SIGNALS AND SYMBOLS. A media-archaeological approach to "textuality"

Textuality in the age of digital computation

The media-archaeological walk is from symbolic code to signal indexicality - and back again. This re/turn is, in non-historic terms, „recursion". „Die Wiederkehr als Rekursion" is the title of a (unrealized) sub-chapter (5.3.1.3) of Kittler's planned volume II of *Musik und Mathematik* (book 1, *Roma aeterna*. The age of digital textuality has even lead to the claim of "lossless" copies (and to the legal hybrid of *Originalkopie*).

Symbolically coded recording beats entropy to a large degree: "Which is why anything that ever happened ended up in libraries" <Kittler 1999: 4f>. Foucault, according to Kittler, has been the "the last historian or first archeologist" in a special sense: His use of the term *l'archive* (not to be confused with the institutional archive which is *archives* in French) refers to „the entropy of a post office" <Kittler 1999: 5>.

A title like *Gramophone - Film - Typewriter* addresses the relation between signal-based and symbol-based media.

The early phonetic alphabet with its explicit usage of single letters for vowals to symbolically express the musicality of oral speech has been developed as a kind of *gramma-phoné* but in fact remained type-writing, i. e.: writing in discrete characters. Although this invites to a word play (early Greek writing as a pre-phonographic[1] recording of the spoken word), phonography is not "gramophone". Emile Berliner's name given to his variation of Edison's invention had strategic, disctinctive reasons.

Rather than symbol-writing in printing culture, a real "sense" of time (the tempo*real*) is related to signal recording since the age of the phonograph. Alphabetic writing has not simply been transformed but radically challenged by signal-based recording media like the mechanical phonograph which does not simply record the symbolic value of speech but the physical trace of the actual voice – all the difference between the elementarisation of speech by writing (Aristotle) and the recording of the sub-literal frequencies of actual *parole* (in terms of de Saussure for whom the early phonograph was a decisive tool for linguistic analysis). The ultimate return of symbolic "writing" though takes place within the alphanumerically coded computer.

Alphabetisation of movement: cinematography

With cinematography a similar divide takes place. Even if all the media power of the cinematic apparatus stems from its deceiving human perception to create the impression of continuous movement, cinematography – in spite its „graphic" name - is not steady writing at all, no (kymo-)graphical method of registering varying continuous singnals in Étienne-Jules Marey's sense, but a discrete sequence of photographic stills. This is why Marshall McLuhan still

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1   See Anthony Moore, xxx, in: Siegfried Zielinski / xxx Fürlus (ed.),
    Variantology 4, xxx

subsumes cinematography under the „mechanic" Gutenberg age. Images recorded on celluloid are technically configurated like in printing.

Radical media archaeology vs. contextualism

Media archaeology thinking first of all addresses the structural level of media practice; the governing techno-logical laws, such as Internet protocols or the von-Neumann-architecture of digital computers. Furthermore, it is an aesthetics of anlysis: the "cold gaze" of distanced understanding. Then it is an "archivology", that is: deeply obliged to archival evidence and technological precision (circuit diagrams as source of evidence, f. e.), and finally, it might even result in an art form (as exercised f. e. by Paul de Marinis) which displays media in its archaic basics as opposed to the intangible hiddenness of micro-chip based processes.

In addition, media archaeology is a form of generating knowledge with the media themselves as active agents respectively archaeologists, like digital signal processing which restored early "phonographic" records of John Logie Baird's experimental electro-mechanical television.

It is a gesture of "open source" (de-constructing hardware) not only in the sense of public usage of source codes in programming, but as well in the sense of dis-mantling media from their designed enframing, like "platform studies" perform it.

Finally, media archaeology is an approach close to the materiality of media, here akin to Classical Archaeology which deals with the material remains of a culture (as opposed to philological hermeneutics). But let us not be seduced by the archaeological metaphor. Admittedly, a certain nostalgia for so-called "dead media" (Bruce Sterling) and "the analogue" is a driving bias, but this melancholy should be kept private. Media archaeology is n o t about beginnings, about origins in the temporal sense, but rather about the *arché*, the laws governing media in action. These principles are rather structural than temporal, though it happens that at its emergence a medium most openly reveals its structures before it becomes dissimulated by interfaces.

This is a techno-deterministic, that is: machine- and code-centered form of media studies indeed[2], an archaeological / archivologicalbeing rooted as much in Foucault's definitions[3] as it is connected with Marshall McLuhan's non-contentist media analysis. The field of (new) media theory seems split between two very different approaches: "Media archaeologists, like Kittler, Wolfgang Ernst or Alexander Galloway describe the non-discursive practices of the techno-cultural archive. Media phenomenologists like Katherine Hayles, Tara McPherson or Mark B. N. Hansen analyze how phenomena in various media

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2   As expressed in Wendy Hui Kyong Chun, Introduction. Did Someone Say New Media?, in: New Media, Old Media. A History and Theory Reader, eds. Wendy Hui Kyong Chun / Thomas Keenan, New York / London (Routledge) 2006, 1-10 (4)

3   The archive "governs the appearance of statements as unique events", whereas archaeology "questions the already-.said at the level of its existence <...> and the general archive system to which it belongs": Michel Foucault, The Archaeology of Knowledge, New York (Tavistock) 1972, 129 and 131

appear to the human cognitive apparatus, that is, to the mind and senses"[4] - an epistemological positioning maybe in the best sense of Heraclit's pre-Socratic notion of *harmonía*[5].

In the discussion of, e. g., what is an "image" in the age of new (that is, electronic and digital) media, phenomenology, in an explicit Bergsonean tradition, insists on the coming-into-being of the mediated image in the "enframing" acts of the human bodily cognition.[6] Radical media archaeology as a form of "posthuman cultural studies"[7], rather takes the point of view (*theoría*) of the machine itself.[8] Non-discursive media archaeology (different from, e. g., Zielinski's version of media archaeology, recently re-phrased as "variantology"[9]) is going to the roots (Greek *arché*) in two ways: to the archive (in order to open the time-critical *momentum*[10] and its temporal horizons), and in the sense of the mathematical square root "$\sqrt{}$" as a constitutive force in algorithmic, techno-mathematical media.

Media archaeology exercises a close examination of technical media as they actually operate, while maintaining a hermeneutially distancing look (akin to the "passion of distance" which Friedrich Nietzsche once declaired to be his method of analysis).[11]

Media studies acknowledge both the non-human agencies (Bruno Latour) and their discursive dependencies[12] but tends to privilege rather semiotic than signal-based approaches to technologies. "Software studies" (Matthew Fuller[13])

4   Kjetil Jakobsen, Anarchival Society,, in: Eivind Røssaak (ed.), The Archive in Motion. New Conceptions of the Archive in Contemporary Thought and New Media Practices, Oslo (Novus) 2010, 127-154 (141)

5   His fragment B8 defines the harmonic juncture of the different.

6   Mark B. N. Hansen, New Philosophy of New Media, Cambridge, Mass. (MIT Press) 2004, 13. See Henri Bergson, Matter and Memory, New York (Zone Books) 1988, 35 f.

7   Geoffrey Winthrop-Young, Cultural Studies and German Media Theory, in: Gary Hall / Clare Birchall (eds), New Cultural Studies, Edinburgh (Edinburgh University Press) 2006, 88-104 (100)

8   In their introduction to *Critical Terms for Media Studies* (Chicago 2010), the editors W. J. T. Mitchell and Mark B. N. Hansen take the title of Marshall McLuhans seminal *Understanding Media* (1964) at face value: understanding current culture from the perspective of media.

9   Siegfried Zielinski, Deep Time of the Media. Towards an Archaeology of Hearing and Seeing by Technical Means, Cambridge, MA / London (MIT Press) 2006, and the book series on *Variantology* edited by same author, starting with vilume I (co-edited with Silvia M. Wagnermaier), Variantology. On Deep Time Relations of Arts, Sciences and Technologies, Cologne (Walther König), 2005

10 See Axel Volmar (ed.), Zeitkritische Medien, Berlin (Kulturverlag Kadmos) 2009

11 See Helmut Lethen, Cool Conduct: The Culture of Distance in Weimar Germany, Berkeley / Los Angeles (University of California Press) 2002

12 As an exemplary study from the German side see Cornelius Borck, Hinrströme. Eine Kulturgeschichte der Elektroenzephalographie, Göttingen (Wallstein) 2005; same author: Electricity as a medium of psychic life. Electrotechnical adventures into psychodiagnosis in Weimar Germany, in: Science in Context vol. 14 (2001), 565-590

13 See Matthew Fuller (Hg.), Software Studies. A Lexicon, Cambridge, Mass. / London (MIT Press) 2008; Jussi Parikka, Digital Contagions. A Media Archaeology of Computer Viruses, New York et al. (Peter Lang) 2007

and "platform studies" (Bogost / Montford), and a refreshed materialist (forensic) approach[14], links both cross-Atlantic schools.

Siegfried Zielinski, in his book (Berlin 2012) *Jenseit der Medien* ("beyond media"), argues for a "philology of material things" - a reminder of the term "monumental philology", once coined by Eduard Gerhard for the method of classical archaeology in the 19th century. To analyse a material technical artefact in its own terms (as *monument* in terms of Foucault) differs from deriving this evidence from the accompanying texts - unless reading circuitry diagrams. As a partial off-spring of the literatures department, media archaeology practices techno-material and techno-mathematical philology, material *aisthesis*. Sobchack even identifies the archetypal *emplotment* of media archaeology as still adhering to the historicism of the post-enlightenment Romantic age: the preference of ancient artefacts and the desire to re-vive them (first by literature, later by film).[15] It is on the argumentative level that media archaeology differs from the discourse of history: "Unlike contextualism, media archaeology's aim is to set these objects a spotentially *transhistorical* - that is, not necessarily context dependent."[16]

Different, non-textual shapes of time

Symbolic (textual) writing of "historical" time differs from actual signal-based time-writing. A science of signals from the past which has opened a new field of memory research (not just as an additional source for historical inquiry). With photography, the phonograph, and electro-physiology an alternative agenda has been set. So-called Humanities (as defined by Wilhelm Dilthey) have not been concerned with the physically real - due to the limits of hermeneutics as text-oriented method, to the privileging of narrative as dominant form of representation and because of an essential lack of non-symbolic recording media. Battles have been described and interpreted, but the real noise and smell of a combat could not be transmitted until the arrival of the Edison phonograph.[17]

After Second World War, that is: in an epoque "in which time has been torn into fragments"[18] (leading Deleuze to his diagnosis of the "Time Image" in post-war cinema), McLuhan's academic teacher Harold A. Innis published his collected

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14 See M. Kirschenbaum, Mechanisms. New Media and the Forensiv Imagination, Cambridge, MA (The MIT Press) 2008

15 Vivian Sobchack, Afterword. Media Archaeology and Re-presencing the Past, in: Erkki Huhtamo / Jussi Parikka (eds.), Media Archaeology. Approaches, Applications, and Implications, Berkeley / Los Angeles / London (University of California Press) 2011, 323-333, referring to Hayden White, Metahistory. The Historical Imagination in Nineteenth-Century Europe, Baltimore / London (Johns Hopkins University Press) 1973

16 Sobchack 2011: 329

17 See Bernhard Siegert, Das Leben zählt nicht. Natur- und Geisteswissenschaften bei Dilthey aus mediengschichtlicher Sicht, in: Claus Pias (ed.), Medien. Dreizehn Vorträge zur Medienkultur, Weimar 1999, 161-182 (175), referring to: Wilhelm Dilthey, Die Abgrenzung der Geisteswissenschaften. Zweite Fassung, in: same author, Gesammelte Schriften VII, 311

essays *The Bias of Communication* (1951) where he confesses his philosophy of history as a kind of discretely woven time-image: "It is assumed that history is not a seamless web but rather a web of which the warp and the woof are space and time woven in a very uneven fashion and producing distorted patterns"[19] - an interlacing of kairotic moments (*kairos* nominating the „just moment" in weaving) rather than smooth development, closer to the delicate synchronization of TV or video lines than to the linear layout of a printed text.

Still textuality, but organized in non-linear ways

The non-discoursive operators and operations of technological media can not be communicated in the form of textual stories.

As lamented by Henri Bergson, the process of "spatializing time" which is a by-product of chronophotography, the mechanical clock (Heidegger's "vulgar time") and mathematical *analysis*, transformed the nature and experience of time as duration and flow, replacing it by the quantification (mathematization) of time into a static, spatial, divisible entity.[20] Logical electronic circuitry is text under current. In a way, only with the arrival of techno-mathematical notation systems which are numeric rather than alphabetic, true textuality takes place in the cultural engineering, resulting in time-discrete media tempor(e)alities

What happens to text in the age of computer-based literacy?

While for human reading, minor corruptions of a single letter mostly do not seriously affect the meaning, the hidden textuality of computer programs ("operative texts") is highly bit-critical. An algorithm might be reduced to shere logical textuality; its material implementation as a computer program, though, is in the (physical) world and thus subject to temporal (entropic) and time-critical ("kairotic") noise. The value of magnetically stored information is vulnerable to physical disturbance. All of the sudden, traditional textual criticism (as known from close examination f. e. of medieval parchments) is required on the level of hard drives in computers again - as argued by Matthew Kirschenbaum's *Mechanism*. Textual studies can be extended to "textual forensics"[21], taking the physical embodiment of texts on paper and in books further to the analysis of its media-archaeological sitatuations.[22]

The curator of the department *Computing and Control* at the National Museum of Science and Industry in London, Doron Swade once described the situation.[23] Software is a cultural artefact, but no material object any more, since it unfolds only in performance, that is: algorithmically. Software belongs to the "generic

18 Harold A. Innis, the Bias of Communication, Toronto / Buffalo / London (University of Toronto Press) [*1951] 1995, "Preface", xxviii

19 Innis 1951/1995: xxvii

20 See Mary-Ann Doane, Does time become Space?, in: Liv Hausken (ed.), Thinking Media Aesthetics, London (Routledge), forthcoming

21 D. C. Greetham, Textual Forensics, in: PMLA, January 1996, 32-51

22 Matthew Kirschenbaum, Mechanisms. New Media and the Forensic Imagination, Cambridge, MA (The MIT Press) 2008

23   Doron Swade, Collecting Software: Preserving Information in an Object-Centred Culture, in: History and Computing, Bd. 4, Heft 3 (1092), 206-210

objects (media)"[24]. A computer which only passively is on museum display is not in any "medium" state; it is much more of a challenge to display its time-critical and bit-critical data processing - maybe by transposing them into acoustic frequencies which can be literally „understood" by the human ear - a sonic computer museology. "A piano score, even a 19th century one, is software when its instruction code can be executed by a human pianist as well as on a player piano."[25]

So-called Software Art is embedded in a long tradition such as combinatorial poetry[26] with its inherent desire of the self-executable text; Lucretius' scientific poem *De rerum natura* which is not only written in alphabetic letters but makes them represent the literary „elementary" moves of nature itself. This tradition is continuing with Raimundus Lullus' textual knowledge machine in the Renaissance. But the inherent textual desire of becoming performative itself only materialized with the algorithmic Turing Machine which takes its origin in textual operations literally by providing moves like "read" and "write", on the basis of a kind of typewriter dispositive reduced to two (thus binary) keys and an ink ribbon extended to infinity - the endless tape to write upon and to read from (reminding of the magnetophone tape which co-originated in Turing's time).

If software is defined as executable formal instructions, logical scores, "[t]he first, English-language notation of the Dadaist poem qualifies as software just as much as the three notations in the Perl programming language. The instructions only have to meet the requirement of being executable by a human being as well as by a machine."[27] "The Perl code version of a Dada poem "can be read and executed even without running it on machines" (Cramer ibid.), with the human becoming a "paper machine" in such an algorithmicized reading state (Alan Turing 1937) at that moment. But be it human "brainware", pencil and paper, or hardwired electronics: there is no software in operation without the physical medium it runs on. The link to the physical world insists, the necessity of material implementation of all logical systems in order to become dramatically active. Symbolical analysis ("Schaltalgebra") in itself can not operate, only when being implemented into swichting circuits (like electro-magnetic relays).[28] There is a crucial difference between the mathematical model of a logical machine and the really implemented machinery called "computer" today which brings time as a critical parameter into the event. Even mental processes depend on their implementation in bio-cybernetical hardware (neural synapses).

Like Foucault's example of the difference between a mechanical keyboard of a typewriter and its representation in a handbook, printed computer code in programming handbooks "rarely ever executed on machines, but provides examples which readers follow intellectually, following the code listings step by step and computing them in their minds."[29] This concerns the critical edition of

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24 Swade 1992: 208
25 Cramer 2002
26   See Florian Cramer, xxx
27 Cramer 2002
28   See Claude Shannon's master thesis: A symbolic analysis of switching relays, in: xxx
29 Cramer 2002

Friedrich Kittler's code *Manual* which remains on the hard drive of his computer in the Kittler estate. A media philology of Kittler's self-written source code can not be limited to human reading, asks to be but read operatively, executed by the machine. "Usually, hard drives of scholars in the Humanities end up as dead media and are perceived as mere storage units of texts that continue to exist on paper. Friedrich Kittler's UNIX system, however, forms a living entity, in which text, source code and executable programs produce a consistent system of philosophical and scientific invention, rather than just an inventory of data."[30]

The term "archaeography" is meant to indicate alternative models of writing the being of technologies in time: their governing principles, their archaic essentials, their variabilities and invariances. For early computers, software execuation oscillates between the real (hardware) and the symbolic: One welding point in wiring failing or one bit wrong and the system crashes. "In archaeological terms the operational continuity of contemporary <"text"> culture cannot be assured."[31]

For a long interval of culture, there have been just symbolical, not technically real means of storing, ordering and administrating physical time signals. There were just alphabetic texts, musical scores, mathematical algorithms. On the contrary, "whatever ran as time on a physical or (again in Lacan's terms) real level, blindly and unpredictably, could by no means be encoded. Therefore, all data flows, provided they really were streams of data, had to pass through the bottleneck of the signifier. Alphabetic monopoly, grammatology."[32]

Latin language is clear on that: *res gestae* (what actually happens) differs from the *historia rerum gestarum* (the narrative). The dichotomy between signal-processing and merely symbolic time-writing became (again symbolically) suspended with Leibniz' differential calculus - the mathematical analysis of physical dynamics itself. Such a symbolic machine equals its material implementation (the turingmachine).

The media-induced temporal affect

A "museum" technology from the past, when being functionally re-enacted in the present, is suspended from history. "In einer materialistischen Untersuchung wird die epische Kontinuität <...> in die Brüche gehen"[33], Benjamin concludes almost in media-archaeological terms, in favor of a short-circuiting Now-ness („Jetztzeitigkeit") where antiquity (the *arché*) becomes co-original to the presence: "So war Robbespierre das antike Rom eine mit Jetztzeit geladene Vergangenheit, die er aus dem Kontinuum der Geschichte heraussprengte"[34] - a kind of chrono-cinematographic cut-up or *montage* indeed. "If the film called history rewinds itself, it turns into an endless loop."[35]

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30 Draft of talk Paul Feigelfeld to Yale University conference *Beyond Textuality*
31 Swade xxx: 209
32 Friedrich Kittler: Gramophone - Film- Typewriter, Stanford UP 1999, Introduction, 4
33   Walter Benjamin, Gesammelte Schriften, Frankfurt/M. (Suhrkamp) 1972-1989, vol. I, 1252
34 Benjamin, GS, vol. I, 701
35 Friedrich Kittler: Gramophone - Film- Typewriter, Stanford UP 1999, Introduction, 4

The symbolic regime allows for time-reversed operations (which for the regime of alphabetic letters G. W. Leibniz defined in his thought experiment as *Apokatastasis panton*[36]). This concerns the level of human interaction with physical time (aka "history"). Media archaeology rather focuses on inherent media temporality - below textuality, the subliminal tempor(e)al affects induced by machines. While film philology argues in terms of image sequences, media archaeology concentrates on the single frame which just for a fractal of a moment appears to the eye and to (subliminal) consciousness. "Das wahre Bild der Vergangenheit *huscht* vorbei. Nur als Bild das auf Nimmerwiedersehen im Augenblick seiner Erkennbarkeit eben aufblitzt, ist die Vergangenheit festzuhalten."[37] At first glance this analysis seems to refer to the material film frame which at the moment of projection indeed is being arrested for a fraction of a second in order to evoke the physiological after-image in the eyes of the audience. But by naming the temporality of lightning, in fact Benjamin already implicitly describes the aesthetics of the electronic television image (just emerging at his time) - a regime of electrified *Weltbilder*. In the most literal sense Adorno during his work at the Princeton Radio Reseach Project summed up this tele-presence („live" signal transmission) under the title *Current of Music*. The temporality of the television and video images with its 64 micro-seconds per line is much too time-critical to be physiologically noticed by the human perception at all, different from the 24 frames per second for cinema which still can be detected as a subliminal massage and of what Leibniz' had termed *petits perceptions*.[38]

Not just different histories, but different from history: signal-based tempor(e)alities

The signal-based chrono-sphere is alienated from history. Alphabetically coded documents of and on an era, made accessible by lists, card-indexes, computer catalogues, together with material kinds of reading equipment which constitute a "time machine"[39] - but only in a symbolic way. Only when signals instead of symbols become the basic operators (which is true for classical "analog" media technologies, ranging from telegraphy to radio and television), a different temporality takes place (as known from "live" transmission which is electro-physically authentic, even "indexically" true to physical time (in Thomas Levin's sense, as opposed to pre/calculated "real time" windows of presence). Signals are (electro-phyiscally called) "time signals" in most cases, with t as the constant parameter). As opposed to mere written or printed characters, signals take place in time itself.

Audio-visual media address humans at the existential level of affective sensation of being which is the temporal sense. They re-generate temporal experience by addressing the human on the sensory (aisthetical, physiological) level as radically present, while mental cognition distances it into a "historical" con*text*.

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36   xxx

37 Benjamin, GS, vol. I, 695

38   See Maurizio Lazzarato, Videophilosophie, Berlin (b_books) 2002

39   Tjebbe van Tijen, We no longer collect the Carrier but the Information, interviewed by Geert Lovink, in: MediaMatic 8#1 <Jahr???>

Conflicting archival tempor(e)alities: Symbolic order *versus* indexical signal

As symbolic order which, according to Lacan, always already implies the machinic[40], archives are no time machines at all. They need external temporalization to generate a sense of history. While the traditional archive consisted of predominantly textual records providing a frozen spatial order which could only be transformed into "history" by the very act of historiography, the audio-visual records - when operated within machines - take place in time itself, different from the scriptural regime.

"Bias" originally is a technical term in electronic engineering describing the necessary basic electric voltage to operate a vacuum tube (esp. triode) - a pre-condioning, a ground tension for making the circuitry work at all, an electric *a priori*.[41] In terms of Harold Innis, the archive belongs to the tools of empires which are temporally "biased"[42]; it has to be temporally charged or rather "biased" in order to become a memory base.

As long as the archival records consist of strings of symbols (i. e. alphabetic writing), a cognitive distance - in spite of the auratic qualities of handwritten manuscripts or autographs - is more or less being kept, since an act of decoding has to take place which involves the cognitive apparatus. But once photography, the first medium in its modern sense, entered the archive, the sense-affective, presence-generating power[43] of signal-based media cuts short the temporal distance in favor of mnemonic immediacy - the photographic *punctum* (Barthes), chrono-electric *choque* (Benjamin).

Negentropic encoding

Once a cultural message has been transduced into the symbolical code, such as a musical score from the hands of Mozarts, it can be transmitted with a high degree of fidelity in copying, regardless the material support[44]; like the genetic code), especially the phonetic alphabet, is mostly invariant towards historical, i. e. entropical time. Digital data is just a special case of such alphabets. Documentary science has developed the notion of „logical preservation"[45]. But any information must take place in or on a material support which introduces another, different tempor(e)ality. Does the concept of „information" (which is

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40 See Friedrich Kittler, [Ordnung des Symbolischen / Welt der Maschinen], in: same author, Draculas Vermächtnis. Technische Schriften, Leipzig (Reclam) 19xxx, xxx-xxx

41 For magnetic recording, the "bias" names the pre-magnetization of the tape by hight frequency signals to ameliorate the signal-to-noise ratio (dynamics). The proper informative time signal thus is overlayed or pre-conditioned by a different *a priori* temporality.

42 Harold Innis, The Bias of Communication, University of Toronto Press 1991

43 See Hans Ulrich Gumbrecht, Production of Presence. What Meaning Cannot Convey, Stanford University Press 2004

44 See Rudolf Gschwind / Lukas Rotenthaler (interviewed by Ute Holl), Migration der Daten, Analyse der Bilder, Persistente Archive, in: Zeitschrift für Medienwissenschaft 2, 1/2010, 103-111 (104)

45 Hans-Joergen Marker, Data Conservation at a Traditional Data Archive, in: Edward Higgs (ed.), History and Electronic Artefacts, Oxford (Clarendon Press) 1998, 294-303 (296)

measured by the binary digit) dispense with the material link? To what extend is software independent of the carrier used for transport?[46] In order to be executable, any algorithm has to take place in matter - even if this is just paper. The metonomy which takes the Floppy Disc as a material support for the software itself is a hint to the material link.

Retextualizing the sonosphere: digitized sound

There is an implicit "sound" of the temporalized archive. For the electric age Marshall McLuhan identified a „culture without writing"[47] which he calls „acoustic space". Against the immediate impression, this expression does not simply mean sound and music, but a specific form which he correlates with the electronic media sphere - the sphere of resonances. Thus a different kind of tempor(e)alty is introduced, resulting in a different *media theatre*. To conceive the operational theatre not from the optical-perspective but from the acoustic dimension opens access to the awareness of time-based and time-critical processes - the signature of high-technological media.[48]

In a variance of the notorious *incipit* of Kittler's *Gramophone* book, media determine our *temporal* situation. When coupled to technical media interfaces, humans are being placed in a different temporal "situation" than normally experienced. In alliance with Günther Stern's (alias Günther Anders) unpublished habilitation from around 1930 *Philosophische Untersuchungen über die musikalische Situation* the question arises to what degree operative media („im Vollzug") perform *ekstasis* of (or: from) historical time.[49]

What is called "Hörspiel" as an art form in German, the radio play, in the anglophone world is often called "radio drama"[50]. This is still oriented at the definition of drama as literary script, logocentristic (orientated at literature), as opposed to a radical different approach which is medium-centristic (radio-phonic)[51], the acoustic-based "Schallspiel" (Friedrich Knilli)[52] which dramatizes the signal materiality of radio transmission - a genuinely media-dramatic approach.[53] McLuhan defined the (literally) „current" state of media-induced communication as "acoustic space", since the ear perceives signals simultaneously (which indeed is the implicitely sonic situation of electro-magnetic waves as well). Such signals are beeing processed in the right

46 Doron Swade, Preserving Software in an Object-Centered Culture, in: Higgs (ed.) 1998: 195-206 (195)

47 See Herbert Marshall McLuhan, Kultur ohne Schrift, in: Martin Baltes / Fritz Böhler / Rainer Höltschl / Jürgen Reuß (eds.), Medien verstehen. Der McLuhan-Reader, Mannheim 1997

48 Frank Hartmann, Instant awareness. Eine medientheoretische Exploration mit McLuhan, in: Soundcultures. Über elektronische und digitale Musik, hg.v. Marcus S. Kleiner / Achim Szepanski, Frankfurt/M. (Suhrkamp) 2003, 34-51 (35)

49 Siehe Veit Erlmann, Reason and Resonance. A History of Modern Aurality, New York (Zone Books) 2010, 325f

50 See Tim Crook, Radio Drama. Theory and Practice, London / New York 1999

51 See Friedrich Knilli, Das Hörspiel, xxx

52 See Elke Huwiler, Sound erzählt. Ansätze einer Narratologie der akustischen Kunst, in: Harro Segeberg / Frank Schätzlein (eds.), Sound. xxx, Marburg (Schüren) 2003, 285-307

53 Klaus Schöning, Zur Archäologie der Akustischen Kunst im Radio, in: WDR (ed.), Klangreise. Studio Akustische Kunst: 155 Werke 1968-1997, Cologne 1997, 1-11

hemisphere of the brain, as opposed to the sequential processing of signals in the left hemisphere which has been privileged since the invention of the phonetic alphabet for processing of information. Beyond the *Gutenberg Galaxy* as described by McLuhan 1962), with "live" signal transmitting electronic analog media, non-Euclidian temporal synchronicity has emerged.[54] With contemporary realtime data processing, however, "textuality" returns in algorithmic computing more strictly than ever.

Active media archaeology (such as the opto-electronic reading of otherwise unaccessible groves from recording) retrieves past sound signals by digital sampling and quantification. Thus, was appears to the ear like the restituted sound, in fact is already the function of a mathematical matrix. The digital *close reading* of sound dissolves any signal into discrete blocks. Digitized signals resemble the tradition of music notation; they wait to be algorithmically executed. The textual regime returns in alphanumeric codes. Algorithmic archaeology is the return of textuality in the representation of the past, but this time, the text itself becomes media-active - a kind of operativity which the handwritten or printed text never knew.

Im/mediacy: towards a dynamic technology of image retrieval

It is possible, in the age of high-frequency computing, to navigate through large amounts of data below orientation at verbal language. There is an im-mediate access to data patterns, unfiltered by metadata. Expressing texts, sound and images in numerical or logical values subjects all phenomena to the turingmachine. As expressed by Vilém Flusser for the "technical image", all continuous signal-systems thereby becomes divisible into discrete units which can be transmitted and reproduced as code.[55] But what is an image in computable space: a set of data, a format, an „epistemological thing" (Jörg Rheinberger)? From the media-archaeological point of view, such an "image" is just a visualisation of what been translated into a two-dimensional mathematical matrix (just like the sound from a CD player is nothing but a sonification of a serial array of binary data, that is: square-shaped signals). This symbolisation in form of bits, while being an abstraction from the real world, does not mean though that the relation between the information and the physical world has become purely arbitrary. When analog signals from the physical world are being sampled (i. e. time- and value-discretely quantized), the resulting strings of bits ("words") as still quasi-indexically shaped by the original physical event which, in the case of digital visual recording of dance, is the moving bodies.

At what moment is such a set of data interpreted as a cultural image? By the agency of human perception only, by verbal description (*ekphrasis*), or independent from human awareness already? Without human interpretation of certain visual patterns, the image would just be a cluster of data. Optical signals become information in the eye of the human beholder only, while the computer can deal with the symbolical analysis of such data without the imaginary.

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54   See Tony Schwartz, The Responsive Chord>, New York (Zone) 1974

55   See Vilém Flusser, Für eine Philosophie der Fotographie, Göttingen (European Photography) 1984

What digital space allows for instead is the option of navigating images in their own medium - without changing the channel from visual to verbal language. In digital space, the task of *searching images* does not only mean searching for images, but has a second, reverse meaning as well: movement sequences can be automatically matched to similar movements, without the interception of words. This is dynamic navigation in *Dataland* (as designed in 1973 by William Donelson), not in the alphabet or in dance notation. Different from printed letters in a book, the symbols in digital dataland are arranged and distributed algorithmically - a dynamics which matches the kinetic nature of orderly movement itself.

One moving image sequences have been digitized and subjected to compression for economic storage and transmission (such as the MPEG or MP3 standard), for humans it is not possible any more to interface to movement for analytic use. Visual knowledge does not arise from meta-dating only, but from within the visual endo-data: entering movement immersively. As observed from the computer, kinetic information generates a kind of second-order visual knowledge, cartography, diagrams - infomapping. A critique of the notion of „meta-data" draws on the assumption that there is knowledge already within the images, a kind of knowledge which either does not need to be meta-dated or can not even be grasped by verbal description at all - *endo-data*. Let movement be informative itself - by means of operating with values that are, already, intrinsic to the recorded movement. Such insights can be teased out once the operative unit is subjected to algorithmic data processing.

Any „digital image" is an image no more in its emphatic cultural, phenomenal sense; what looks like images to humans, for the computer is rather a function of mathematical data sets. The media-archaeological hypothesis reads like this: There is a knowledge already implicit, „dormant" within the electronic images, which - independent from external descriptions (metadata) - waits to be un-covered from within. Digital data banks of moving images, when cleverly adressed, render a kind of knowledge which would otherwise be unimaginable. Digital images render aspects of visual knowledge which only the *medium knows*, virtually in the „unconscious" of the data-bank. Different from media phenomenology which is still oriented at human perception, the media-archaeological program is to uncover inherent *virtual visual knowledge*.

Navigating digitized cultural items is possible by means of their numerical addressability, independent of verbal meta-dating. Most video extraction in archives of moving images is not based on the single frames (like in post-production editing tools like AVID) or even picture elements, but on whole image sequences. The computerization of such media archives now promises to decipher them as algorithmicised data sets, as clusters of pixels and colour values, edges, curves, sonic timbres. Strings of textual symbols, images and sounds have become calculable and thus capable of being exposed to pattern-recognition algorithms. Such procedures will not only media-archaeologically "excavate" but as well *generate* unexpected perspectives from an audio-visual archive that can, for the first time, organize itself not just according to meta-data but according to its proper criteria - visual memory in its own medium. Contrary to traditional semantic, musicological or iconological research in the history of ideas, such an endogenic visual archive will no longer list images and

sequences according to their authors, subject, and time and space of recording. Instead, digital image data banks will allow visual sequences to be systematized according to mathematical rather than narrative *topoi*, revealing new insights into their informational values.

Algorithmic search operations remind of the methods of the info-brokers of early modern science. Collectors in the 17th century imposed structure on the apparent disarray of the phenomenal world by searching for correspondence among the otherwise jumbled elements. This aesthetics was based on visual patterns rather than on verbal classification: "Their patterns are to be read as comparative contingencies or juxtapositions, as a system of potential *matches*.[56] Claire Preston identifies an early modern version of field theory and chaos theory in Montaigne´s observation that "toutes choses se tiennent par quelque similitude"[57]: Similitude binds everything together. Is it this where the Renaissance and modern computering meets? Even for sophisticated forms of visual rhetoric the computer is capable, identifying the whole of an object from the sight of a part of it. With the "deep learning" concept of recursive "big data" processing, the computer has been trained to spot associations between seemingly unrelated pieces of information and derive generalizations on the basis of new protocols.[58]

Art historian Aby Warburg, between the two World Wars, made an attempt at a serious memory game. He assembled an atlas of artistic gestures of passion in the Occident based on photographic reproductions exclusively. Warburg aimed at a kind of sub-conscious visual cultural memory. Although this project looks primarily iconographic at first glance, its coupling with digital image-sorting programs nowadays opens genuinely new perspectives - a productive tension between the traditional image content and a media-archaeological approach where the reproductions, built from numbers, can be constantly re-arranged, re-configurated and re-calculated from within. For the epistemological analysis of the techno-logical "within" and "inbetween", media studies takes over from the humanities.

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56 Claire Preston, In the Wilderness of Forms: Ideas and Things in Thomas Browne´s Cabinets of Curiosity, in: Neil Rhodes / Jonathan Sawday (eds.), The Renaissance computer: knowledge technology in the first age of print, London / New York (Routledge) 2000, 170-183 (174f)

57 Michel de Montaigne, Oeuvres complètes, ed. Albert Thibudet / Maurice Rat, Paris (Gallimard) 1962, 1047; see N. Katherine Hayles, The Cosmic Web: Scientific Field Models and Literary Strategies in the Twentieth Century, Ithaca, NY (Cornell UP) 1984

58 See Duncan Davies, Diana Bathurst u. Robin Bathurst, The Telling Image. The Changing Balance between Pictures and Words in a Technological Age, Oxford (Clandendon) 1990, 64 f.