Interaction Computer Dance

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INTERACTION COMPUTER DANCE

THE RESONANCE PARADIGM 1900/2000

Martina Leeker

All movement causes oscillation,
yet we lack the ears to hear it.
Marin Mersenne

The subjects of this paper are theater/performance formats of contemporary dance as exemplary instances of the interaction between people and media. Thus, practices of dancing with computers and the generation of music and sound in so-called real-time are interrogated.[1] This entails the discussion of situations where the impression occurs that dancers create "their" own music by their movements.

I intend to consider contemporary practices of dancing with computers in their relation to a highly problematic historical discourse. Central to this discourse is the paradigm of a *resonance between human beings and media* constituted around 1900, which emerges through technical media and within the history of knowledge these technical media are based on. A frame of reference for the *Resonance Paradigm*[2] is the encounter with electricity in the course of electromagnetic research. In this shape, it is the basis of signal theory in physics as well as in the experimental human sciences, the emerging physiology. While many of the phenomena observed in electromagnetic research could not be scientifically explained at the time, they were implemented in technology used by media such as the telegraph or cinematography.[3] This gap between knowledge and technology frames the discourse of an "Aether Physics" influenced by spiritism. Aether Physics provides the foundation for the Resonance Paradigm, which – in turn – produces newly invented, overstimulated "trigger-bodies" (*Schaltkörper*) dancing on the stages of theaters. Crucial for a critical reading of the Resonance Paradigm is the masking and camouflage it provides for an epistemic shift induced by electromagnetic research: from a conduction model of electricity to induction and thus to a notion of signal processing beyond language and meaning. This shift is masked by various suppositions of similarities between human beings, devices, and media on the one hand and the superimposition of the non-human with spiritism on the other hand, thus opening a channel of communication between a para-physical world and humanity.

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1   Good examples of contemporary practice are the works of *blackhole-factory* (2001).

2   Resonance occurs, once at least two entities start to oscillate and once they are oscillating in the same frequency amplify each other's vibration, which presupposes a similarity of the participating entities.

3   About film as scanning and signal processing, see Siegert (2006a) and Herrmann (1996).

1. Resonances in Technical Media around 1900 and the Interaction with Computers

Around 1900, both discourse networks[4] and dance come into the reach of technical media such as phonography, cinematography and telegraphy, which allow the notation of the physically real. All of a sudden, the acoustic and the visual are frequencies. Entities that had been simply non-recordable and in-visible, now take shape according to the properties of new technical media. Simultaneously with these "new" media and new devices, dancers appear whose claim for the practice of dancing rests in their lack of formal training, since this very lack best suits a new kind of dance. Forms of dance emerge which are not touched by language but are constituted by sheer physiology, by a transmission of stimuli from body to body. In this context, dance and music turn into continuous imprints on the physically real and, furthermore, to options for regulating and optimising hitherto uncontrollable, preverbal organicity.

Ma(g)deleine Guipet: Automaton of Reflexes and a Physiological Aesthetics

Madeleine Guipet may well be seen as the defining instance of a new relation between dance and music, created and practiced in the realm of electron physics and spiritism. She leads the way in the transposition of the organic into *technical media*[5], into *trigger-bodies*[6]. Guipet belongs to a group of hysterics, who had become something of the great white hope for an intensification of physical presence and the heightening of physical abilities. The female hysterics are seen as over-stimulated and over-sensitive subjects whose pathological disposition makes them resonate with the whole of their environment. Somewhat drastically, Albert von Schrenck-Notzing, the physician in charge of Mlle. Guipet's therapy, calls her a "somnambulist automaton of reflexes."[7] From the 1870s on, the French psychiatrist Jean-Marie Charcot uses hypnosis, the newly established experimental science, to draw the female medium into a state of trance, thus switching off cognitive control.

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4   The term "discourse networks" has been used to translate Friedrich Kittlers notion of "Aufschreibesysteme" (Kittler 1985) apparently for reasons of resonance with Foucaultian terminology (Wellberry 1992, p. XI). A more literal translation would read "systems of writing down" or "notation systems" (note of the translator).

5   The notion of "technical media" is not meant metaphorically here, but in a very specifically technical sense. Bodies turn into technical media by being defined and addressed by contemporary automatons of experimental physics and physiology.

6   Georges Didi-Huberman (2004, p. 192) introduces this term in his discussions of "Repetitions, Rehearsals, Staging" (pp. 175-257) as elements of the photographic practices in Charcot's Salpêtière.

7   von Schrenck-Notzing 1904, p. 117

In this way, hypnosis turns into a controlling function of the human power plant of hysteria, since it turns the hitherto uncontrollably twitching ladies, who had been interesting for their intensified stimulatedness and sensitivity, into "trigger-bodies" where an archive of gestures and facial expressions could be retrieved and made visible in a precise manner.[8] If the human body had up to his point primarily been the site of language, of the subject and the soul, it now turns into a terrain of technically reproducible command circuits; a constitution that humans share with animals and telegraphs.

Madeleine Guipet is put into a trance on stage;[9] she is exposed to piano music, which – in the eyes of her physicians and her audience around 1904 – forces her to dance like a puppet on strings.[10] The theory explaining this phenomenon claims that the sound of the instrument consists of frequencies, which induce oscillation in the body of the medium, thereby activating programs of stimulation stored in the body as neurological circuits. Madeleine is celebrated as the perfect example of the sensitised body and by extension, of the human potential for retrieving and unlocking ever-increasing powers of perception and knowledge.

In a Nietzschean vein, Madeleine Guipet could be framed as evidence for a physiological aesthetics, an aesthetics constituted beyond language by being a pure transference of stimuli from body to body.[11] Symbolic bodies thus turn into technical media, into trigger-bodies, and this is the final frontier of dance as an art form, since it is not art that is at stake here any longer, but the intensification of stimuli and biopolitics.[12]

Epistemic Shifts: Electromagnetism and Spiritism

Studying the (false) belief in a resonance between people and media, which also echoes McLuhan's notion of "media as extension of man" in mid 20th century media studies,[13] reveals the epistemic situation of the late 19th century. The Resonance Paradigm emerges at a time of revolutionary changes in both physics and media technologies, which in turn foster insecurities and shifts in philosophical and epistemological means and concepts. In my view,

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8   Herrmann 2005, p. 191

9   Bahr 1999

10   Herrmann 2005, pp. 202-211

11   Herrmann 2005, pp. 195-200

12   Hans-Christian von Herrmann notes that this increase in potential has always been a point of entry for biopolitics. If phenomena which had not been measurable turn into subjects for notation, they may also be reproduced and turned into training devices. Evidence for this dynamics may be found in the research and practical methods developed with the cinematograph and chronophotography by Frank Bunker Gilbreth in the context of ergonomics.

13   Leeker 2008

the Resonance Paradigm – fueled by spiritist insanity – bridges two episte-mologies. It serves the purpose of blunting the impact of a cultural revolution by reworking notions of the anthropological[14] and by the "expulsion of spirit" (*Austreibung des Geistes*)[15].

The substantial turn at issue here is based on electromagnetic research.[16] Its initial guiding question was an explanation of electromagnetism in accord-ance with calculable and predictable laws of nature – such as the law of conservation of mass/matter – as they had been known up to this point. The discovery of electromagnetic sparks by Heinrich Hertz (1886-1888) raises issues that cannot be resolved for the time being, since the spark leaps over a gap without being conducted by any materially specified substance. This phenomenon raises not only the all-decisive philosophical issue if and how the universe and the world could still be observed and comprehended. It also raises the question, whether a world in which something belonging to nature can leap may still be explained by one, spiritual, and all-encompassing prin-ciple. If electrons may be waves as well as particles, then – thus the inconven-ient truth – the traditional laws of classical Newtonian physics could perhaps not explain them and neither could they be calculated by a mathematics[17] believing in its reference to the world.[18]

This loss of direct access to the world occurs on several levels. Crucial for an understanding of dance and music around 1900 for instance, is Hermann von Helmholtz' research about the "Sensations of Tone" in the 1870s. It dem-onstrates that it is not the world that is heard but the brain itself, so that the

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14   Siegert 2006b

15   See Friedrich Kittlers *Austreibung des Geistes aus der Geisteswissenschaft* (1980) where he laid the foundations for his media theory, namely the provocative argument of a *mediatechnological apriori of anthropology and culture*. The situation around 1900 is related to this notion, not in terms of media technology, however, but in the practices of camouflaging machines and as a discourse of its own. Major dramaturgical efforts are necessary, after all, to deliver human beings to the machine.

16   Hagen 2005

17   The role of mathematics within the turn to a theoretical physics of approximation and uncertainty relations initiated by electromagnetism can only be sketched here. At first, mathematics obstructs the inevitable paradigm shift. Although its crisis of foun-dation turns it towards a self-referential axiomatic model (Hilbert), mathematics also comes up with the new metaphysical concept of the inclusive calculability of the world. Suffice to mention, that Cantor presented in 1880 the *Mannigfaltigkeitslehre (*known today as set theory), which tries to calculate (aether's) infinity and make it computable. Hilbert's Axiomatic Mathematics, as well as the formal logic that rose from it and became the basis for computers, continue this tradition of abstraction and formalisation towards the ends of calculating the infinite and purely spiritual (and thus of the aether). For an introduction to the interplay of physics and mathematics in the context of spiritist ways of thinking, see Hagen (1995/96).

18   According to Wolfgang Hagen, the discovery and exploration of electromagnetism was a turning point that turned thinking and knowledge away from the philosophy of nature and towards a world of approximations and uncertainty relations, where world and formal systems co-exist side by side.

human body, its nervous system pervaded by electrical circuits, constitutes perception.[19] If we had different ears, brains and nerves, we would be hearing differently. In the wake of Helmholtz, the issue of perception turns from the transport and passage of impulses to their transmission and to induction as an ensemble of triggering events and circuitry within the confines of previously stored programs. It is all about the control and the operation of information.

The phenomenon emerging in the realm of physiology, namely the separation of energy from information, is implemented in the media technologies of telecommunication. The terrain where insecurities raised by the epistemology of electromagnetism crystallise most tangibly is telegraphy, which emphatically articulates the bond between telecommunications technology and Aether Physics – the kind of physics that still believes in the existence of a spiritual and, at the same time, materially tangible soul of nature, despite emerging doubts.

Furthermore, telegraphy demonstrates that in information technology neither ghosts nor energies, neither rays nor currents are being switched, but only information. And similar to electrons, information has no business with the anthropologically meaningful. If Helmholtz had already reduced the sense of tone to electrical impulses whose fate was bound to the facilities of the brain, the separation of energy and information finally creates an empire fundamentally at odds with human facilities of comprehension, since meaning is nothing and signals are all. Any relation of signifier and signified is severed and communication may no longer be comprehended in terms of comprehension but merely as transport of signals.

This new disposition places human beings in an uncertain position between modalities of conduction and switching, between spirit and information – a site emerging from the differentiation of energy and signal, of matter and information in electrical processes. The potentially threatening effect of the electrically electronic media – that is the technical media – is an erosion of the anthropomorphous. They create a realm framed by analogue signals, which could still be human and thus comprehensible (not the least because they make him or her dance), and information, which human beings cannot comprehend any more. Human existence thus turns into a co-existence with self-organising machines and with White Noise, where meaning is either some kind of accident or a result of programming.

It is this situation, where Aether Physics comes to the rescue since it establishes connections between media, physics, experimental sciences and spiritism, which bring incomprehensible media and their momentum of with-

19   For the importance of resonance or "Mittönen" in Helmholtz' psychophysiology of hearing on the basis of soundwaves and Fourier analysis as discrete formations with no orientation in meaning, see Volmar (2003).

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drawal from human comprehension into a horizon of explanation. While this horizon is in itself not rationally comprehensible, (since it operates with phenomena of the extra sensual), it is potent and seemingly salutary for the strain of epistemological shifts. Within the awkward philosophical, theological, and media-technological situation, Aether Physics may be seen as an attempt to provide access to phenomena of electromagnetism no longer or not yet explainable by laws and methods of classical physics. Yet at the same time, Aether Physics claims to have evidence of a "fourth dimension" consisting of rays and fluids endowed with spiritual power, the aether indeed. Thus, William Crookes[20] proclaims:

> It seems to me that in these rays we may have a possible mode of transmitting intelligence, which, with a few reasonable postulates, may supply a key to much that is obscure in psychical research. Let it be assumed that these rays, or rays of even higher frequency, can pass into the brain and act on some nervous centre there. Let it be conceived that the brain contains a centre which uses these rays as the vocal cords use sound vibrations ... and sends them out, with the velocity of light, to impinge on the receiving ganglion of another brain. In this way some, at least, of the phenomena of telepathy, and the transmission of intelligence from one sensitive to another through long distances, seem to come into the domain of law, and can be grasped.[21]

In favour of spirits and ghosts, which may neither be seen nor heard, the leaping sparks – as much as the electrons whose dynamics are as such invisible, yet leave traces of their operations on other, conducting media – are thus denied the status of being real by themselves. This resolves issues arising from the new technical media's seeming abilities to record the physically real itself – as opposed to the semiotic-hermeneutical systems of notation employed by writing and the notation of dance. Thus, the recordings of frequencies of voices, sound and movement in resonance with the human body are displaced into the Aether and explained as phenomena of spiritual and spectral transmissions – all implications of insanity and occult spiritualism included.

Aether Physics in Performance: Occultism and Bodies as Technical Media

The turn in media history and the history of knowledge from the physics of electricity and its epistemology to the era of communications technology

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20   William Crookes was a physicist and chemist. Since he conducted experiments with vacuum tubes, he is widely credited for the discovery of the cathode ray tube. He also experimented with various spiritistic media and was a member of the Theosophic Society as well as president of the Society for Psychical Research. See Hagen (2005) and Siegert (2006c).

21   Crookes 1897, p. 338

and Quantum Physics denies feasibility to traditional concepts maintaining a unified comprehension of and access to the world. Within the confines of this situation, the dancers of hysteria may well be read as bridging a gap between two epistemologies – albeit fuelled by spiritism and insanity. Their cultural productivity derives from their ability to prevent a complete, conceptual collapse of the human being by abolishing the anthropological altogether. The hysteric, musically-induced dancers may well be seen as hinges between energy and information. They are an attempt to conserve some of the Aether, before Axiomatic Mathematics, computers and Quantum Physics turn aside the electrified universe and the anthropological, or rather try to fuse both into the information machine.

Bodies as technical media achieve this delay, yet also break the ground for the integration of human beings into informatics: by the mediation of resonance and embeddedness in a model of oscillation contextualised in the occult on one hand, and by opening a passage towards the discrete, the transformation of the anthropological into information, on the other hand. Bodies as technical media thus provide a training ground for the trespassing of the threshold and simultaneously liquidate discreteness. The technological epitome of this risky position between energy and information is the relay, the switch, separating energy and information.[22] Thus, bodies turn into relays or trigger-bodies. Yet inside of them, information also turns into oscillation, is triggered into resonances with the person and thus its ghostly apparition may still be humanly comprehensible and controllable. That this embodiment of media means to inscribe insanity into media, people and human-media, is the price to pay.

2. Interaction and forced Immediacy: Digital Operations since 1960

As we know from cybernetics,[23] this scenario of camouflaging the history of knowledge, of epistemic shifts and media in the resonance paradigm, continues well after the actual switch to discrete processes in the mid-1940s. Human beings turn into information processing machines and cybernetics rises to the status of an all-encompassing discourse of explanation for humans, animals, learning, society, education, economy and culture.[24] All these entities are similar in respect to the engineered control of self-organ-

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22   Paradigmatic of this function are the relays at telegraph stations. By installing a relay on the side of the receiver, one does not have to send energy any more, but only an impulse, which hits the relay, moves it to switch a battery and thus close an electrical circuit for the transmission of signals.

23   Pias 2003

24   Pias 2004

ised processes following the principles of a formal logic of classification and address-management by means of feedback. In order to explore the architecture of computers but also to construe interplay between bodies, perception and machines, many performances since the 1960s have turned to the Resonance Paradigm. Strategies and approaches that attempt to create resonance by means of camouflage are contemporary additional elements, while historic arguments referring to para-psychological events have ceased.[25] Instead, the technological structure of computers is displaced[26] by connecting electronic processes via imitation to the imagery and epistemology of hysteric media and dancers. This camouflage of the symbolic, universal machine with the aid of electronics has materialised since the 1940s in developments like interfaces and analogue/digital conversions.[27] In addition, there has been a notable stress on *performativity* since the 1980s and more emphatically in the 1990s. Non-permanence, traces, intermedial transmission and transformation have gained importance, and to some extent even turned into ontologies of the technical materiality of computers as well as the anthropological. May we surmise then, that performativity as mediality and mediality as performativity have taken the place of spiritist and occult discourse?[28]

Echoes: The Resonance Paradigm and Contemporary Interactive Performances

As mentioned earlier, contemporary dance performances with computers evoke the impression of dancers creating their own music by means of their movement. While these practices seem clearly opposed to the spasmodic electro-hysteric dance circuitry of the 19th century, they may also be seen as modifications of hysteric dance for the age of the computer. Thus, the dancer is no longer "wired" to the music like Mlle. Guipet, rather it may seem that she or he is in control of the computer. In as much as the computer seems to

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25   If spiritist hermeneutics have been debunked for good, it, however, remains a subject of discussion. Areas of research like *biofeedback*, where the circuitry of the brain is to be made visible, are somewhat suspicious. This practice would have to be questioned for its genesis from theosophical concepts like those of Leadbeater, who assumed different auras of human beings, which materialised in energies and colours.

26   Since the inauguration of cybernetics, this camouflage has lived off its own impossibility, since the analogue data of continuous organic processes cannot be transferred to modes of discrete scanning without considerable friction. Faster computing and scanning are needed, as well as a deception of perception by means of dramaturgies controlling attention and an aesthetics of imitating the electronic. See Hagen (2002a).

27   For a history of the ambivalence of analogue/digital conversion, see Schröter (2004).

28   For a discussion of the introduction of performativity as status of media into media and particularly computer studies via concepts like trace, process, transformation and contingency, see Krämer (1998, 2001). For a critical discussion of performativity, see Winkler (2004).

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transform human movement into the dance preceding its acoustic coding, the impression occurs that the difference between notation and performance as well as the difference between dance and music have finally been overcome, since performance is writing itself down. Dance thus would return to its "essential being" – an ephemeral occurrence in time, which seems to embody processuality and transformation as anthropological ontology. Yet behind this discursive superimposition lures the fact that human beings and computers are fused to *the same* feedback loop.

Performances using so-called image/sound processing in realtime are a case in point. In the realm of media art and performances with media, this setting has been popular since the 1960s. It has meanwhile consolidated into a standard design: analogue sensors gather data of physical systems and, via the MIDI protocol for analogue/digital conversion, a computer calculates this data. In the course of processing, transformations of images and sounds are generated and

Fig. 1. Max/MSP/Jitter patch example 1a

passed on to analogue electronic devices, so that the computed changes are turned into output that is accessible to sensory experience. A program controls the so-called image and sound processing in realtime and this program also creates the illusion of interaction.[29] Since the mid 1990s, the most popular software for this purpose has been Max/MSP/Jitter (Fig. 1 and Fig. 2).[30]
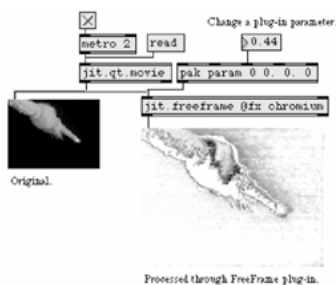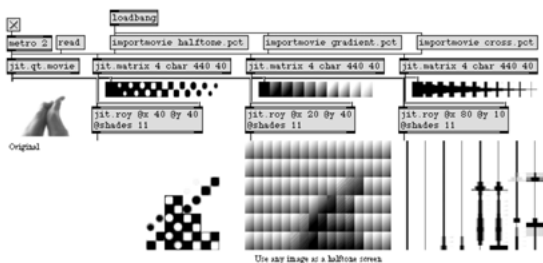

Fig. 2. Max/MSP/Jitter patch example 2

The Resonance Paradigm, based in spiritism and Aether Physics as it is, can hardly be articulated more blatantly. Assisted by McLuhan's notion of media as externalisations and extensions of human beings, these contem-

29   Leeker 2005

30   See <http://www.cycling74.com/products/maxmsp>.

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porary practices pass on the insanity of those dancers in hysteria who connected to machines around 1900.[31]

Technology Suppressed:
On the Difference between Recursion and Mapping

A closer look at the technologies involved however shows that the coding of human motion according to statistical data is thoroughly suppressed in this setting. Suppressed and made invisible is, for instance, that it is the recording of movement with digital videocameras that generates this "music in motion". Video images are read into computers as an analysis of differences to be *mapped* on (pre-)programmed sets of data, which then are turned into outputs of acoustic phenomena. Just like the electrical-electronic experiments in motion research around 1900, this contemporary practice has very little to do with motion. Instead, we face a quite thorough transformation of motion by means of its discrete formalisation. This is not an inscription of motion but the generation of signals being fed into circuits and interfaced with an analogue output. And computers are operating independently from human beings according to protocols of calculation and address-management based on a coding that is self-referential. Computers may – in other words – receive signals and process them, yet they do not compute human beings and the world but – in mercilessly flawless recursions – only themselves.

It is thus not motion captured in sound or codings, but motion disassembled into discrete parameters, which are transcoded to fit the unity of a dataset consisting of zero and one. This data, relayed to units of sound, writing, image, constitutes the output. Mapping is a process quite different from recursion within the autonomy of coding, as it takes place in computers on the level of symbolic calculation. Mapping is trans-coding and thus representation or, differently put, it already has and always will happen in the realm of representation.

Imitation and Interaction:
Electrohysteria and the Camouflage of Technology

The camouflages, suppressions and deceptions practised in these performances are strategies of reconfiguring computers as something they have technically never been. I would argue this reconfiguration of technology as the prerequisite for the association of humans and machines with the Resonance Paradigm around 1900.

To imply that computers and discrete codings are in any way connected to human beings and motion is clearly the product of a discursive inscription,

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31   Leeker 2008

which may draw on the still resonant insanity of resonance between man and media around 1900. The implied recursion[32] turns out to be camouflage, coverage of technology, which in turn allows the discursive production of computers as media by means of aesthetic-dramaturgical practices. The two strategies used in this context are (1) interaction and (2) imitation.

Covering technology creates the (1) aesthetic impression of interaction and the impression of *flow* is crucial in this context. More than anything it is flow, the staged immediacy of a relation between dance and music, that would turn computers towards human beings, by developing and training strategies which transcribe discrete operations into continuous phenomena and perceptions. This kind of imaginary interaction with computers not only blocks its intrinsically time-critical dimension, but also purges constituent elements of digital encoding such as the inclusion of defects from the scenario of signal transport.

This configuration of interaction is finally staged as a resonance between performers and computers by summoning iconographies whose power derives from their traditional embedding in cultural memory. This is achieved by a simple strategy of technical and aesthetic imitation, since the aesthetic design, the output of images and sound imitates (2) the phenomena inscribed or made visible by electro-electronic devices: waveforms, frequencies, distorted sounds, electro-acoustic tonalities, and multiplications of images. This is to say, that these manipulations refer to technologies belonging to the realm of the electro-electronic; they may be generated based on the deflection of electrons and sound frequencies. The analogue surfaces of computers, like screens or – as far as the conversion of analogue data is concerned – the MIDI converter, are used to imitate these manifestations of the electrico-electronic. Performance with computers thus seems to have made little progress since Nam June Paik's practice of an "aesthetics of deflected electrons"[33]. Needless to say, this aesthetics of the electron obscures its sources, operates beneath the surfaces, under the cover of camouflages, and technically speaking is based on discrete coding. It does entail, however, a cultural, electro-electronic re-programming of computers, whose technological sedimentation and implementation may even be observed in devices like MIDI interfaces, sensor interfaces and software environments like Max/MSP/Jitter. Manipulation of signal chains and circuits themselves, however, does not occur at all, or remains the exception.

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32   More precise in terms of technology, we must speak of re-coding. If there were recursion, motion would write itself acoustically without mediation. Yet this only happens, if motion is already available as relay-able, discrete symbolic coding. Motion itself, however, cannot discretely be addressed "directly".

33   Leeker (in print)

Interaction and the imitation of the electro-electronic superimposes the inputs of human beings and machines and thus computers are generated as a continuation of the kind of electro-electronic epistemology of around 1900, described earlier. Where computers are used and thus a technological transformation of flowing energy in digital codings and rhythms of information occurs, these very structures and events are covered. At the same time, the conversion of analogue data into discrete data that separates human beings from machines is buried under this cover.[34] Call it a tactical misapprehension of computers' discrete "nature".

Interactive Performance with Computers, Electro-hysteria and Cybernetics

Interactive performances with computers since the 1960s[35] have thus managed to (re)create the computer from nothing but the epistemology of the electro-physiological experimental settings around 1900. This in turn brings forth cybernetic computing whose "merit" it has been to induce an understanding of human beings as information processing machines and to have liquidated the computer as a symbolic machine.

The crucial aspect of this connection is the inclusion of the human organism in the image of a system controlled by electrical currents and circuits that designs this organism as a control device for integration in cybernetic feedback loops.[36] The electro-hysteric-cybernetic analogy of human beings and computers created by performances are thus of particular productivity. They merge both entities to *one* system, which is to say, that human beings are now part of an autonomous feedback loop of discrete operations – a prerequisite for these two systems to form an interactive relationship at all. Performances thus realise the integrated cybernetic feedback loop for human beings and universal machines, although the latter operate based on invariant chains of symbols.

3. Media Technologies: Towards a History of their Dramaturgy

The history of philosophy and the history of knowledge prepared an epistemological field, which allowed and allows devices, machines and cultural techniques to turn into media. Media emerged and emerge from discursive and cultural "programming"[37], which may crystallise in technologies, as

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34   Hagen 2002a

35   The connection of computers and performance started with the experiments of the artists group EAT at New York during the 1960s. See Büscher (1998).

36   Büscher 1998

37   Schröter 2004, pp. 8-15

demonstrated in the instance of the MIDI interface. Performative techniques, dramaturgies, perhaps the instance of play as such, perception and camouflage are central to this process.

For Media Studies, this may well mean that they must always deal with the performative and that they have to do so in very specific and precise terms. After all, the instances discussed in this paper show that theatrical practices like camouflage, deception, empowerment, mimicry and imitation have been practices of immense power. They managed to reconfigure the computer against its own technological history and thus bestowed it with the potential to create worlds accessible for human beings.

For Theatre and Cultural Studies, these findings suggest approaches that seek proximity to the analysis of technical materialities, since this may well be the only way to retrieve and decipher the discourses and the cultural programming of media technologies – including those by one's own scholarly discipline.

There is little doubt that the interaction with computers in performances is a valid field of research in this context, since it refers to both foundations *and* training within a historical account of the dramaturgy of media technologies. The Resonance Paradigm is a cornerstone of this history, not merely because it continues to resonate in the interaction with computers up to this very day, but also as a cultural technique generating media as well as modes of using them.

Translated by Michael Barchet

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