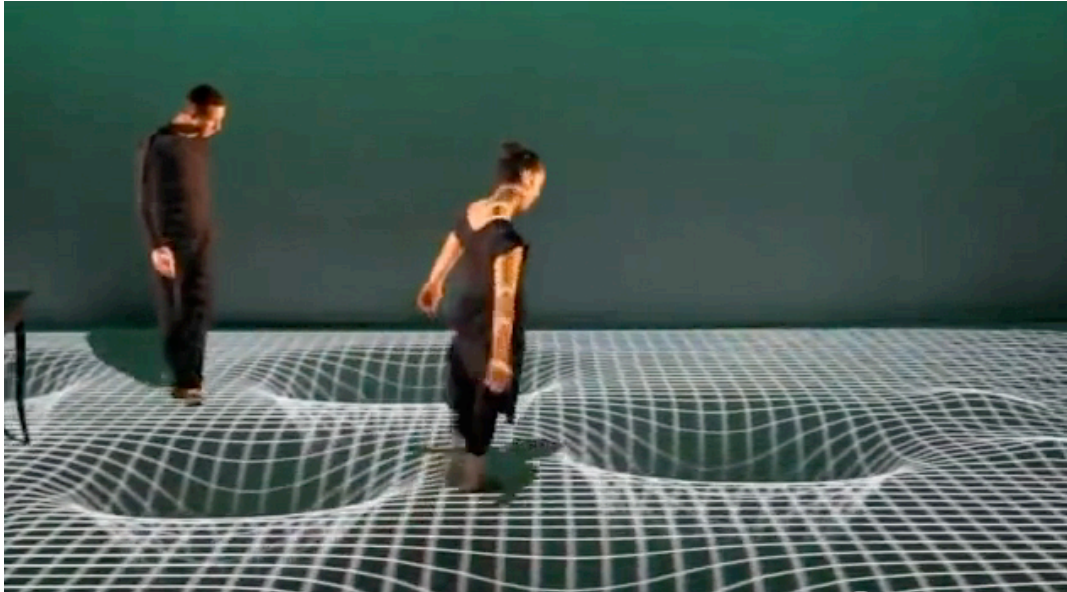

Fig.2 Cie. Adrien M - *Cinématique*, Digital Media Performance, Bains Numérique Festival in Enghien-les-Bains 2009. Screengrab: http://www.youtube.com/watch?v=cGE3q6GLNIg

If we now look at an archival photo of the 1912 *Orpheus* performance in Appia's rhythmicized space, we can imagine how the spatial organization affected the sensory

Fig. 3 Archival photo of Dalcroze and Appia's 1912 *Orpheus and Eurydice* production showing the dancers and movement chorus distributed almost like a swarm network (envisioned by Biloria) in multidimensional space. Hellerau Festspielhaus, Reprinted with permission. Beacham 2006b

economy of the body, how the dancers, so to speak, concretely had to navigate or adopt to the depth and verticality of the staircases, responding to spatial densities (height, width, breadth, etc) and wearing them like an envelope, moving with them. I will return to this idea of a tactile-kinetic envelope near the end of the essay when discussing Rauschenberg's and Klüver's event 9 *Evenings of Theatre and Engineering* (1966) and Chunky Move's intra-active dance pieces *Glow* (2006) and *Mortal Engine* (2008).

Thinking of wearable space or the mutual embedding of body and space through *sensorial dilation*, the question of alignment or non-alignment then becomes critical, since ambiguous and difficult spatial environments tend to destabilize proprioception and intra-actional behavior just as immersive multimedia environments can become nervous systems where anything can happen and where there are no privileged points of intensity or clearly defined places (center, foreground, etc) for directional impulses.(6) Ambiguity, at the same time, is not what the quantitative logic of predefined parameters for motion tracking is set up for: the tracking system inevitably implies a readable syntax of body movement, and it needs to calibrate positions and postures. The term "nervous system" for a sensitive, interactive *dispositif* is owed to David Rokeby, who in the 1980s was one of the first spatial sound composers working with a computational environment he had developed for audiences to explore by moving through a space equipped with sensors. Rokeby's *Very Nervous System* (VNS), first installed in 1983, was quite unobtrusive as an apparatus; infrared sensors or video cameras observe the room into which visitors enter, and the system is inactive until recipients move around the system's radius of action. The sensing system then records the motions, analyzes them digitally and responds by emitting (via small loudspeakers) sequences of sound, timbres of musical instruments or everyday noises. Recipients explore the room (and thus the system) as they begin to realize their movements generate particular sounds: they can play the system (or the system plays them).(7) Rokeby kept modifying VNS over the years, later also adding video projections (e.g. *Reflexions,* 1983; *Silicon Remembers Carbon*, 1993-95) and verbal languages (speech-synthesized voices describing objects that visitors were invited to place in front of the video eye in *Giver of Names*, 1991). The system is to a large extent paradigmatic of most responsive/interactive installations and their functional parameterization (how motion detection translates such data into sound synthesis or graphic image behavior, whether projected onto screens, walls, floors or in an immersive all-around manner). The camera vision systems must necessarily register motion, position, amount of movement and action behavior within the parameters; most other commonly used

software systems (Max/Msp/Jitter, EyeCon, Isadora, EyesWeb, MotionComposer, gesture follower, etc) and wearable sensor systems act in the same way, "capturing" movement and gestures, then translating the input data into real-time (or delayed) media output – sound, images, 3D projections, animated avatars, text – and the various recombinatory loops and generative processes during which data perform their sonic and graphic emanations.

Working with controllers and conducting research in motion analysis based on computational data is a fairly recent phenomenon in the dance and technology community (since the early 1990s) that owes its existence to particular circumstances and cross-disciplinary developments (scientific motion studies and investigations of biomechanical or psychomotor laws characterizing human movement, kinematics and human factors research, neuroscience and cognition studies, software development in Human-Computer Interaction) and an overlap between the music technology and dance experimenters. Researchers working in these fields had become interested in what Antonio Camurri and his team at the Genoa InfoMus Lab, for example, call "extraction" of expressive, non-verbal features of gestural and full-body communication (Camurri and Volpe 2004, p. 460). More concretely, music and dance experimenters came to share a scientific interest in the integration of extraction of movement cues into multimodal interfaces for performers or users enhancing physical participation and expressive articulation in the human-machine interaction processes, controlling dynamic and interactional data displays, as well as understanding, evaluating and classifying information from gesture tracking and recognition techniques.(8) In the following pages, I want to reflect on the issue of capture and what significance – in the context of motion responsive technologies – a capturing of motion holds for performance artists and designers who must have been aware of a longer history of practices that engage media, animation, sound and image diffusion integrally in live performance.

2. Capture/control *dispositifs*

Aside from Taylorist time-and-motion analysis and studies on worker movement and efficiency, capturing or recording movement in the modern era begins with early chronophotography and the initial developments of the cinema (Lumière brothers, Edison, Marey, Muybridge) seeking to transpose bodily movement to the mobility of projection (images passing through a projector), Muybridge's cinematic stills forming a special case of serial recomposition still highly influential for today's students of animation. Cameras were

pointed at bodies, landscapes, urban space, trains, factories, and actors. Lest it be forgotten, cameras in the hands of Dziga Vertov or Alexander Medvedkin were factographic tools used not to capture an accurate image of the world but to transform it, activating the spectator to provoke revolutionary change. If we now consider the relations between corporeal and incorporeal materialism, with the historical role of the agency of the camera in mind, we could begin an archaeology of technology (and technological *dispositifs*) in choreographies of movement by looking at the spatial organization of bodies, and the utility of bodies (as it has now surfaced quite clearly in interactive performance that limits and controls action while pretending that the interactor is a controller). It is a remarkable historical detail to discover that Medvedkin's *kino-poezd* (ciné-train), consisting of three carriages transformed into film-production studios and projection room, travelled all across the Soviet Union to agitate and document labor, generating silent films almost in real time – "film today and show it tomorrow" (Stark 2012, p. 129) – and thus participating in a productivist political project as well as an operational inclusion of the recipients just as Eisenstein had imagined with his "montage of attractions" focussed on the audience as "material" (Raunig 2010, p. 53).

Gerald Raunig points out that Meyerhold and Eisenstein performed for workers (sometimes inside the factories) to show and develop particular competences that gestured at a precise scientific investigation of the audience to aid the socialist construction, and we can understand this to have been part of the logic of collective production/reception. The Lumière Brothers, a few years earlier (in 1895), had filmed "Workers Leaving the Factory" and demonstrated the precise choreography (organization) of bodies in front of the camera – framing and editing movement in a way that we can now read (following Kracauer) as an ideological (cinematic) production of worker conditioning (Taylorism predating today's ubiquitous surveillance systems) which in the subsequent silent film era became a dominant mode of representation.(9) The body, in early experimental film and slapstick comedies (Buster Keaton), is manipulated through artificial techniques (slow or stop motion, different speeds), dis-played into false movement/gesture and thus, we could argue, also performed as a contradictory effect (on the recipient) – funny slapstick contortion rather than sober functioning, biomechanically automatically and properly (as in an assembly line).

Is not this historical cinematic *dispositif* a clear precursor of today's interactive operationality? And of the contortionist aesthetics of catching sounds or jumping to perform your digital double (closed-circuit playing with your image)? The *dispostif* is based on rules

and perceptional alignments that link instrumental constellations with various material stagings of processual activation – framing (spatio-temporal limitations) and parameters, with the cause-and-effect technical elements of the user interface (microphone, sensors, cameras, keyboard, mouse, joystick, buttons, sliders, projectors, screens, loudspeakers, etc) that control input and output media. Who would have thought that the rules of the game are so clear, that recipients intuitively want to "master" the functionality of the system and offer their labor?

Let me clarify both the notion of the *dispositif* and the question of who controls what, or indeed what controls whom. Unlike theatre theory, which after Brecht speaks of the "apparatus" when it looks critically at the operations of the stage/illusions, film theory since the 1970s has prefered the term *dispositif,* the French word meaning "disposition" or "arrangement" (Baudry 1978, p. 23). Philosophers of media and social/political theory such a Foucault, Deleuze, Guattari, Lyotard, Flusser, and Zielinski became hugely interested in the notion of the *dispositif* in the 1970s and 1980s, utilizing it as a conceptual category for examining environments (material, technological, medial). Furthermore, the terms was used to regulate strategic frameworks that are configured in certain ways making it possible for certain types of phenomena to occur. Foucault tended to emphasize the regulatory and panoptic formations that produce power, knowledge, and subjectivity. Deleuze and Guattari became more interested in the drifting and disjuncture between heterogeneous elements in a multilinear collective assemblage or *dispositif.* In other words, these authors acknowledge that arrangements are precarious and cannot always control outcomes; the lines that compose a multilinear ensemble – referred to as *agencements collectifs d'énonciation* or "collective enunciations" – can change direction or become unbalanced and forked. When human and technological processes are intimately intertwined or cannot be easily differentiated, the component materials, forces, energies, rules and conventions, and lines of communication are not stable, their contours are not fixed but subject to a series of variables (Deleuze 1992: 159). Although factories were closing and new media art galleries opening up (Steyerl 2012, 99) it took a while for interactive art to catch up with its aesthetic self-analysis, distracting from the control apparatus and emphasizing a postvisual affective phenomenology of sensory deterritorialization (while Deleuze's academic stock seemed always on the rise).

In the music technology field, whenever "mapping" is invoked it tends to be concerned with precise controller functions. Kia Ng, in an article for *Organised Sound,* prototypically describes wanting to facilitate an intuitive and non-intrusive interactive multimedia

performance interface that offers the users or performers *real-time control* of multimedia events using their physical movements. The mapping framework he proposes is intended to be a dynamic real-time performance tool, able to sense and track activities and changes:

> Physical movement, gesture and expression play an important role in stage performances, irrespective of the mode of human communications: verbal or non-verbal (audio or non-audio), or the language used. With the advances in electronic and computing technology, there has been increasing interest in new musical instrument design… to augment traditional instruments… with new capabilities, for example triggering digital sound and visual output (Ng 2002, p. 191).

In music contexts, such controllers were often keyboard interfaces (to pitch), with each key assigned to a particular pitch (on the MIDI scale of 1 to 127) or any other potential modulation or filtering function on the scale (accented notes, sound effects, distortions, any data – audio or visual –prepared in the programming environment). This one-to-one mapping, as well as one-to-many mapping and many-to-one mapping designs, and the "triggering" of data responses that in music and dance performances/installations produce sonic effects and video projection outputs, are so familiar that we do not need to dwell on them, but it became clear over the years that the action-reaction model required increasingly complex programming to allow for more interesting, complex behavior either on part of the performer who had become the controller (e.g. wearing a sensor interface or being motion-tracked via camera sensing system) exploring interactional trajectories and interweavings of physical or hyperphysical surfaces, or on part of the computational system (including servers, networks, GPS, etc) able to provide dynamic, generative, and even autonomous agencies or audio-visual formations. One assumption of contemporary hybrid interactive architectures is their complex multimodal operation – involving "tangible interfaces" that afford various sensory modes (auditory, visual, tactile, olfactory, gustatory).

Fig. 4 Lázló Moholy-Nagy, *Lichtspiel: schwarz weiß grau* 1930. Screengrab from the exhibition of the film at *Bauhaus: Art as Life,* Barbican Art Gallery, London, 2012.

Tangible matter always mattered in performance, not just in relation to instruments and hardware but also through material processes and techniques of enactment themselves, and the sculptural Bauhaus stage workshop experiments or the Russian constructivist performances are important examples of the kind of gestural materiality we studied in the DAP-Lab. The sculptural or biomechanical gestures projected a particular *gestalt* – image shapes, properties and assemblages – hinting at new forms of work-design/choreographic objects to touch upon the early 20th century industrial and aesthetic abstraction of human motion, as well as concrete abstraction of object motion (Moholy-Nagy). The kinetic *dispositif* for *Lichtspiel* suggests that Moholy-Nagy's emphasis on coalescence of sensory communication and sculptural gesture was complementary to Schlemmer's. Both artists, in their experiments with motion, light, space, and *Faktur* (Moholgy-Nagy's term for surface aspects, the perceptible effects, of the performative treatment of a material), exploit material presence, not as mere productivism (for industrial usage and union of purpose and material) but in the technogenetic and transductive sense Erin Manning has demanded in her, perhaps shortsighted, argument that technological systems tend to "operate prosthetically and are often attached to the human body. They operate on the basis of more-than, 'enhancing' a dancing body's capacity to create space-times of experience" (2009, p. 63). But this enhancement is of course often imperceptible, for the dancer, and thus it cannot be experienced as enhancing. Unlike the performers in *Cinématique,* most dancers in interactive

stage performances do not see/look at digital projections on the screens behind them. I always wondered how they could possibly be affected.

Directors attracted to the newly evolving cinematic medium in these early decades (e.g. Piscator, Appia, Boccioni, Artaud, Svoboda) probed the relationship between theatre and film; their interest in *projecting* action and movement images was largely scenographic and thus invested in the apparatus of what Eisenstein called the "montage of attractions." Bodies always participated in the aesthetic and sensorial transformation of space and temporal experience, but material qualities of movement harbor a special relevance in view of costumes, devices or equipments placed directly on the body. Being captured by a sensing or vision system (audio recording presenting a particular case that needs to be addressed separately) to produce synchronous output effects was not an option before the increasing availability of computational software in performance, however. It was not until the 1980s and 1990s that computation entered the equation, and thus notions of code or data are relatively recent. Sound generating, audio recording and amplification technologies have a longer history, and their trajectories – since the Futurist *intonarumori* („Geräuscherzeuger,“ in German) or the theremin – bear a particular interest for me. The *intonarumori,* so lovingly extended in the extravagant instrument constructions of Harry Partch, whose *Delusions of the Fury* [1965-66] was recently recreated by musicians for the 2013 Ruhrtriennale in Bochum, form a bridge to the mid-sixties electronic performance arts that showed how engineering – alongside instrument design – introduced microelectronic circuitry and cybernetics into artistic, process-related visions explored by Kaprow, Paik, Cage, Cunningham, Rauschenberg, Halprin, Rainer and their peers. A transposition of Appia's modulated living space into wearable performance space could be seen in what Trisha Brown called "equipment pieces" – dances that required tools to be functionally and aesthetically effective, especially if the tools or harnesses meant that the performers could scale up buildings in New York City (*Man Walking down the Side of a Building*, 1970) or walk perpendicularly to the floor across walls of a gallery (*Walking on the Wall*, 1971), requiring most strenuous realignments. These equipments pieces had in fact involved from an interest in applying constraints (equipment that also in-formed a "technique") to movement creation, testing how constraints call forth particular kinaesthetic behaviors.

3. Open Scores and Gesture Followers

The sounding of performance gesture/controller tools and the atmospheric and aural transformation of an entire space were demonstrated most memorably in the collaborative event Robert Rauschenberg and engineer Billy Klüver staged in 1966 at the 69th Regiment Armory in New York (*Nine Evenings: Theatre and Engineering),* working with Steve Paxton, Deborah and Alex Hay, John Cage, Yvonne Rainer, Lucinda Childs, Robert Whitman, David Tudor, and Öyvind Fahlström. How do we discern the "controllers" and material gestures in the *dispositif* of *9 Evenings*? And how do gestures matter in the most tangible sense, if the *dispositif* were to tend towards the incorporeal effects of extraction? How can gestures be affectively transformative? The tactile dimension of sound, and the tactility of sonic gesture, arguably form a core idea for Rauschenberg's experiment with *Open Score,* his spatial design and dramaturgy at the same time illuminating the regime of "optical tests" Walter Benjamin had so brilliantly described in his commentary on film and on the camera taking the position of the audience (2003, p. 259), yet also undermining it through a cunning transformation of the visible coordinate system. I want to suggest that the notion of "materiality" can be disentangled from materials (instrument, sensor, wearable) to the extent that "digital movement" and digital materiality allow a perspective on engineered objects that combine material and im-material, generating processes of dilation between these domains through gestural constraint, which the trope "tactile sound" can illuminate. Movement of the body and its material wearable becomes coupled, invisibly, with the intangibility of sound, intimating what we can perhaps call, after Benjamin, "audible tests." This testing of the audience, of course, is a provocation in the tradition of acousmatic sound art where distinct sounds cannot be located (perceived) in a source that causes them.

The *Open Score* performance began with Frank Stella playing a tennis match with Mimi Kanarek on a real tennis court set up on the large floor – a sports parameter for theatricalized re-engineering of nonaesthetic gestures (hitting the ball). The rackets were wired to amplify the sounds of each hit. The audience hears a "plonk" sound, while at each sound occurrence one of the lights in the Armory switched off. In other words, Rauschenberg and Klüver had designed an interactive tennis match in which gesture controlled both sound and light, and as the game proceeded, the hall increasingly fell into darkness. The gestures grew invisible. An infra-red closed-circuit TV projection system was then turned on to throw images onto large suspended screens: a cast of nearly 500 extras, people hired from the streets for a small fee

Fig. 5 Untitled (Robert Rauschenberg, *Open Score*, first performance), 1966 © Peter Moore, Reprinted from the catalog *9 Evenings Reconsidered: Art, Theatre, and Engineering, 1966* (2006).

had come on in the dark to perform various gestures invisibly. Algorithmically speaking, they performed instructions for simple tasks given to them ("touch someone who is not touching you"; touch two places on your body where you are ticklish"; "hug someone quickly then move on to someone else"; "men take off jackets, replace them, repeat", etc).(10) These gestures could not be seen: the audience could sense their presence but not perceive anything except spectral images of the crowd swarm on the screens, blurry ghosts that were captured but eluded signification. Their gestures survive only in the score. They existed, back then, only as tactile images inferred from, though not logically related to, the previously enacted "tennis game" of controllers, the sublimely silly and tedious "plonk" that dimmed the light in the space. *Open Score* ended when "the people" had vanished in the dark, and a single spot light picked out Rauschenberg carrying something obscure in a burlap sack. Inside was dancer Simone Forti, singing in a soft voice the tune of an old Spanish folk song, while Rauschenberg carefully pulled her about the empty space.

Behind the surface plonk, Klüver had regaled nearly thirty engineers from the Bell Labs to work on the various artist-scientist collaborations devised for the Armory building. He had also quietly imported the special infra-red closed-circuit TV projection system (not allowed for general use in the U.S., only for the military) to be deployed for *Open Score*. The engineering operations and circuits for the projects were drawn up into diagrams by Herb

Schneider in order to visualize the coordination of the elements of action, film, video, sculptural objects, sound, and electromagnetic waves. Klüver had put much effort into the prototyping of a new Theatre Electronic Environmental Modulator (TEEM) to be used at the event. TEEM was designed as a central control panel to operate all the remote functions, composed of more than 250 elements including decoders, encoders, power amplifiers, power relays, tone control units, FM receivers, FM transmitters, photocells, speakers, program drums, preamplifiers, Speaker Distribution Matrix, Proportional Control System, and a specially developed wireless system that set up a "networked" environment in the Armory. Such a wireless system, using transmitters and FM receptors, was novel at the time, untested by the artists who envisioned interactive performances with new materials (such as the electrodes worn by Alex Hay which transmitted muscle activity, heart beat, eye movement and brain waves into sound) and "physical things," as Steve Paxton called the enormous plastic inflatable tunnels made out of polyethylene. Schneider noted that TEEM and the AMP equipment functioned like a proto-computer, demonstrating to the artists the fundamental principles and logic of computer science: programming, data storing, shifts between one media form and another, random logic, combinatories, and the wired and wireless system architecture (cf. Morris 2006, pp. 55-63). He also admitted that there was no guarantee that anything would work, since most of the engineers had trouble understanding the artists' visions.

The overarching *dispositif* of TEEM allowed for the flexible insertion of specific devices, such as Robert Kieronski's Vochrome and various other objects built for David Tudor's *Bandoneon ! (a combine).* Klüver envisioned Tudor turning the cavernous Armory into a musical instrument for immersive acoustic experience. Yet in spite of the carefully engineered patch-boards and controllers, this "self-composing" system with its multiple microphones and loudspeakers not only struggled with the Armory's extended reverberation time and ambient noise, but when "played" by Tudor became literally uncontrollable. When activated, its many evolving sonic and visual conditions, affected continuously by feedback, reverb, and signal processing, made the performance totality quite unstable, and while Tudor, Cage or Paxton probably welcomed this insurgent behavior of the effects of the devised *dispositif,* other artists were more baffled by delays and technical failures. There were glitches (so fashionable in today's sonic arts) and, ironically, TEEM did not work well during the first night of *Open Score*, forcing the engineers to manually unpatch the lights meant to

go out during the electrified raquet game (without anyone in the audience noticing the difference to the second night, when TEEM worked perfectly).

This paradox of a controlled environment generating simultaneous, equivalent processes (causal, emergent, dissociated, acausal) is still a major techno-aesthetic problem today, fifty years later. Alex Hay, collaborating with Paxton and Rauschenberg as performers, pushed the performance medium to the same limits we still see today in interactive sensor-driven performance. The biofeedback apparatus worn by Hay simultaneously emphasized the body's materiality as well as its abstraction. The body's interior workings, invisible, were translated into immaterial aural and visual effects, while other, exterior actions were carried out physically: 100 six-foot squares of cloth which Hay had laid out in a modular pattern were moved around in an arithmetic progression and placed centrally.

Fig.6 Alex Hay (seated in the center) in *Grass Field, 9 Evenings of Theatre and Engineering* 1966 © Peter Moore. Reprinted from the catalog *9 Evenings reconsidered: art, theatre and engineering, 1966.*

The imperceptible inner organic rhythms were here conjoined with external "natural" movement of a formally coherent action, even if this action appeared nonsensical. Hay's description of his work's unrelated, simultaneous processes is purely syntactical: they are

equal in time. He locates the organic body (his own) in the spatial center, and this body remains still: his involuntary internal system movements are comparable to Alvin Lucier's brain waves activating sound amplifiers in *Music for Solo Performer* (1965) – in Lucier's case the cones of speakers, set into motion by his alpha waves, were the actual performers, the composer himself a silent and stationary presence. What Louppe calls the "extreme nearness" of dance here reaches a new dimension; Hay absents all movement and gestural displacement while inviting to be seen or heard – suggesting an autonomous nervous system activity as internal "gestures" (mediated through worn biosensors) that might be experienced through a kind of synaesthetic resonation. Biofeedback, I suggest, is the limit case of disalignment. We do not know what it is we hear.

Paxton's *Physical Things* – along with Cage's *Variations VII* the only audience-participatory piece – performs a similar syntactic maneuver: the transparent, plastic inflatable tubes play with inside and outside, confounding the textures of plastic membrane and skin. The visitors entered into a translucent intestine-like space, a resonating "blurred" architecture:

> Wading throughout the warrens of Steve Paxton and engineer Dick Wolff's *Physical Things*, the *9 Evenings* audience was also made to confront ruptures in interactivity and transmission. Spectators palpated the tunnels' translucent plastic skin, then entered a magnetic potlatch of sound picked up on handheld receivers. Bodily sensation and receiving process overlaid each other…*Physical Things* mapped not only the space of the Armory but the commercial airwaves that girded it. During the first night, the work also entailed infamously long delays. The transmission to the modified transistor radios was weak, resulting in less aural incident than intended. As one critic complained, 'There was nothing to throb over.' Yet Paxton himself opposed such climactic thrills. Rather, the work was to unfurl in a slow series of haptic discoveries . . . .The intrusion of dead air and delay enhanced this halting process, as the synaesthetic turned to an awareness of mediated reception. Unlike the brassy showmanship of much kinetic art, these works inhabited a space of fissures and temporal lags. It was in this sense that Klüver explicitly positioned *9 Evenings* against the immediacy of 'flashing lights and psychedelic effects.' (Morris 2006, p. 33)

The haptic discoveries point to the biophysical imagination about skin conductivity underlying such installations. One could even interpret Hay's "grass field" as an analogue metaphor for the many numbered pixelated (electrodermal) skin patches made of felt material (Hay's instructions say that "all properties and dress will have the color identity of the skin of the performers," while engineer Robby Robinson who developed the body-worn electrodes notes that "it was like preparing a man to go into outer space with the sensors attached to his body and the radio transmitters and amplifiers scattered over his body so they would not interfere with his movements in performing his tasks" [p. 14]). Both *Grass Field* and

Physical Things conjured images of metabolisms and electromagnetic energy systems. These early interactional performances were modeling complexity, and they understood organisms to be complex control systems that are vulnerable to perturbations (cf. Birringer 2009, pp. 294ff).

This notion of perturbation (and the Cagean ideology of chance and indeterminacy) has been resituated, forty years later, in increasingly overdetermined capture systems of contemporary digital interface architectures that envelop the performer in totalizing projection environments, reducing movement choices while tuning the pre-programmed assets of the system to the dancer's gestures it wants (to follow). Chunky Move's *Glow,* witnessed at the Hellerau Festspielhaus during the 2007 CYNETarts Festival, and their later *Mortal Engine* (2008, seen during a reprise at London Southbank Center in 2012), in fact struck me, *pace* Klüver, as immediately invested in "flashing lights and psychedelic effects," curiously entrapping the performers in the all-around graphic and laser projections devised by Chunky Move's software engineer Frieder Weiss and laser designer Robin Fox. Both performances display an overwhelming suturing effect, an overlapping of the graphics and light effects onto the performed action that makes it hard in fact to remember Gideon Obarzanek's choreography. The temporal enframing here is largely owed to the software's gesture following, its spectacular technography that "writes" or inscribes its particle physics behaviors as fluid projections onto the floor canvas – the stage on which the dancer writhes.
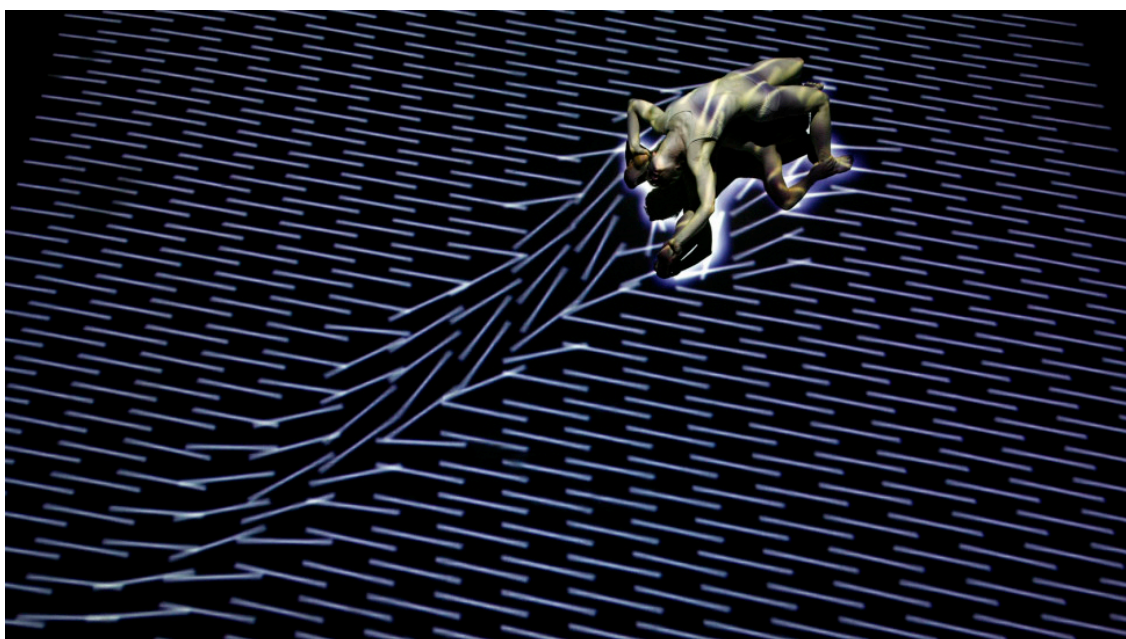

Fig.7 *Mortal Engine*, Chunky Move, choreographed by Gideon Obarzanek, interactive system design by Frieder Weiss. Queen Elizabeth Hall, Southbank Center, London 2012. Photo courtesy of Frieder Weiss (http://friederweiss.org).

The *dispositif* is surprisingly simple: a single overhead camera can observe all the action on the stage below; the LCD projector is mounted beside the camera and projects the liquid graphic mutations in real-time (with extremely low latency) downward onto the body of the performer and the floor. Both *Mortal Engine* and *Glow* use the Kalypso software program developed by Weiss for these data-intensive dances: it captures the contours of the performer and feeds the information into programmed visualizations such as lines, curves, contouring silhouettes, blobs, blotches, smears or harder polygonal geometries (the system does not "see" the body, it calculates the changes in the pixel field and structures this continuing input information via subtraction into the computer according to the possibilities of the Cartesian grid – from the material image to numerical grid). The effect is visceral and stunning.(11)

At the same time, the system here clearly acts as the controller manipulating the flow of images that appear to be generated by the immediate motor-sensory linearity of action, giving the dancer (Kristy Ayre and Sara Black, alternating in *Glow,* and both performing in *Mortal Engine*) the sensation that her gestures or postures can push the envelope, and that she can feel the "resistance of the instrument" as Kwastek calls the relationship between a virtuoso and the apparatus, thus of course addressing trained performers in staged processual interactions rather than untrained visitors to installations within which the operational rules are unknown to the recipient (Kwastek 2013, p. 172). In *Glow,* the dancer knows the rules, her crouched, flattened body, her splayed form on the ground, becoming entwined with the appearing and disappearing graphic animations, dropping over her, which she cannot see but experiences kinaesthetically on a level, perhaps, of blindness. What I described as the work's stunning visceralness is largely effected by the powerful rhythmic quality of the light (the graphic animations are the only light appearing – always intensely mobile and dynamic, creating constantly mutating shapes and contours around the moving body) that traces the gestures. It must electrify the somatic consciousness of the dancer who acts in the moment, wholly aware of her corporeal relation to Kalypso's contouring digital accoutrements. She might as well dance with her eyes closed, intuiting her floor work as a continuous exfoliation into the shards, lines and curves of light radiating outwards and coalescing around her. Her gestures are inconsequential as sounding gestures since in this *dispositif* they are not tracked (sound design is by Luke Smiles), which one can read as a compromise. The system does not expect choreosonic gestures by the dancer to be capable of actuating or controlling sound compositionally correlative to the complex visual animations. In this case, then, the affective connection is largely tactile-kinetic.

Fig. 8 Sara Black in *Glow*, co-created by Chunky Move and Frieder Weiss © 2007 Videostill courtesy of Frieder Weiss.

Seated on raised platforms either side of the stage, we look down upon each movement and each tilting of the body generating an animated calligraphic gesture, a response, an echo, a whispered word from the shadowy lover Kalypso (and why not call our control/capture systems our lovers). Half-way through, Sara Black becomes quite audible in her ecstasy, she slides and slides, spinning around, stuttering words of love in unknown dialects of the possessed dervishes – suddenly all is white, and each gentle motion of her arm and elbow draws purple outlines of her coffin below her, she literally draws her envelope, wearing down her lover's embrace, the Draculan sucker who will climb into the coffee with her when the sun rises, now it is night again, we are in the dark, only thin stripes flicker across, lines like knives stab and cut, and the dancer continues, happily enslaved to her pulsating underground. The electronic music vibrates in our ears, but our hearts melt, we are swayed to stay on this island, like Odysseus, drawn to the mimicry of the perfectly coupled re-union of dance and technology.

Near the end, the dancer jumps up, and lets herself fall, again and again, creating powerful dark blotches on the white floor. Her body leaves the silent black blob of a silhouette on the surface, and as she leaves and retreats to the side, anxiously, she separates from the loved

silhouette, but then the dark blobs slowly begin to move, follow her across the space, to finally catch up with her. She is reunited with the impression of her body, embraced by digital movement, silhouette and person become one again. Distance and unity have been calculated and recalibrated.

4. Unalignment/haute couture

I am not sure whether I want to end with these images of a worn out marriage. The *dispositif,* Edward Snowden alerted us, loves us and keeps track. InfoMus Lab's EyesWeb software, I recently experienced in Genoa, has been trained to develop ever more sophisticated high-level parameters (though they are hardly clearly defined concepts) for physical motion extraction and the analysis of movement features (kinetic energy, "objective" features that can be measured such as velocity; perceptive and semantic aspects; emotional and social signal analysis, expressive features, etc). What interests us in the *METABODY* project just getting under way (and InfoMus is a partner), are material gestures that can be processed but remain illegible or cannot be reduced (and transposed) to a tracking syntax that remains indebted to biometric parameters and mapping coefficients. The old skeletal model of the human body is perhaps also overdue for revision. All the markers for motion capture have been attached to the wrong places. "Perhaps now is the time to do away with pictures of things which encourage our pleasure centers before trying to destroy them," Kara Walker once proposed in an exhibition (*American Primitives,* 2001). I was reminded of *Glow*'s silhouettes when I saw her retrospective *My Complement, My Enemy, My Oppressor, My Love* at the Whitney Museum, and it then occurred to me that the visually stunning coupling of gesture to interactive systems is always also an involuntary political comment on ideological alignments, on how bodies are enframed or incorporated, insufficiently resistant to mortal engines.

On the basic level, then, there is the *system controller*, as I just experienced it again in an installation (*Re-Work*) shown at my university by digital artist Benjamin Fox whose Kinect camera sensing *dispositif* invites the visitors to slapstick – ostensibly gesturally "re-mixing" the music of Beethoven's *Für Elise*. The infrared and 3D functions of the Kinect read the body contours of the players (on Fox's computer screen, the figures show up like in the footage from the first moon landing, ghosts beckoning to ghosts in a blurry silent movie) and assign sound responses to the gestures which we hear from the loudspeakers; instructions

based on Fox's Max/Msp patch advise the recipients to "use large gestures with hands and body to manipulate the sound around you"; "moving forward or backward to slow/speed up the tempo"; "move hands left to right to change transpositions"; "move hands up and down to change volume", etc.

On the more complex level, say in immersive installations such as Char Davies' *Osmose* or in Yoko Ando's *Reactor for Awareness in Motion,* you wear sensors strapped across your chest (measuring your inhale/exhale) or whole body and you appear to step inside a computer-generated landscape (projected into your headmounted goggles in *Osmose,* or onto three large screens surrounding you at YCAM) which becomes a participatory medium for your body's convergence with itself in relation to the virtual world, an inwardly/outwardly directed movement in which the immaterial is confused with the bodily-felt or acoustically heard: you imagine floating across a forest and listening to your organism. As you appear to sense your own tactile sound, you lose control of balance, your breath exhales your movement into the virtual environment, you are transported (while standing still on a spot). Your wear your
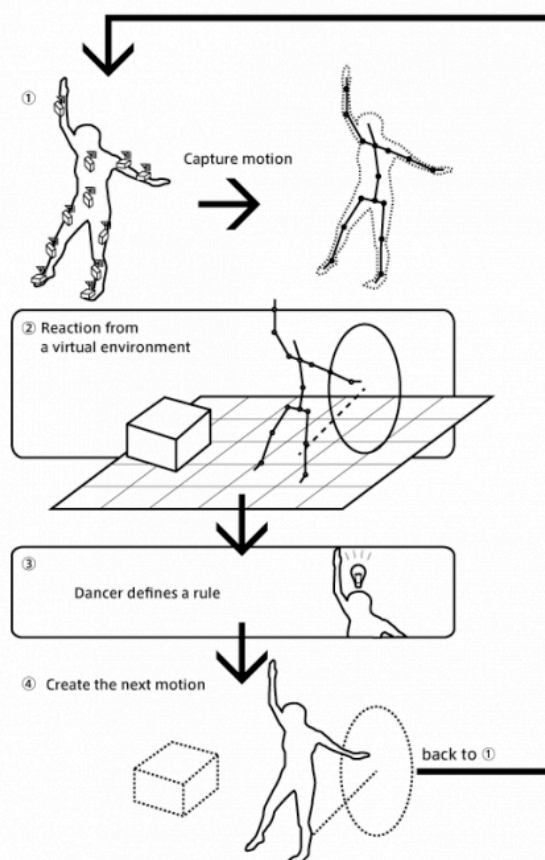

Fig. 9 RAM's conceptual diagram: via Motioner or "Microsoft Kinect™", a computer detects the movements of dancers, collects and converts various relevant information, and visualizes them in the context of the dancer's

body. Processing everything in real time, it allows dancers to decide their next movement, create their own "rule", based on visual, aural and haptic information. Screengrab: http://interlab.ycam.jp/en/projects/ram.

dispositif, and the outside observer wonders what you are affected by. You try to control your breath in order to test your anti-gravitational powers. You become ecstatic or motion-sick. You hear your amplified heart beat. Maybe you want to fly upside down, or your relation to the "space" is unimaginable, unformed, and thus inexplicable. You also cannot control hearing, and thus you are immanently tied to a body dilated from attunement to gestures and motion (regarding space, proximity, proprioceptive direction, awareness of above and below, etc). You become adrift. You are on the moon. This, however, could be mostly an effect of the consensual hallucination in *Osmose*'s VR. The tactile-sonic experience of RAM is more modest, as you remain aware of sound triggers or (as in *Glow)* have no control over sound assets. Regarding *Glow,* and the many instances of rehearsal I remember, the drifting is hard to achieve: the body does not deform. It tends to want to con-form, even if blind, to the rules it knows and the system it remembers. I suspect the choreographic impulse behind *Glow* is a structured improvisation (largely horizontal floorwork) prepared to be "fitting" the graphic animation. Or to describe it from the point of the view of the conturier (programmer) of the gesture follower syntax: based on recognition of the contours of the figure (see the RAM diagram), the conturier is fitting the bespoke projected images according to the pattern cutting (mathematically based on measurements of the figure) and specifications of the dancer. We are thus also in a world similar to Jean Paul Gaultier's cutting edge design (now on view, beautifully orchestrated, at the Barbican Art Gallery (April – August 2014).

The dancer's anatomy, contouriered, remains her destiny in the performance, unless we imagine not noticing the silhouette. At the same time, the affective experience of the moving silhouette on the dancer and her own gestural motion awareness, like the perceptional-cognitive processing that Yoko Ando pulls out of RAM to drive each of her single executable movement options, will not be known to the system. Fortunately, the system does not know what pattern of thought, awareness or emotion underlies the dancer's movement.

NOTES

(1) I first began to write on the *dispositif* during the 2010 Live.Media + Performance Lab which I co-directed with Mark Coniglio at EMPAC (Experimental Media and Performing Arts Center. Rensselaer Polytechnic Institute, Troy, NY). The blog was posted at: http://empaclivemediaperformancelab.blogspot.com/. I wish to thank the participants, as well as all the members of the DAP-Lab ensemble, especially our designer/co-director Michèle Danjoux, for their contributions to the research/performance projects conducted over the past years, in particular the various versions of *UKIYO (Moveable World)*. Danjoux's writings on her design of wearables have been published, for example, in "The Sound of Movement Wearables," *Leonardo* 46:3 (2013), pp. 233-40, and "Choreography and Sounding Wearables," *Scene* 2:1/2 (2014), 197-220. The core concepts of her research, featured also in our new production, *for the time being [Victory over the Sun]*(Sadler's Wells 2014)*,* will be delineated in her PhD thesis *Design in Motion: Choreosonic Wearables in Performance*.

(2) Regarding these scenographic experiments for early modern dance, and the implications for our discussion of equipments and the *dispositif,* see Brandstetter and Wiens (2010), especially Richard Beacham, "Thinking with Things, Speaking with Spaces. The Enduring Legacy and Lessons of Appia's 'Expressive Elements' in the Digital Age," pp. 38 – 59, and Michael Takeo Magruder, "(Re)Configurations of Space and Movement. Performative Extensions of Appia in *Second Life,* pp. 60-75. See also Beacham 2006a and 2006b.

(3) Erin Manning writes poignantly about Marey's graphic "movement machines" and photographic experiments in *Relationscapes* (2009, pp. 83-111), noting that Marey devised new techniques for perception that "in turn became new kinds of sensing machines" (p. 83) able to capture and compose durational rhythms through successive, overlapping images assembled/spread over the photographic plate. For my interpretations of Schlemmer's and Moholy-Nagy's designs, see Birringer 2013.

(4) Regarding the astonishing freedom of spatial imagination in the vast, open Hellerau Festspielhaus architecture, which early on made me think of movement choreography as being enveloped by a transparent "costume" without front or back, without a determined way to be seen or felt, see my reflections on the 1995 *Parsifal* opera installation we created there at the 9th Dresden Festival of Contemporary Music (Birringer 1998, pp. 46-50; 348-51).

(5) For Biloria and Hyperbody (Department of Architectural Engineering & Technology, TU Delft), see: http://www.hyperbody.nl/research/projects/metabody/. The *METABODY* project was initiated in Madrid (July 2013) by a collaborative network of arts organizations and performance companies engaged in a radical rethinking of perception and movement away from the mechanistic and rationalistic tradition towards a (digital) embodiment that puts emergent differentials of bodies and affects in the forefront of its concerns. The *METABODY* project is coordinated by Jaime del Val (Asociación Transdisciplinar Reverso) and encompasses seventeen partners including DAP-Lab, STEIM, Palindrome, K-Danse, Fabrica de Movimentos, InfoMus Lab, Kouros, the Hyperbody Research Group, Trans-Media-Akademie Hellerau, and others (http://metabody.eu).

(6) The idea of sensorial dilation, evoked for me in my study of Appia's spatial modulation, deserves further explication for which there is not enough time here; I learnt the expression in a workshop on dilated bodies conducted by Eugenio Barba back in the 1980s. Karen Barad's notion of "intra-action" deserves mention here as it provocatively riffs on the tired interactivity which has become such a technological vaudeville. Barad suggests that unstable (rather than formatted) "phenomena are produced through agential intra-actions of multiple

apparatuses of bodily production. Agential intra-actions are specific causal material enactments that may or may not involve 'humans'" (2003, p. 817); they dilate – generating differential boundaries – the capturing instrumentations set up to work in particular ways. She implies, therefore, that apparatuses are not necessarily closed but open-ended practices.

(7) Katja Kwastek, visiting the work's installation at the Lentos Kunstmuseum in 2009, patiently describes the interactional behavior of audiences in detail, noting the "material minimalism" of the space and how visitors slowly explore "the effects of different movements" and how sounds were triggered and how they could "catch" them (Kwastek 2013, pp. 234-40). Kwastek is concerned with an empirical approach to interactivity and relationality and thus offers many detailed observations (including audience feedback, interviews) of user behavior in interactive installations. Unlike Popper (2007, p. 271), who disarmingly claims that *Very Nervous System* is not a control system, she is aware that interaction/interactivity is always limiting, yet seeks to distinguish between *interactivity* as a characteristic of certain sensing systems (bearing the potential for interaction), and *interaction* as the actual feedback process itself. What has to be understood as limiting, to her view, is interactivity, even if this characteristic makes interactivity interesting. She also proposes that, instead of perpetuating an earlier 1990s rhetoric circling around expectations of interactivity as implementation of an ideal of collaborative authorship, or the critique of unfulfilled expectations, we acknowledge its foundation on programmable control as a distinguishing feature.

(8) The latter is an undertaking more closely pursued in the computer science community, but the establishment of the International Gesture Workshop (since 1996) and other research projects facilitated by various institutes (IRCAM, STEIM, MIT, XSLabs, KTH Stockholm, YCAM, etc) and featured at regular annual conventions (SIGGRAPH, IEEE, ICMA, NIME), points to a vividly growing international network of research into modelling, analysis and synthesis which most often provides knowledge transfers between scientists and performance practitioners (in some cases with entire dance companies, such as William Forsythe Company, Wayne McGregor's Random Dance, or Emio Greco | PC). See the special issue on "Choreographic Documentation" edited by Scott deLahunta and Sarah Whatley for *International Journal of Performance Arts & Digital Media* 9:1 (2013), and especially Bertha Bermúdez Pascual's essay on Emio Greco | PC, "(Capturing) intention: The life of an interdisciplinary research project," pp. 61-81. The Forsythe Company's collaboration with OSU on the creation of *Synchronous Objects* is documented online: http://synchronousobjects.osu.edu/. McGregor's research with cognitive scientists was recently exhibited in *Thinking with the Body* at London's Wellcome Collection (19 September – 27 October 2013).

(9) During a workshop in Croatia, dramaturge Goran Sergej Pristaš pointed me to Marko Kostanić's "The Choreographic Unconscious: Dance and Suspense," included in the program for BADco's performance of *Semi-Interpretations, or how to explain contemporary dance to an undead hare* (Zagreb 2012). BADco.'s political and dramaturgical interventions into the relations of performance and image are relevant here as they seek to recover and deconstruct early modern choreographic "scores" and enframings, noting how bodies are slowed down when the camera moves and how our attention is conditioned. We had a prolonged discussion about the "responsibility for things seen" and the "actionable image," i.e. the question whether images can have agency. I am redirecting the question here to the role of agency or control of sensing systems in generative real-time capture environments where motion is both

analyzed (by the system) and where the interactor can feel/realize and improvise (dis)alignment from an affective environment.

(10) The MIT List Visual Arts Center offered its 2006 exhibition *9 Evenings Reconsidered: Art, Theatre, and Engineering, 1966* as a critical homage to the original event, featuring the records of 1966 to focus on a ground breaking link in the history of performance, art, and technology. The excellent catalogue of the exhibition was edited by curator Catherine Morris. My reference is to Rauschenberg's original typescript "Instructions and List of Cues to the Group of 500 People" (Morris 2006, pp. 36f).

(11) Naturally, when I first watched *Glow* in 2007, I was sceptical about the hype that Chunky Move had caused regarding its interactive system. The CYNETart 2007 November Newsletter announced that "in most conventional works using light/video projections, the positions and movement sequences of the dancer need to be cued precisely to the space and temporal structure of the video playback. The role of the dancer is reduced to the difficult task of making each performance an exact copy of the original. In *Glow* the machine vision of the software observes and analyzes the performer and reacts to her movement. It thus releases the dancer from restrictiveness and monotony." My impression was exactly the opposite, namely that the downward projection encapsulated the moving body entirely, restricting the dancer to the precise programming feedback/mutations of her largely horizontal motions she was asked to elicit from the gesture follower to maintain the topological logic of continuous geometric variations.

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